**Options for Defining Monofloral Manuka Honey Submission**

It is good to see some recognition of the problems facing the Manuka honey industry. Methylglyoxal can be manipulated by DHA feeding or adulteration and Methylglyoxal directly added to honeys. I understand there is confusion around Manuka and Kanuka pollen identification. Manuka honey can be blended down overseas and still be called Manuka honey depending on percentages and label laws. It is a serious issue for the Manuka honey industry. And New Zealand's food reputation.

My submission is that 1/ All Manuka honey is packed (meaning retail packaging) in New Zealand.

2/ Mandatory 100% New Zealand honey on labels.

3/ GMO Free on all New Zealand honey (reason is most cheap honeys used for blending come from countries with GM crops) NZ has no GM.

These three suggestions will not add too much cost to industry and help support the industry until science is established around Manuka honey profiling. And help protect NZ reputation.

Look forward to hearing back from you.

Yours Sincerely

-ends-

11 September 2013

Some years ago we were told that there was no Active Manuka honey in the South Island buta tested manuka honey from all our Manuka sites and only one had activity below 10%.

Since then I have had our manuka honey analysed and found it had traces of gold in it, and manuka honey from areas with gold in the soil also were active. I have the un-proved theory that there is some relationship between gold and activity. Perhaps we should have tested for Silver as well as silver has proven antibacterial properties.

One problem relating to purity is the reliance on pollen analysis. The extraction methods in essence release stored pollen from earlier flows and these affect the results if a "percentage" system is used. The only way pollen counts could be used is if

it was determined the number of manuka pollen grains per gram was determined and this compared with the honey in question.

However this will not work as bees collect very little pollen from manuka and a lot from kanuka, which does not let you determine the manuka purity.

Beekeepers often do not know the difference between Kanuka and Manuka honey that they are producing. Kanuka has a sharp after taste while Manuka has an aromatic after taste. To confuse things more, Manuka yields better if the soil is wet and Kanuka if the soil is very dry. Consequently if both types are present the honey produced can be quite different depending on the season.

During recent years the analysis for Activity has been less dependable than earlier. I have sent identical samples to three different labs with quite different activities. I get the impression that some groups are trying to discredit other's activities.

At the same time I know many beekeepers add perhaps 30% of other honeys like Kamahi to their manuka to increase their revenue.

Also a big overseas buyer of manuka honey has had problems with the addition of artificial MGO's, excessive heating to increase the Activity etc.

With our Manuka honey production we treat each comb individually rather that a super at a time. We examine each comb and open several parts of the comb to determine if it is good manuka based on colour, jelly nature etc and if the honey is not uniform the comb is rejected and added to our bulk honey extraction.

Pure combs of manuka are then scraped to the foundation midrib and the results pressed out. The resulting honey is then very uniform in nature with the proper manuka nature. All buyers want as much as we can offer.

Because of the variable analysis, we do not sell on activity. Just sell it as Manuka honey leaving it for the buyers to choose who to test it for them. Most results now come out below 10% in contrast to what found in the past.

As Doctor Molan came up with the original testing idea, I would like to see his Gold Standard being accepted as the correct method to give uniformity to the manuka industry.

One problem I can see coming up is that some people are starting to sell on Total Activity which is confusing the buyers who are assuming it is the Manuka Activity.

There needs to be a distinction between the two.

-ends-

To whom it may concern,

In regard to the honey submissions currently being lobbied via various parties with vested interest in promoting agendas that support their business interests I feel several salient and validated points must be recognised in order to contextualise what is best for the NZ honey industry.

Firstly - the antimicrobial effect of UMF (NPA) Manuka honey is widely recognised and scientifically supported.

However, what is not widely promoted by UMF and Methylgloxal advocates is the inherent dangers of consuming high UMF/Methylgloxal Manuka honeys.

These honeys are contraindicative to the health of intestinal flora and create severe imbalances with the internal microbial balance, which is essential for correct healthy bodily function and natural Vitamin B production through microbial interaction within the intestinal tract and villae.

**As such it is irresponsible (bordering on litigative) for MPI or any other body to support any move to define Manuka honey as only valid, where UMF/Methylgloxal residue is present !**

In fact, over NPA 15+ UMF/Methylgloxal equivalent Manuka honeys should only be marketed as suitable for EXTERNAL TOPICAL ONLY application and **not** be consumed internally.

Regarding Total Peroxide Activity Manuka honeys, the science proves quite the opposite in that TPA microbial enzymic content is proven to support and nurture the correct balance of intestinal flora...

Reputable science recognises both laboratory certifications for;

NPA/METHYLGLOXIAL ACTIVITY and TOTAL PEROXIDE ACTIVITY

Both assignations have marketable validity and correct applicability for both internal and external usage.

It is not up to MPI, nor any other party to limit the ability of any NZ Honey producer to promote, market and export their legally and scientifically defined and recognised product !

It is the choice of the consumer to purchase as they will.

Where Manuka honey is independently laboratory certified, correctly and clearly labelled true to content as; UMF/NPA (Active+) /MGO (MG) /TPA (Total Peroxide Activity) that is all that is ethically required in assignation. Anything else is morally and dictatorially unsound.

All proposed standards of defining Manuka honey, via Methylgloxal and pollen count including Options 1,2,3 are entirely erroneous.

Non Active Manuka honey is still Manuka honey and pollen analysis is entirely unreliable and not a true indication of content as Manuka honey pollen content varies widely regionally.

It is widely recognised Bees will harvest pollen from any floral source other than Manuka, whilst harvesting nectar from Manuka...then many beekeepers are implementing new techniques of scraping frames which mixes a variety of stored floral pollens into quality Manuka which further inhibits quantification.

Additionally pollen content in both Manuka and Kanuka single varietals varies wildly but both are marketed as Manuka as even the pollen grains cannot be individually identified.

Producers are selling Kanuka as Manuka and adulterating low pollen count Manuka with Kanuka to increase relative pollen count...it is all smoke and mirrors.

The only true quantification is Laboratory certification of Activity content whether defined by the producer as NPA UMF Active+ MGO MG TPA or Total Peroxide Activity along with taste, smell, thixotropic nature (even this isn't entirely reliable)

To be honest, there is no definitive technique with which to define a standard as the quality and characteristics of Manuka honey are so varied within NZ.

-ends-

**Options for Defining Monofloral Honey**

Submission

I strongly object to your three options as defined in your Discussion Paper No 2013/38.

Use of option one - as most North Island manuka honey has a very low pollen count (20% or less) this would exclude 80% of North Island honey. I also draw your attention to the scientific paper written by J M Stephens Comvita and Dr Peter Nolan University of Waikato, in the New Zealand Beekeeper September 2008, pages 8-12, which concluded that use of pollen analysis for a manuka standard was not viable.

Use of option two - MGO only - I do not believe this is a definitive standard as the MGO test is a trademark of Manuka Health which is a private enterprise and goes against other companies using other activity tests. Also, there are 3 other species/nectar types that test positive MGO. These are fennel, ragwort, and sometimes rewarewa. If these test positive for MGO are they able to be called manuka under this test?

Use of option three - is very, very restrictive on what can supposedly be called manuka honey, as it combines both of the above. This will exclude a lot of honey which should be classified as manuka.

Suggestions:

The only true way to establish a manuka standard is to have a genetic fingerprint of manuka honey using gas chromatography.

It is also possible to have identification of the product done at Oritain, Dunedin, and receiving a certificate which proves or disproves authenticity of the product by traceability fingerprinting.

Also, we need to have country of origin labelling on the product.

These three actions will stop the fraud instantly.

If you pursue your options under the discussion paper, it will be challenged in a court of law

-ends-

I have become aware of the difficulty of authenticating manuka honey from my neighbours who sell manuka honey. makes a hand portable analysing device which could, identify the chemicals that make manuka honey unique. The device is robust and meets US military specification for various features including ingress of water and dirt. It is easy to use and weighs about 2.3Kg. It is battery powered and designed for use in the field. It requires only small samples and gives result in under a minute. The device is primarily designed to identify hazadous materials for military, security and first responder services, but is capable of identifying a wide range of substances. If the compounds that give manuka honey its colour, aroma, taste and anti bacterial properties can be identified the device can detect their presence and thereby autheticate the honey. Compounds foreign to manuka honey can also be detected. is a new model improving on previous machines and it's application to food substance authentication has only just occured to us. I am unsure of how this effects the potential manuka honey regulations but very willing to help.

Regards

-ends-

It is my opinion when defining a standard for Manuka Honey that it should focus on what the New Zealand consumers expect and what overseas markets and their consumers expect.

The consumer's worldwide expect Manuka Honey to come wholly or mainly from the Manuka plant as based on the Codex standard.

This has been confirmed in the Hong Kong Consumers Council's report and in the United Kingdom's tests on Manuka Honey.

I believe there should be two main Manuka products labelled as Manuka.

One labelled "Manuka Honey" if its pollen count is 70% Manuka /Kanuka.

Second labelled "Active Manuka Honey" if its pollen count is 60% Manuka /Kanuka including its NPA level on the label.

Numbers on the front of a label should relate to the NPA level only. Not to pollen count which would be misleading to consumers.

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?

Yes with a pollen count to back it up.

Q3: What are the likely impacts of Option 1 for businesses?
Q4: What are the likely impacts of Option 1 for consumers?

Consumer would have confidence in the label and would know when a label says Manuka Honey that's what it is. This would be good for business, as overseas markets would have confidence in buying NZ Manuka and the bad press will go away.

Q6: If a definition based on pollen count is adopted:
- what is the appropriate percentage of pollen to indicate a monofloral honey?
- what, if any, additional parameters should be included?

I think the codex standard should be used and with a pollen count of 70% Manuka/Kanuka for a Manuka pack and 60% for an Active Manuka.

Q7: What are the likely impacts of Option 2 for businesses?
Q8: What are the likely impacts of Option 2 for consumers?

Local and overseas consumers will continue to feel ripped off with low pollen counts. Consumer groups and overseas regulators will ban more NZ product from shelves and the bad press will continue.

Q11: What are the likely impacts of Option 3 for businesses?
Q12: What are the likely impacts of Option 3 for consumers?

Most Manuka sold around the world is eaten. Consumers buy it as Manuka believing its Manuka and eat it. By eating it they are getting no or little benefit from DHA in the Manuka Honey. So by adopting option 3 you would remove the main market for Manuka.

The market would be met by a privileged few who can achieve a high DHA level and high pollen count.

**In Summary**

As I said in the start of my submission, I believe there should be two main products labelled Manuka

All other manuka honey between 40% and 60% to be call a Manuka Blend.

There could be another pack call Active Manuka Blend

I believe this is what worldwide consumers want, a true to label Honey.

-ends-

**Manuka honey definition**

Until there is a more objective method (scientific method) of determining what is manuka and what is not, I believe that nothing should be done.

As stated in the report, there are a number of scientific projects in the pipe line that will be presented in the next year or two which will give a much better answer than the three presented.

To run with one of the three methods suggested for a short time will only confuse the market when an objective scientific method arrives.

None of the three suggestions give a clear and correct answer of what is manuka honey.

From my understanding of manuka honey, pollen type and counts do not correctly define manuka and neither does MG levels. To implement a ruling that is far from objective is going to set in stone a definition we all know is incorrect. People will suffer loss through incorrect legal definitions. Leave it as it is for a little while longer until some objective scientific method comes to the surface. The honey industry has a history of divergent views. It definitely needs some objective rules that all have to agree on. To institute rules that are not scientifically validated will just perpetuate an already dysfunctional industry.

-ends-

**Options for Defining Monofloral Honey.**

**SUBMISSION.**

1. The proposed methods outlined in the discussion paper have flaws outlined, which means that none of the proposed three methods will meet the criteria of confirming that Manuka Honey is true to type and guaranteed NZ Manuka.

2. The concept of using pollen count is flawed. This was reported in the New Zealand Beekeeper Journal in 2008. The report was from research by Comvita and Prof Peter Molan and the conclusion was that use of pollen analysis for a Manuka Standard was not viable.

3. Option (2) using MGO only. We already have a firm "Manuka Health" actively promoting this standard. But reports have indicated that MGO chemical can be added to honey to improve the rating level. I understand that other NZ honeys also have MGO present and this would certainly confuse the issue of honey being true to type/label. MGO is one of the chemical markers present in Manuka honey but is not the sole criteria

4. Option (3) USING POLLEN Analysis and MGO only compounds the error factors. .

5. I note that one NZ Company already states in their website that they are able to verify Honey :

   From Oritain.co.nz website

   *.More honey is sold than is produced. How does this happen? The demand for high-quality honey has driven the development of a counterfeit market, where honey is diluted with ingredients such as high fructose corn syrup, or mislabelled as being from a country or region where it is not. Oritain works with honey producers and traders in New Zealand and globally to provide independent verification of the origin of honey. This means that the importers and exporters that we work with can be assured that product bearing their label is the genuine article.*

   So obviously one company is able to make the statement – and others must be able to as well.

6. The only way to establish a Manuka Standard is to have a genetic fingerprint of Manuka Honey ( from the main producing NZ areas) is to use gas chromatography. This could be verified anywhere in the world at any laboratory to establish that honey being sold conformed to the standard established.

7. One of the main problems seems to be that NZ Manuka Honey sold in the drum and exported can be subsequently mixed with other foreign honeys and packaged as NZ Manuka honey , when the contents may contain a small portion of NZ Manuka Honey and a large portion of some other type. Gas chromatography would prevent this and lead to international understanding of our NZ Floral honeys not just Manuka, but others such as RewaRewa etc.

8. Any honey packaged should have country of origin labelled

-ends-

**The monofloral Manuka standard.**

Question 2 The UMF honey assoc is working on a series of chemical markers that would define a manuka honey MPI needs to look further at this work as I only know of it and have not seen any actual results.

Pollen counts

We have found from test results over the years that high purity, high NPA manuka honeys do not exhibit high pollen counts ;

This is what we have observed in practice.

It is important to note that there are different strains of manuka even in the small area we service and we are coming to realise that there are large differences between the characteristics of some strains. We have been able to get high pollen count manuka honeys from some area's but the high NPA honey's tend to be lower pollen count.

The really high pollen count manuka honey's we produce are actually predominantly Kanuka.

Recently we extracted some kanuka honey and put the boxes with the Kanuka residue still in them onto hives on a squash paddock when we extracted the honey it had all the characteristics of squash honey but on sending the samples to a buyer it tested high pollen count manuka but contained no manuka.

Thus I would consider pollen count to be a very poor indicator of manuka honey and a better indicator of Kanuka honey.

Question 3 A 70%Pollen count would exclude some of our high UMF manuka honeys so unless you dropped the pollen count to 55% you would have a UMF 15+ manuka blend (which is high purity manuka) and high pollen count Kanuka with no manuka in it being sold as monofloral manuka which is a joke.

Question 4 Consumers would be paying a premium prices for a product that contained none of the properties and potentially none of the nectar they were paying that premium for.

Methylglyoxal.

The premium value of Manuka honey is totally due to the presence of its NPA properties. MGO has proven to be a good marker of these properties in fact manuka honey with no NPA properties should have little premium on other table honeys.

Therefore by setting a standard based on MGO you are basing the standard on the consumer perception/expectation. It is most notable that all the bad publicity coming from overseas is around

manuka honeys not meeting their perceived activity claim or the C4 issue (which I believe is the bigger issue) nowhere have I seen any pollen counts done.

Yes there is the possibility to turn one NPA20+ into 4x NPA5+s but the consumer is still getting honey of the UMF value stated and the perceived value.

Equally artificial DHA can be added but most systems will be open to some fraud and the only way to deter this is to set the penalties high.

The reality is that the consumer is buying Kanuka honey and Manuka honey of less than NPA5 with the false expectation that all Manuka honey contains NPA activity this is a false expectation and can be remedied by using MGO as a marker.

Question 10 The market has accepted UMF5 as manuka honey thus I would argue that an MGO content of 100 parts would meet the market expectation.

I believe the inclusion of DHA would only confuse matters. It is up to the Beekeeper/Packer to grow the honey. The consumer is buying NPA activity not potential NPA activity.

Pollen + MGO

This is a possibility if pollen counts are set at a level that would allow high UMF Manuka's to pass ie55%. However I do not see any advantage a fraudulent operator will still be able to add DHA to kanuka to meet the standard or filter low pollen count NPA5+manuka to meet the standard Thus I would say it only marginally improves on an MGO standard.

Question 11 This option would add a lot of cost with multiple tests and the need to blend to multiple standards we are currently having to blend for MGO and C4s so this would make it much harder with little added benefit.

Question 12 The consumer is buying on an expectation of NPA/MGO so the consumer's expectation would be met.

Conclusions

A standard should be based on the values that the consumer is paying a premium for. The consumer will only pay a premium for a less than NPA5 because they believe it has NPA activity equally they will only pay a premium for a Kanuka honey if you call it Manuka.

I believe the main problem facing the Manuka industry at the moment is activity claims based on something other than NPA (i.e. peroxide activity)being passed off as an NPA claim. All the testing/bad publicity from overseas is around Manuka honeys not meeting their perceived activity claim this must be cleaned up and can be easily be solved by requiring NPA/MGO test documentation (any other test is passing off as NPA/MGO)for any manuka honey with an any activity claim.

-ends-

This is my submission in response to the MPI discussion paper providing options for the parameters that define monofloral manuka honey. The essence of my submission is that:

- Manuka honey is honey that is produced by bees from the nectar they gather from the Manuka tree.

- Manuka honey may or may not hold the Unique Manuka Factor.

- Whether or not honey can be called Manuka honey should be determined primarily by a pollen count with honey containing over 70% Manuka pollen being classified as Manuka honey.

- Whether or not the honey holds the Unique Manuka Factor is secondary to honey being classified as Manuka honey: that is, only honey that has been classified as Manuka honey (with a Manuka pollen count of over 70%) can be said to hold the UMF and whether or not it holds the UMF and to what degree should be determined by some other test.

My more detailed comments on the Discussion Document are:

**Regarding 1 Introduction**

- It is not clear to me what the difference is between 'product definitions' and 'content claims'. I wonder whether content claims refers to whether or not the honey has the Unique Manuka Factor? If so, then this should be made clear.

- It seems strange that the guidelines are voluntary and interim. Are there guidelines for honey form sources other than Manuka? And if so, how are these other guidelines written, managed and enforced?

- A clearer picture of the problem would facilitate a better solution. It would be useful to know more about the problems recently identified in the market place that the Discussion document refers to – should I assume that these relate to New Zealand Manuka Honey labelled and sold directly by a New Zealand company? Or was there some involvement of other countries?

- Again, I am not sure what is meant by "content claims", however, from my interpretation of the Objective stated on page 6 appears, it seems to confuse three distinct issues or problems that have been identified as needing to be resolved. I suggest the best approach to these issues is to clearly distinguish

them, and then to deal with them sequentially. I suggest that the three issues and the order in which they should be dealt with are:

1. A definition for Manuka Honey – this is the first step and should be the sole objective of this discussion paper;
2. How to determine the Unique Manuka Factor – this is a separate issue but dependent to some extent on the definition of Manuka honey, and should be resolved once Manuka honey has been defined.
3. How to label honey – the objective includes statements with reference to labelling such as ensuring New Zealand Manuka Honey is "true to label" and "consumers are not misled". Is ensuring that honey is true to label a compliance issue? And what exactly do you mean by "ensuring consumers are not misled"? Labelling is the issues that is perhaps less specific to beekeepers and it would be wise to look beyond honey to how other New Zealand products are labelled.

**Regarding 2 Standards for Honey**

The Codex is a good place to start, and the quote from Codex sets the scene for defining Manuka as a mono floral honey:

> "Under Codex, a honey may make a monofloral claim if that honey comes wholly or mainly from a particular source. For such claims, the 'common' or the 'botanical' name of the floral source can be used."

The starting point for any definition of Manuka honey should be recognition that Manuka honey is nectar or blossom honey produced by bees from nectar from Manuka flowers. It is most important that there is no confusion between whether or not honey is from Manuka nectar and whether or not it has the Unique Manka Factor.

That Kanuka pollen is indistinguishable from Manuka pollen is certainly a problem, especially now that Kanuka is not classed as belonging to the *Leptospermum* genus. I do not have enough knowledge of the differences and similarities between Kanuka / Manuka to comment on this. Does Kanuka honey taste the same as Manuka honey? If so, this may be OK.

I am not sure how most honey is analysed. For my honey, I either have it analysed by the wholesaler I sell it to, or if I pot and sell it myself, then I have pollen counted by

1. Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?

The Manuka honey produced at my apiaries is not active. People buy my honey because they like the taste, colour and texture. For them, it is these parameters that make it Manuka honey. I think that using colour, aroma and flavour are important to a definition of Manuka honey. I do not know if these parameters can be improved on.

2. Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?

Don't know.

3 Q3: What are the likely impacts of Option 1 for businesses?

If the parameters selected to define Manuka honey are pollen count, taste, colour and aroma, then I image not much of an impact.

4 Q4: What are the likely impacts of Option 1 for consumers?

Depends on how this option is applied and labelled.

I like to know the pollen count, and so do those people who regularly buy my honey, they are interested in the pollen count each year and how the balance of different pollen/nectar affects the taste and consistency of the honey.

5 Q5: What practical steps are required to effectively implement Option 1?

I am not sure how most honey is analysed.

6 Q6: If a definition based on pollen count is adopted:

- what is the appropriate percentage of pollen to indicate a monofloral honey?
- what, if any, additional parameters should be included?

I have had honey with the deep colour, taste and aroma of Manuka honey, but a pollen count of between 65 and 70% Manuka pollen. I have also had honey that is lighter in colour, and with the aroma and taste of Manuka but in which clover can also be tasted, with a pollen count of over 70% (I think about 77%). This experience leads me to think that a pollen count alone is not adequate for defining Manuka Honey and that the three parameters noted above – taste, colour, aroma are also important.

I agree that methods for counting pollen must be standardised.

## OPTIONS 2 and 3: DEFINITION BASED ON METHYLGLYOXAL CONTENT AND POLLEN COUNT

As stated above, honey that is produced by bees from nectar gathered from Manuka flowers must be called Manuka honey. Whether or not it has the UMF does not define the honey as being Manuka honey. As I have mentioned, my own honey has a high Manuka pollen count, the taste, aroma and colour of Manuka honey, but does not contain the UMF. According to Options 2 and 3, this honey would be classified as Manuka Blend. This is simply not true, the honey is monofloral Manuka honey.

Thank you for the opportunity to comment on definitions of Manuka honey. Please do not hesitate to contact me if this submission is unclear.

Yours sincerely,

-ends-

Monofloral standard for honey is 70%+ by pollen analisis The reason I belive is from my experience as a producer of fine honeys for 23 Years, Honey from manuka forests of the south islands west coast, the Richmond range & Paparoa national park From these forests manuka is the dominant species at 90%. kanuka 10%.

Manuka Honey from all of our production areas, tested for NPA from 2001to the present shows no to very small amounts of NPA/MGO-82mg/kg A manuka Honey sample from 2005 tested in 2010 had NPA/MGO-185, time is a wonderful.I have tested Manuka Honey from near Kaikoura , no Kanuka at all, the sample had no detectable NPA/MGO, this honey and my own, Manuka Pollen is the dominant pollen present from a 85% to 96% From 2001 producing Manuka honey of a very purity based on pollen analisis with low to No levels of NPA/MGO Management of our hives involves most of the year near Beech forest so bees gather Beech forest Honey Dew, the only Raw sugar feed to the 30 hives is to help with queen rearing.No C4 sugar/DHA fed to contaminate our hives before/during the Manuka Honey Flow The Manuka honey standards definition needs to & must be separate from
Activity rating.
Over the past six years I have taught queen bee raising & genetic stock improvement in Wales & Orkney UK, Upon my travels I purchase Manuka Honey packed in NZ, Australia, the Republic of Eire & UK,at my considerable expense had these samples tested for purity by pollen analisis, most NZ packed Manuka pollen tested 70%+ Eire & UK samples were extreamly disappointing the lowest Manuka pollen count was 35% and the honey was very runny, no thickotropic qualities, Kilcree Gold Active 10+ 100% Manuka honey, (not on your life) I sent the results to a week before the UK Manuka Bomb exploded First the standard for Manuka Honey should be just that,, Monofloral Honey 70%+ by pollen analisis Secondly the Activity NPA/MGO is another value added test with lab & test results on the retail label for consumer confidence. Three years ago when I was in Europe there was concerns about The levels of MGO in food being toxic food for mammals Mabe NPA/MGO Manuka honey needs to be marketed for Medical use only and become UMF/NPA/MGO trade mark honey with manuka honey content Manuka Honey definitely an Unknown (GOD FACTOR) whether NPA/MGO or hydrogen peroxide levels, or both from the same sample A north island manuka honey purchaser came to the top of the south in 2011 They were not interested in pollen count in Manuka Honey, they tested our Manuka honey samples for UMF/MGO and it was so below the mark, they were not interested, the retail sample left with us was being sold as UMF10+ I had pollen tested, an alarming 46% Manuka pollen, light pastrol tasting honey This led me to believe that NPA/MGO was what the purchasers wanted,,,,Not Monofloral Manuka Honey Honey contains hydrogen peroxide & is found at varying levels depending on tree or floral types & indeed the season, honey containing hydrogen peroxide levels sold advertising this also need to have verifiable lab results, table grade Manuka Honey included Back to the Standards for Manuka Honey Honey contains a lot of properties & one is pollen Pollen is a very good indicator of the type of flowers most visited by bees to collect the Nectar needed to be condensed into a honey type.Monofloral Manuka Honey Standard of 70%+ by pollen analisis will ensure consumers are getting what they are purchasing MANUKA HONEY

Thank You for taking the time to consider this information

-ends-

Submission to Discussion Paper 2013/38 (Options for Defining Monofloral Manuka Honey)

Please find attached some responses to the discussion paper. I have commented both on parameters and information that is immediately available, and what has potential in the short to medium term future. My interest and experience relevant to this topic consists of R&D work both as

This work was carried out as commercially funded projects with , with intensive examination of manuka populations, antibacterial activity during storage, and exploration of chemical markers as unique identifiers of manuka and kanuka. My CV is attached.

I appreciate the opportunity to contribute to the definition of manuka honey and would appreciate receiving future communications on this topic.

**Introduction**

Any definition of monofloral manuka honey (MMH) must provide answers to four major problems facing the honey in the market today. The definition must eventually include parameters and measurement methodologies which focus separately on and solve each of these problems.

1. Presentation of mixed honey that includes manuka but at levels lower than that required for monofloral status
2. Presentation of manuka honey with significant kanuka honey, either by bees gathering from mixed populations or by post-harvest addition
3. Adulteration of manuka honey with honey other than kanuka which may have been heated to maintain the darker colour
4. Presentation of darkened honey containing no manuka honey

It should also provide clarity to the confused and contentious state of measurement of the antibacterial activity (ABA) of the honey.

**Responses**

My comments relate to what parameters are immediately relevant and usable. I also suggest some lines of future development based on my personal R&D work on analytical methods for quality control, ABA and its behavior in storage, and exploitation for unique chemical markers for manuka and kanuka pollen and honey.

*Question 1*

The listed parameters are useful in that they are current, simple and functional, but they could and should be extended as follows. Not all of the parameters are necessary but all are easily measured routinely to give accurate numerical data and have the potential to provide discrimination between honeys.

- Organoleptic – Flavor and aroma could easily be described more specifically than by BPSC. It would be straightforward to establish and train an industry panel for organoleptic evaluation as has been done for wine, cheese, olive oil, and for lavender oil.
- Physical – Parameters could include colour, moisture content, viscosity, thixotropy, density, refractive index, optical rotation.
- Chemical – Sugar composition, chemical markers, MHF to check on addition of heat-darkened honeys
- Microscopic – Pollen grains, crystal properties

*Question 2*

MG and DHA contents are current and simple parameters that have real value since the consensus of experienced opinion is that MG is unique to manuka honey. MG is therefore obviously relevant to all 4 problems above, but the problem of addition of synthetic MG or DHA means that it cannot be used by itself as a guarantee of genuine manuka honey.

Currently, it remains impossible to reliably distinguish manuka from kanuka pollen using normal current microscopic methods. Pollen counts can therefore only provide totals for manuka and kanuka pollen, which means that pollen counts cannot be used to determine the proportions of either honey in a mixed sample, or to solve problems 1 or 2. Pollen counts must be used cautiously and limited to problems 3 and 4.

There are two further options for defining MMH –

- Unique chemical markers – discussed in the next paragraph
- A reliable, statistically robust measurement of ABA – discussed in the Claims section below

In a project with one of the major exporting companies, out analytical work which identified a chemical marker unique to kanuka pollen. Chemical discrimination between manuka and kanuka pollen is clearly possible. There were also indications that other unique markers existed, which could be used to discriminate between pollens and to determine the proportions of the two pollens in a mixed sample. With advances in mass spectroscopic instrumentation and data handling, measurement of a few such markers could be made routine and affordable for large numbers of samples. This work was carried out under a non-disclosure agreement

I firmly believe that such chemical markers will provide the most useful, powerful and robust discrimination between manuka and kanuka honeys and provide solutions to all 4 problems. Significant time and funding will be needed to identify further markers and develop quantitative methods to develop suitable parameters but but the value of solutions to all 4 problems is such that this line of work should be developed rapidly as an industry-wide project.

*Option 1*

Pollen counts will only be useful in detecting the presence and levels of honeys other than manuka and kanuka. Because pollen counts can only provide a total value for manuka and kanuka pollen, using them as a quantitative parameter for either manuka or kanuka is misleading. They cannot be used quantitatively to indicate the proportions of manuka and kanuka in mixed honeys, nor whether a sample has an adequate level of manuka honey to meet the level defined for unifloral status.

*Question 3* Producers and exporters cannot provide an accurate figure for manuka content of a honey.

*Question 4* Consumers cannot rely on receiving a specific level of manuka honey in a honey sample.

*Question 5* A reliable, routine and cheap methodology must be established in an independent laboratory. Training necessary staff would be a high priority. It must provide reproducible data on the numbers of pollen grains, consisting of a total for manuka and kanuka grains.

*Question 6* I am not qualified to offer a suggestion for a percentage figure for monofloral status. The pollen analysis should also provide separate figures for each identifiable pollen species, and a figure for the total non-manuka/kanuka pollen. A future objective should be to develop a stain, perhaps based on one of the unique chemical markers that would allow microscopic discrimination between manuka and kanuka pollen. This would then allow pollen counts to be used effectively in all of the problems listed above.

*Option 2*

*Question 7*

Monitoring MG levels would cost producers and exporters extra. Increased analytical facilities would be required. Smaller producers may have difficulty with the chemical aspects and maintaining MG levels.

. on activity of manuka honey during storage confirmed the dynamic nature of the honey's biochemistry and ABA, and the need for close control of storage conditions to optimize the activity during storage. Unfortunately, this work was done before the role of MG had been discovered. Honey producers and exporters would have to absorb the cost of being fussy about the storage and transport conditions. Any parameter quoting a level of MG would have to be qualified to some extent – e.g. MG level at time of shipping – or understated to allow for any drop during distribution.

*Question 8*

Consumers should be able to appreciate a parameter based on a single compound, but will not trust it to be 100% pure and natural if it is known that it can be synthetically boosted undetectably. Public awareness of the dynamic nature of MG levels would also lead to some mistrust. To be safe and to engender consumer trust, distributors should measure MG levels in the destination market just before release to retail outlets. The analytical procedure and facilities are not difficult to establish and run.

*Question 9*

MG and DHA analyses are currently available, but laboratory capacity and trained staffing levels would have to increase rapidly.

*Question 10*

Although I do not have the extensive databases of the larger producers and marketers, I believe that a MG level that would give a UMF score of 5 is too low to guarantee a sufficient proportion of manuka honey in a sample. Certainly, concurrent measurement of DHA should be done to indicate possible addition of synthetic compounds. The work on chemical markers may provide further compounds related to DHA or MG that could be monitored at the same time. Because of the dynamic biochemistry surrounding MG and the variations in storage, any MG measurements to be used on labels should be done at a time which minimizes these changes – e.g. immediately before shipping from this country – and the results should be dated, to allow buyers to evaluate the need for further measurements before distribution.

***Option 3***

*Questions 11-13*

Impacts on producers and consumers and practical steps are the same as outlined in the above questions.

***Claims***

I will address only the claim of antibacterial activity (ABA), but in passing, I mention the following paper in support of an immune stimulating factor in manuka honey.

Tonks, A. J., Dudley, E., Porter, N. G., Parton, J., Brazier, J., Smith, E. L. and Tonks, A. 2007. A 5.8KDa component of manuka honey stimulates immune cells via the TLR4. J. Leukocyte Biology 82: 1147-1155.

Currently, ABA of manuka honey is incompletely characterized, inadequately measured and severely handicapped by conflict within the industry. However, it is just this property that sets manuka honey apart from the majority of other honeys, creates a major part of the commercial value and attracts consumers. It is therefore critical that any definition of MMH includes parameter(s) which identifies the ABA and gives a clear measure of the activity.

The industry acknowledges and agrees that there are two fractions of ABA, that due to hydrogen peroxide and that due to non-peroxide compound(s). Hydrogen peroxide is found in varying amounts in many honeys. It is unstable, variable within honey and hard to measure in a way that would be useful to the industry.

*Question 14* Hydrogen peroxide and its ABA is far from unique to MMH. It is therefore unsuitable as a parameter to define or identify MMH and must not be used.

Currently, MG is the only properly identified and characterized compound giving rise to NPA, but other compound(s) not yet identified may contribute to NPA. There is major disagreement in the industry in representing NPA to the consumer. The UMF brand and scores are still used by one industry group as a competitive tool against other industry groups, who use the same measurement system but express NPA in terms of equivalent % of phenol. Despite the conflict, all are obliged to use the same bioassay system. Consequently, all the activity data has the same level of inaccuracy and unreliability that persist in the UMF bioassay system.

Critical users of this bioassay system acknowledge that it produces variable results and needs improvement. One fundamental fault with the data from the UMF system is that different dilutions of honey have to be used for the low activity honeys (UMF 0-10) and for the higher activity honeys (UMF 10+). It has been shown that it is not possible to combine data from these two dilution series into a single dataset that allows statistical analysis across the whole range of activity in a single analysis. Consequently, any correlation studies involving UMF data across a wide range of NPA are suspect.

**Options for Defining Monofloral Manuka Honey**

**Response to MPI Discussion Paper No. 2013/38**

Although primarily concerned with C4 sugar adulteration testing using AOAC 998.12 method, GNS Science and its collaborators have on-going scientific research around manuka honey and other floral honey types including biomarker characterisation, conductivity, sugar chemistry, isotope chemistry, lipid/fat chemistry, amino acids, pollen, nectar, HMF, DHA and MGO analyses.

**Q1. Are the BPSC parameters for organoleptic and physicochemical properties of manuka appropriate. Can they be improved?**

They appear to be appropriate although manuka has well characterised rheological properties which have been compared to kanuka, these should be exploited (Stephens, 2006; Madden, 2012). Conductivity is also another parameter which we have shown to be useful for differentiating manuka and kanuka at GNS, however this data is as yet unpublished.

**3: What are the likely impacts of Option 1 for businesses?**

Whatever option that is selected should be relatively cheap and fast to test as most testing by industry is done on a per drum basis. This may limit pollen counting to some extent as it is labour intensive, unless pollen counting machines (which are developed but not commercially available) are used.

**Q6: If a definition based on pollen count is adopted:**

- **what, if any, additional parameters should be included?**

A minimum pollen content should be required. Rogers et al. (2010) showed that false positive results occurred when manuka pollen count exceeded 500,000 grains/10g honey, suggesting that these samples were definitely manuka.

The only issue against pollen counting is the possibility of fraudulently increasing the manuka pollen count by filtering out larger pollen grains or addition of manuka pollen collected via pollen pellet harvest.

**Supplementary information**

**Examples of internationally traded honey that includes multiple genera, marketed under a common name**

Blue borage and Vipers Bugloss honey

Ling and heather honey

**Option 2**

DHA and MG content can be fraudulently elevated through addition of synthetic products. Synthetic DHA adulteration would less detectable as it would 'mature' in the same way as natural DHA, and isotope testing of synthetic DHA products has shown that it is indistinguishable from natural nectar derived DHA. Contrary to popular opinion, these chemicals are not regulated and are well known as they are used in sun tanning agents. Like sugar syrup, which is delivered by tankers in large quantities to bee keepers without any questions asked, DHA would go equally as undetected in New Zealand should bee keepers wish to purchase and add DHA into sugar syrups during feeding to elevate the DHA levels in their honey or mix in to honey after harvest. (See attached unpublished article)

**Option 3**

Difficulties with both options 1 and 2 also apply to this option, however it is in the interests of industry unity for a short-term interim guideline while final guidelines and / or further research are developed, therefore this would be the best solution.

**Content Claims**

Most people would agree that all honey exhibits some sort of 'Total Peroxide' activity. I believe this claim should be removed as it is just confusing to manuka consumers who are seeking to get 'something more' from their manuka honey ie NPA.

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Rogers KM, Grainger M, Manley-Harris M. 2013 High NPA 'manuka' honey without manuka. Unpublished article.

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# High NPA 'manuka' honey without manuka?

By Karyne Rogers, GNS Science, Merilyn Manley-Harris and Megan Grainger, Department of Chemistry, University of Waikato

The price of manuka honey is indexed to its Non-Peroxide Activity (NPA) and trade has been extremely brisk this year, with NPA 15+ selling for up to $45/kg in some instances.

Several research programs are underway to cultivate high activity manuka plants, some of which have multi-million dollar investments. But what if it generating a high-activity honey was as simple as buying a $50 bottle of dihydroxyacetone (DHA) and adding it to low-grade manuka honey? Or for that matter kanuka or even clover honey? Dr Karyne Rogers, GNS Science has teamed up with Associate Professor Merilyn Manley-Harris and post-doctoral student Megan Grainger of Waikato University to investigate this possibility.

## Synthetic versus natural—how can we tell?

It is possible to produce a high NPA manuka honey by adding synthetic bioactive methylglyoxal (MGO) purchased from a chemical supplier; however, authentic high NPA manuka honey has a DHA and MGO content in roughly a 2:1 ratio when the honey is matured. A simple chromatographic profile will detect MGO addition, as it would not have the correct DHA: MGO ratio. Addition of synthetic DHA (the kinetic precursor to MGO) cannot be similarly detected because it behaves in exactly the same way as the naturally occurring DHA, converting to MGO over time with a similar DHA: MGO ratio on maturation.

We took a 1kg pot of supermarket clover honey (with no NPA) and added synthetic DHA to test the theory. By the end of 83 days, we had a clover honey with a methylglyoxal content that was equivalent to NPA 30+ and which would rival the world's best manuka activity. We trialled seven different samples of the clover honey in duplicate, each inoculated with varying amounts of synthetic DHA from 0 to 8000 mg/kg and matured at 37°C.

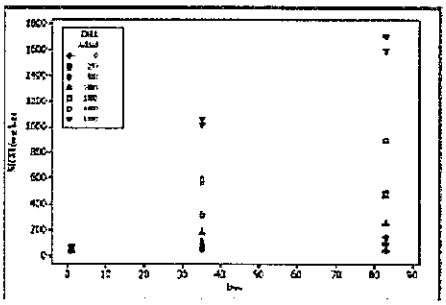
After 83 days of incubation, our control sample (0 mg/kg DHA) did not change in NPA activity, while in the 8000 mg/kg DHA sample, DHA converted to methylglyoxal which grew to a level of 1700 mg/kg (approx. 30+ equivalent, Figure 1).

The clover honey already had hydroxymethylfurfural (HMF) levels (65 mg/kg) which exceeded recommended limits on purchase, and after maturation for 83 days attained an HMF level of 108 mg/kg. This change is to be expected but not excessive given the high temperature of incubation. A similar conversion of DHA could be achieved at a lower temperature and with a longer storage time without forming the high levels of HMF.

## Can we differentiate between synthetic and natural DHA in honey?

In theory, it should be possible to detect DHA artificially added to honey by analysing its carbon isotope signature since many commercially available products are made from petroleum products which have more negative carbon isotopes (around -30‰), compared to plant products which, for manuka honey, lies between -25 to -26.5‰. We decided to investigate the range of isotope values of synthetically available DHA. *[Editor's note: the ‰ symbol means 'per mil'; that is, per thousand as opposed to % (per cent).]*

Dihydroxyacetone is manufactured by the oxidation or fermentation of glycerol; glycerol itself can be sourced either from the waste of biodiesel manufacture from fats and oils or synthetically from a petrochemical origin; DHA from these two sources would



be expected to show different carbon isotope signatures.

> "...using the NPA level as a pricing index for manuka honey is also problematic, since it may encourage adulteration."

We assessed the stable carbon isotope composition of a range of commercially available DHA products, which are used as standards in DHA and methylglyoxal testing laboratories within New Zealand and China. Of the six synthetic samples we tested, only one synthetic sample was outside the naturally occurring honey isotope range (suggesting that this one was derived from petroleum products), while the other five synthetic products were indistinguishable from DHA found naturally in honey. The importance of this research shows that many commercially available DHA products may be chemically and isotopically indistinguishable from their corresponding natural products.

We consider there is a significant risk in basing an identification or authentication program for manuka honey around the presence of DHA and/or methylglyoxal. Furthermore, using the NPA level as a pricing index for manuka honey is also problematic, since it may encourage adulteration.

**Options for Defining Monofloral Manuka Honey**

**Option 1**

**Q1. Are the BPSC parameters for organoleptic and physicochemical properties of manuka appropriate. Can they be improved?**

The colour and organoleptic parameters appear appropriate, and should form part of a future definition. The origin of the colour measurements is not stated by the BPSC.

**Q2: Are there alternative options for defining manuka honey (i.e. not based on MG content or pollen count), and what scientific evidence supports this?**

The BPSC physicochemical parameters do not include thixotropy. Strong thixotropy (becoming less viscous upon stirring) is a distinctive rheological property of manuka honey, and is found in only a few other honeys worldwide (e.g. ling heather). It is part of the public perception of manuka honey. We are not aware of papers on the rheology of manuka honey in the regular scientific literature, but Minerva Scientific (an English food analytical laboratory) have published an online technical bulletin which describes measurement of the rheology of heather, manuka, and kanuka honeys and of manuka/kanuka honey mixtures (Madden 2012). They claim that kanuka honey exhibits normal Newtonian (i.e. non-thixotropic) behaviour, and can thus be distinguished from manuka honey on this basis:

- "A mono-floral manuka honey (>70% *L. scoparium* pollen) will have a viscosity of 35,000 - 40,000 cPs and a viscosity index more negative than - 0.500.
- A Newtonian honey such as kanuka will have a viscosity between 3000 - 9000 cPs and a viscosity index close to zero.
- The composition of mixtures of Newtonian and manuka honey can be estimated using suitable reference standards."

The provenance of the honeys analysed by Minerva Scientific is not described. This work should be verified using carefully sourced honeys, as it promises a component of manuka honey verification which should be inexpensive to implement, distinguishes kanuka honey, and (unlike DHA or MG content) is likely to be relatively independent of the age of the honey. The natural variation in true manuka honey thixotropy needs to be established. There is a possible risk that an undetectable additive designed to falsely increase thixotropy will be discovered.

**Q3: What are the likely impacts of Option 1 for businesses?**

We agree with the general cost-benefit statement given in the MPI Discussion Paper. Depending on the percentage value set, there will be a reduction in the volume of honey claimed as manuka (including kanuka) monofloral.

Pollen analysis costs are currently slightly more expensive than routine chemical tests. GNS Science charges $180-250 + GST per sample, depending on the number of samples submitted in a batch. Our

understanding is that some other New Zealand analysts charge considerably less than this, but the statistical reliability of results may also be less. Per-sample costs should reduce if there is a larger volume of analyses.

**Q4: What are the likely impacts of Option 1 for consumers?**

Greater assurance that manuka honey will meet the Codex definition for monofloral honeys. Likely price increase if the supply is reduced.

**Q5: What practical steps are required to effectively implement Option 1?**

1. A minimum percentage content of manuka type (including kanuka) pollen for monofloral honey needs to be defined. The classification of honey with less than 70% manuka type pollen, but with a percentage within the 95% (or other) lower limit of statistical confidence would need to be defined.
2. In addition, a minimum pollen concentration (pollen grains per 10 g honey) of manuka type pollen should be defined, to reduce the risk of mislabelling or fraud.
3. Standard methods of pollen analysis should be promulgated. The BPSC guidelines currently mention several techniques of which GNS Science uses an adaptation of DIN 10760, employing initial alcohol dilution (Jones & Bryant 2001) and determination of pollen concentration by Maurizio's volumetric method and Demaniowicz's counting technique (Louveaux et al. 1978, Raine et al. 2011). Statistical accuracy of a pollen percentage determination depends on the number of pollen grains counted: a minimum total of at least 500 is generally stated in the specialist literature (Behm et al. 1996, von der Ohe et al. 2004). Confidence limits on the determined percentage can be calculated from the count itself (Mosimann 1965, Maher 1971), but reproducibility of results depends on adherence to sound techniques and can be determined only by replicate analyses and inter-laboratory comparisons. Preparation of microscope slides using glycerine jelly is preferred to the use of a haemocytometer slide, as the slides can be archived for future reference.
4. MPI will need to be assured that sufficient analytical capacity exists before a regulatory regime is implemented.
5. In conjunction with a regulatory regime, inter-laboratory comparisons ("ring trials") and perhaps certification may need to be implemented.
6. Sample traceability and public archiving of samples, analytical results and microscope slides may be required.

**Q6: If a definition based on pollen count is adopted:**

**• what is the appropriate percentage of pollen to indicate a monofloral honey?**

Moar (1985) indicated that manuka/kanuka pollen is over-represented in honey, compared to its nectar contribution. Moar suggested that monofloral manuka honey should contain at least 70% manuka/kanuka pollen type, but admitted that this value was based on a small number of samples (6). Moar's honey samples were carefully sourced and extracted, but no other analytical data is available for them. Moar's results have been widely quoted in the international melissopalynology literature. The recommended minimum 70% manuka/kanuka pollen is used by the NZ producer Airborne Honey. In its reporting of honey pollen analysis results to industry clients, GNS Science currently provides a melissopalynological classification based on Moar's 70% value. Honeys with less

than 70% manuka type pollen but with manuka the most abundant species are reported as "manuka multifloral".

The analyses of 45 Waikato University Honey Research Unit honey databank samples by Mildenhall & Tremain (2005) showed that 5 of 6 labelled as "manuka honey" contained more than 70% manuka/kanuka pollen type (the other clearly being mislabelled), while only 1 of 4 labelled "kanuka honey" contained greater than 70% manuka/kanuka pollen type. This highlights the difficulty in precisely correlating apiarist characterisation of a honey source with measured pollen and other source criteria, but also the possibility that kanuka pollen is less well represented in honeys than manuka pollen. Details of collection techniques or other analyses are not available for this sample set. Mildenhall & Tremain's work was not published in a peer-reviewed journal, but was thoroughly reviewed internally at GNS Science.

In order that a manuka honey be classified as monofloral according to the Codex, more than 50% of its nectar source should be derived from manuka - the greater concentration of manuka pollen in manuka nectar compared to concentrations of the characteristic pollen in most other New Zealand nectar sources implies that a manuka pollen percentage value of greater than 50% is required.

**• what, if any, additional parameters should be included?**

A minimum manuka/kanuka pollen concentration should be included to reduce the risk of fraud. The current BPSC guidelines currently give a pollen concentration for manuka monofloral honey of 517,000 ± 280,000 pollen grains/10 g (mean ± standard deviation). The origin of this data is not stated, and it is not clear if this is the concentration of manuka type pollen, or total pollen in the honey.

Moar (1985) observed manuka/kanuka pollen concentrations of 89,900 (72% of total pollen) to 802,500 (95%) grains/10 g in five samples of manuka honey extracted by centrifugation, and 1,548,300 (91%) grains/10 g in a sample extracted by "crushing and straining". Moar suggested that the last high value could not be compared to the others because of the different extraction technique (but without providing an explanation), nevertheless it is clear that high concentrations of manuka type pollen should be expected.

Moar's (1985) results were used by Sawyer (1988) to suggest a "pollen coefficient" of 250 for manuka, i.e. a pure manuka honey would contain 250,000 manuka pollen grains/10 g. As described by Sawyer (1988) and others, pollen coefficients can be used as correction factors to percentages for estimating the relative contributions of nectar sources to a honey, however the great range in manuka/kanuka pollen concentrations seen in manuka honeys gives cause for concern about the strict applicability of this technique until the cause of these variations is better understood.

In the sample set analysed by Mildenhall & Tremain (2005), the high-percentage manuka/kanuka pollen honeys contained from 114,900 to 893,300 manuka/kanuka pollen/10 g.

Analyses of commercial honeys by GNS Science suggest that concentrations of manuka type pollen less than 100,000/10 g are seldom seen in honeys represented as manuka honey, concentrations of several hundred thousand pollen/10 g being typical. There is some evidence that even values of 1-2 million pollen/10 g are not due to inclusion of pollen from comb pollen storage cells.

**Supplementary information**

**Examples of internationally traded honey that includes multiple genera, marketed under a common name**

**Clover honey** in New Zealand can be sourced from *Melilotus* (Melilot, Sweet Clover) as well as *Trifolium* spp. (BPSC guidelines). A case could be made for also including *Lotus* spp. (trefoils) and perhaps some other legumes (e.g. *Medicago* spp., medicks), related plants which are significant components of some clover honeys (Sawyer 1988).

***Eucalyptus* honey** is marketed as a monofloral honey within Europe (Persano Oddo & Piro 2004). It is principally sourced from *Eucalyptus* s.s., but also from species of *Corymbia* and other genera which until the revisions of Hill & Johnson (1995) and later authors were included within *Eucalyptus.* Hill & Johnson's taxonomic revision was not initially universally accepted, but is now well-established (e.g. Parra-O. et al. 2009). *Corymbia* species include bloodwoods, ghost gums and spotted gums, e.g. the widely planted ornamental *C. ficifolia (*red flowering gum), *C. citriodora* (lemon-scented gum), and *C. variegata, C. maculata* and *C. henryi* (spotted gums). *Corymbia* spp. are regarded as major nectar sources in New South Wales (Somerville & Nicholson 2005).

**Dandelion honey** is traditionally attributed to *Taraxacum officinale*, but pollen morphology literature (e.g. Chester & Raine 2001) indicates that the pollen of *Taraxacum* is difficult to distinguish from that of the closely related genera *Crepis*, *Hypochoeris*, *Lapsana*, *Leontodon*, and *Picris*, cosmopolitan dandelion-like plants common in pasture and wasteland. In New Zealand *Crepis* and *Leontodon* are reported to produce similar honey to *Taraxacum* (Walsh 1967: p. 23).

**Datasets where both pollen count and MG and DHA levels have been measured for the same honey samples.**

approached two major clients proposing joint provision to MPI of pollen data held by for commercial samples with related MG and DHA data possibly held by them, but no response had been received from them at date of submission.

**Option 2**

We suggest that this option is not feasible for reasons provided in the Discussion Paper:

1. It could exclude some true manuka honey which meets the Codex definition for monoflorality;
2. Natural DHA and MG content varies over time;
3. DHA and MG content can be fraudulently elevated.

**Option 3**

We suggest that the difficulties evident with Option 2 apply equally to the use of DHA + MG content in this option.

**Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?**

All raw honeys exhibit peroxide-related antibacterial activity on account of the presence of the bee-introduced enzyme glucose oxidase, so any claim for peroxide activity should be deprecated.

Furthermore, any antibacterial activity claims should be treated separately from the definition of manuka honey.

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We would like to submit an opinion on the proposedoptions for Defining Monofloral Manuka Honey harvested in New Zealand issued by MPI earlier this month.

First of all we would like to express our full support and effort recently made by MPI to improve and standardize Manuka honey definition.

Recent scandals with sugar found in Manuka honey as well as issues with activity levels are damaging New Zealand reputation and honey business.

We believe that whatever option chosen by the industry and approved by MPI must represent interest of not just individual honey exporters, but hard working producers and most of all customers affected.

In this submission we would like to highlight a few issues with existing Manuka honey testing and marketing approaches which are not always meet customers' requirements but in most cases discriminates some honey producers in favour to others.

Current Manuka honey testing issues:

For a number of years we've tried to catch up with the marketing approach dictated primarily by privately owned syndicates like by AMHA and Manuka Health.

Their recent researches and clashes against each other sparked a number of controversies around inconsistencies of tent results and difficulties to promote PURE New Zealand Manuka honey.

Our own investigation into reliability of NPA testing (non-peroxide activity) of Manuka honey, so heavily promoted by AMHA, showed that it can vary as much as 200%-between results reported by Eurofins New Zealand and Hill Laboratories.

At the same time Methylglyoxal tests are definitely showing more consistent and predictable values, which give us a better tool for marketing our honey abroad.

But with proposal #2 there is a real possibility of adulteration of honey to increase MGO levels, which we would never support.

We've had a number of our batches tested over a period of *time* and consistently were looking for Manuka pollen content and MGO levels.

90% of our Manuka honey initially tested for MGO would have level between 150 and 200mg/kg which would eventually go up to 250 - 27Qmg/kg of Methylglyoxal within the next 3-6 months. Manuka pollen content would be varying between 60% and 90%

irrespectively to the identified MG level.

In many cases we were having high Manuka pollen (over 75%), but only 150 - 170mg/kg of MG.

Our opinion

Based on the above and our experience we suggest to set a minimum requirement for Pollen and for MG level as per the option 3 offered by MPI to identify honey as pure Manuka.

We recommend minimum of 150mg/kg MG and 50% of Manuka pollen as the minimum level required to define Manuka honey.

Any higher set levels would push more "artificially" aged honey on the market and less pure Manuka honey producers are able to compete, which will bring the market in to monopoly of a few larger and lobbyer Exporters.

We need also to think about our main markets and its consumers who will have to pay double or triple prices for the less affordable product.

-ends-

30 September 2013

**Submission on "Options for Defining Monofloral Manuka Honey" MPI 2013/38**

**My submission**

1. Neither pollen (Option 1) nor methylglyoxal (MGO) (Option 2) nor pollen plus MGO (Option 3) are good unique markers for monofloral mānuka honey, based on information summarized below.

2. I do not have any pollen expertise, but I note that Oelschlagel et al. [2] report mānuka (plus kānuka) pollen proportions varying from 42% to 95% in 39 mānuka honey samples. A molecular biologist colleague who I asked about the possibility of genotyping pollen commented "That seems very challenging."

3. Concentrations of MGO vary widely in mānuka honeys, with the following ranges (mg/kg) in published papers: 38-761;[3] 38-725;[4] 102-1490;[5] and 41-1178. [2] Kanuka honeys have been reported to contain from a trace up to 174 mg/kg of MGO. [5] For counterfeiting, synthetic MGO could be added direct, or synthetic DHA added to honey, which would then be naturally converted to MGO.[6,7]

4. Furthermore, DHA and MGO are present in some antimicrobial Australian honeys, particularly those derived from *Leptospermum polygalifolium*.[8] Australian jelly bush honey is marketed for its non-peroxide activity, including by Comvita (http://www.myshopping.com.au/ZM--1227852936_Comvita_NPA_18_Australian_Jelly_Bush_Honey_250g ). Presumably the Australian *Leptospermum* pollen will be indistinguishable from NZ *Leptospermum* pollen. Do we want a definition that just covers NZ *Leptospermum*, i.e. mānuka, honey? Breeding work in NZ (PFR and others) for enhanced DHA nectar production might involve Australian species.

5. Some isotope tracer work has just been published,[9] but this is mostly about sugar adulteration rather than the plant origin of the nectar.

6. An additional method to authenticate mānuka honey might be by a characteristic profile of natural product marker molecules, with some of these not available commercially to potential counterfeiters. Two 2012 papers suggest a possible unique mānuka marker molecule: "leptosin" from a Japanese group[10] (also a patent application[11]); or "mother molecule" from Comvita and the University of Auckland.[12] "Leptosin" was also found in *L. polygalifolium* honey from Australia, and two other NZ honeys.[10] A German group also found "leptosin" in mānuka honeys, and found other characteristic phenolic natural products.[2] One technical challenge is that two different chemical structures[10,12] are reported for what I believe is likely to be the same marker molecule, so independent confirmation of structure is needed. But the most important point is to have an overall "signature" analytical profile of phenolic compounds that covers known authentic mānuka honeys.

7. A fundamental problem for all of the published work characterizing mānuka honeys is that the true plant origin is not rigorously established, since the bees were free to collect nectar from any plants flowering within their foraging range. The best collection of mānuka honeys is probably the "Honey Vault" held by Oritain.[9] However, I have been told by Oritain that the plants flowering in the

foraging range were not fully characterized, especially to distinguish mānuka from kānuka. Mānuka, *L. scoparium*, and kanuka, *Kunzea ericoides*, are regarded as quite different organisms by botanists, but are hard to distinguish by the general public (see p 301 in Dawson and Lucas[13]).

8. The "Honey Vault" samples were to be analysed for:

- Total activity and non-peroxide activity (UMF)
- MGO & DHA levels
- Pollen
- Phenolic levels
- Trace elements
- Temperature storage (aging)
- C3 / C4 sugars

See http://honeyvault.oritain.com/results.html.

Is this data available to MPI for defining a standard?

9. I believe that there is a lot of other important data on mānuka honey held by various NZ researchers, e.g. the Honey Vault information (see 8. above). Because of commercial rivalries, much of this has not been subjected to peer review and published in scientific journals.

10. I believe that experimental production of authentic unifloral mānuka honeys is needed, with nectar collected by bees enclosed with mānuka plants only. Known mānuka (and possibly separately kānuka) honeys should be analyzed for DHA/MGO. UMF/antimicrobial, pollen, isotope ratios and characteristic natural products. Results must be published in a peer reviewed journal. Ideally industry, CRI and academic researchers would collaborate to get this done as soon as possible.

Yours faithfully

**References**

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-ends-

## Submission 17

25 September 2013

**SUBMISSIONS TO MANUKA DISCUSSION PAPER**

This simple submission is made on the understanding that the MG Manuka Industry is a constant work in progress.....

**Introduction:**
The following replies to 'Questions for Submitters' are based on experience over 30 yrs as:
• An international marketer of niche food products
• Marketer and exporter since 1995 of certified organic and raw manuka and MG Manuka honey in retail packs
• Following closely the rise (and challenges) of the MG manuka industry from inception with Prof Peter Molan through evolution with Prof Tomas Henle to where we are today.
• Watching markets closely as gradually total peroxide and hydrogen peroxide brands started infiltrating the market on the coat tails of the MG manuka brands, which started mass confusion. (All honeys have total peroxide – MG Manuka also had that X factor if you like, which the others did not)
• Listening to countless wholesalers, retailers and consumers in UK, Canada, Singapore, Malaysia, USA in their own work environment, or at a myriad of trade shows and many consumer shows regarding their MG manuka understandings and utter confusions re hydrogen peroxide/total activity brands
• Fielding /managing hundreds of internet enquiries from wholesalers, retailers and consumers over the years re confusions arising between MG manuka's and hydrogen peroxide/total activity brands

**Brief Summary of Submissions Based on Option 3**

- Recommended review of BPSC definitions of MANUKA
- 70% pollen count for labelling of ord. Manuka (no claims)
- Labelling of MG manuka to start at MG100
- 50-60% pollen count + MG test for MG Manuka (as an interim pending new science)
- Guideline / Regulation Quality Control Measures for MG Manuka around Shelf Life
- NO labelling AS MANUKA or even MANUKA BLEND for hydrogen peroxide/ total activity brands.

**Questions for Submitters**
Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved? **We believe a Review could be helpful as per following guidelines**

- **Manuka Colour:** medium to deep amber - other?
- **Manuka Aroma:** deeply earthy, herbal, aromatic – other?
- **Manuka Flavour:** earthy, semi mineral / barley sugar tangy - other?
- **Moisture:** 17-21
- **Manuka Sugars:** for Manuka with MG claims there needs to be more independent research done as evidence shows that sugars are a very real threat to our industry

**Comment:** These guidelines could vary from region to region. However, I would argue the current BPSC word 'bitter' as 'bitter' alludes to other spieces being in the mix other than straight manuka! Having said this, it could be a regional thing!

**Microscopic properties determining Classification?:**

• **MG100:** Some would argue that for hives which are never moved from their manuka or manuka/kanuka locations, a minimum of MG100 and over would be sufficient to determine the monofloral classification of MANUKA. It is a known fact now that MG comes from MANUKA spieces (leptospermum scoparium) as against the KANUKA spieces (kunzea ericoides).

**Pollen Count:** For others, whose hives are moved in and out of pollination many times over and therefore exposed to a plethora of mixed pollens, before going onto a manuka or manuka/kanuka flow, pollen count would be the recommended classification to determine the monofloral classification of MANUKA

**Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?** Currently there are a number of scientific projects in process, such as fingerprinting, which is said to determine monofloral spieces. However until these projects **are verified by independent scientists** across all our key trading partners: China; USA; UK, Europe (there may be more), New Zealand needs to sit on the only acceptable and stable criteria currently available to it:

• CODEX parameters with pollen count
• MG testing

**Option 3 – combines both MG and Pollen Count Reasons:**

1. **Until new science** determining monofloral MANUKA is **validated INTERNATIONALLY**, the ONLY robust science for confirming both content claims and/or monofloral claims under the **'MANUKA'** label, that can be relied upon is:

- MG testing **starting at MG100**
- CODEX parameters with pollen count as follows:
    - 50-60% pollen count for MANUKA with claims from MG100
    - 70% pollen count for MANUKA without claims

**NOTE:** As mentioned above, there is general consensus from exporters of methylglyoxal MANUKA honey, that from MG100 upwards, the honey is primarily derived from the MANUKA spieces (leptospermum scoparium) as against KANUKA (kunzea ericoides) spieces. As there is science already in place to back this claim up, this needs to be taken into consideration as it is the prime substance of OPTION 2. This is why we believe there should only be a pollen count of 50-60% and only in lieu of new monofloral science being verified.

**Q.11: What are the likely impacts of Option 3 for businesses?**

**MG MANUKA LABELLING**

***1 Absolute Authenticity:*** New Zealand can no longer offer ambiguous or misleading MANUKA labelling with or without claims to national or international wholesalers, retailers or consumers

***2 Simplicity:*** It is paramount to keep to simple tried and true and easy to understand methods such as Codex Parameters (with pollen count) and MG testing , which can be supported with robust testing in off shore countries

***3 Urgent need to Eliminate:*** Confusion (particularly between methylglyoxal manuka and hydrogen peroxide/ total activity brands in the market place). Sadly, it is largely these total activity or hydrogen peroxide brands that have bought the New Zealand

***4*** MANUKA industry to its knees. There needs to be clear differentiation /demarcation for buyers, for retailers, for consumers

***5 Higher prices: It is believed that higher pricing can be achieved through Option 3***

**MANUKA labelling – NO CLAIMS:** This MANUKA is largely made up of a mix of manuka/kanuka as currently we cannot tell the difference between the pollens. This MANUKA **will not have any claims on it (otherwise confusion will start all over again) but would ideally have a 70% pollen count.** This offers absolute confidence that GENUINE ordinary MANUKA honey is being offered to buyers.

**NOTE:** It is important to NOTE that ordinary MANUKA is an ICON in New Zealand and even off shore. This MANUKA must remain. HOWEVER it MUST be a GENUINE manuka – not one largely made up of bush honey! Thus the 70% pollen count

**Q.12: What are the likely impacts of Option 3 for consumers *(wholesalers and retailers)*?**

- Absolute confidence that they are buying GENUINE AUTHENTIC Methylglyoxal Manuka
- Ditto for ord. MANUKA.
- With Option 3 Parameters in place and the elimination of all Total Activity of Hydrogen Peroxide brands being called MANUKA, the New Zealand MANUKA industry can only grow and thrive

**Q.13: What practical steps are required to effectively implement Option 3?**
**Methylglyoxal MANUKA:**

- **MG Testing:** Minimum for a claim to be MG100. .
- **Pollen count: 50-60%**: Until such time as new science can ratify MANUKA as the monofloral.

**MANUKA – no claims**

- **70% Pollen count.** It is important that this be higher than for the MG brands as this manuka has no other markers at this time to assist in determining floral type. As we all know here in New Zealand this no claim MANUKA is often largely made up of KANUKA. However as it is a New Zealand ICON, it needs to remain in place!

**MAKING CONTENT CLAIMS TO CONFORM WITH LABEL – Shelf Life**
"If any activity, chemical marketer or rating statement is made on a manuka honey label, it **must meet the stated level throughout its shelf life"**

**COMMENT: QUALITY CONTROL PROGRAMME – MG MANUKA:**

**General:** All MG Manuka exporters/packers would likely have additional basic quality control programmes in place for the batch number from harvest through its shelf life, ie tests for:

- DHA
- MG
- HMF
- Residues
- C4 Sugars
- other as regulation or off shore markets require

**MG MANUKA Labelling Information:** All labels should state, as at packing:

- Batch #
- MG minimum (ie MG100)
- Storage: 20°C (universal figure)
- Mfd:
- Exp:
- HMF:
- Min. Pollen 60%
- other as regulation or off shore market require

**Samples**

• Samples need to be kept for the length of the shelf life at appropriate temperatures

**SPECIAL NOTE: Controlling In Market Climatic Conditions**

All reputable companies send their honey out in optimum condition and they (usually) arrive in optimum condition. However, reputable packers cannot be held responsible (or to ransom) for product that is not kept to specification. Quite often – even though the storage and other specs are on the label, have been pointed out in meetings and are written into contracts, the product can still be stored at inclement temperatures for short or longer periods of time and all unbeknown to us or monitored by us as the product has been sold on to another party.

These in market temperature variances could play havoc with a naturally active product causing heat damage, rising sugars and even diminishing MG and other variances from when it was packed and arrived at its destination.

**So saying that our label claim MUST meet the stated level through its self life is OK, PROVIDED it is very clear that regulation quality control specifications are in place and fully understood by the purchaser that they must be adhered to throughout the product's shelf life, if claims are to be honoured!** This would be normal quality control practise I would have thought.

**CARE REQUIRED:**

**The Government needs to be very careful about putting out a blanket statement like:** 'If any activity, chemical marketer or rating statement is made on a manuka honey label, it **must meet the stated level throughout its shelf life' WITHOUT recommending responsible quality control label labelling specifications!**

**Content claims**

**Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?**

**NO. Absolutely not at this time:** Please review the first three points under 'Assessment Criteria for Defining Manuka Honey' in the Discussion Paper on page 5.

**Assessment Criteria – abbreviated**

- Minimise the potential for false or misleading label statements
- The definition should match what a reasonable consumer would understand and accept to be manuka honey, and it should be possible to communicate this definition clearly and unambiguously
- Minimise fraud

**Comment:** From day one, MANUKA with a CONTENT CLAIM, is perceived all around the world as being the MANUKA that Prof Peter Molan discovered and which was later confirmed by Prof Thomas Henle as 'methylglyoxal manuka'. There would be very few genuinely reputable international wholesalers/retailers today who are not fully aware that the AUTHENTIC manuka is the methylglyoxal manuka.

**The most significant confusion around the world today is:** methylglyoxal manuka –v- hydrogen peroxide or total activity MANUKA (which manuka is which? or How do I know what to buy? Utter confusion!

**FAKE MANUKA – a bone - as it is likely predominately KANUKA!** The 'manuka' brands driven more by hydrogen peroxide are what the methylglyoxal manuka industry call 'FAKE' manuka brands. Until these brands are regulated OUT from being labelled MANUKA or even MANUKA BLEND, New Zealand MANUKA will continue to fall into disrepute. This aspect needs addressing URGENTLY

**MANUKA (leptospermum scoparium):** While pollen may be indistinguishable between Manuka and the Kanuka spieces: MG is now becoming scientifically known to come ONLY from some Manuka (leptospermum scoparium) spieces.

Therefore, there should be no claims, other than MG claims made on labels that say MANUKA (or MANUKA BLEND)

**KANUKA and hydrogen peroxide brands** The writer has no concern if hydrogen peroxide or total peroxide brands – should there be generally consensus they are to stay – to be called KANUKA. Just not labelled MANUKA or MANUKA BLEND.

Please do not hesitate to ask for clarification or more information

-ends-

**Submission on Defining Monofloral Manuka Honey**

On behalf of

The point of the standard is to set a minimum quality level and to prevent blatant fraud and misrepresentation of manuka honey. New technology is likely to improve the profiling in coming years but commercially the honey industry cannot wait for this and is compelled to get an agreed standard together.

There is industry concerns in only using one key parameter to define monofloral manuka. It is very likely a high % of product that had been accepted as good quality manuka honey would have to be labelled blend because it didn't meet the 'main' defining parameter. The fear is a significant reduction in value of once acceptable manuka honey.

Eg Minimum 70% pollen

A batch with 65% manuka pollen and a MGO 430 (UMF13.5) would have to be labelled blend.

Due to commercial returns, beekeepers/packers probably have more historical data on how their manuka batches perform for MGO/NPA than pollen?

There is a strong lobby group that advocates pollen % as the only creditable defining factor in assessing manuka 'purity'.

An equally vocal group advocates MGO/NPA as the only creditable method

An option for either a pollen or a MGO/NPA seems to be unacceptable as an international standard. It can't be an either/or standard.

Therefore to get a standard that can be workable for both the pollen and the MGO camps, it may be necessary to include both characteristics in the standard but at a reduced level. A level of 50% pollen and 85 MGO (5+) could define the labelling standard for manuka honey. Honey not meeting these two parameters would have to be labelled Manuka Blend. An extensive database comparing MGO/NPA against pollen % needs to be collated. This would help to define where the parameters for each could be set.

It is submission that manuka honey should be defined using taste/smell/colour/ thixotrophic features backed up with a pollen analysis that considers both total pollen as well as pollen %. MGO/NPA levels can be manipulated and should not form the major defining parameter for manuka honey.

## Option 1: Definition Based on Pollen Count

Q3: What are the likely impacts of Option 1 for businesses?

- Reduced volumes meeting the specification (need data)
- More emphasis on pollen in sales and purchasing decisions
- 'downgrading'of the NPA story and worth that got manuka to the values currently enjoyed.
- More testing costs.
- Blending to achieve pollen standards but not exceed eg 60% + 80% = 70%
- Pollen % determining price
- Kanuka and manuka honey has virtually identical pollen.
- Blending down high pollen count manuka with eg Rewa Rewa (low to zero pollen)

Q4: What are the likely impacts of Option 1 for consumers?

- Low value connotations for the term 'Blend'
- Confusion as to what has more value, pollen or NPA . NPA has been the previous price driver.
- Confidence that there is a minimum if labelled as manuka.

Q5: What practical steps are required to effectively implement Option 1?

- Standardised and reliable pollen counting method
- Education and ranking of pollen% as a component of total pollen count. What is the correlation?
- Quick turnaround for testing.
- Homogeneous mixing and correct sampling of batches
- Inventory controls/blending records

Q6: If a definition based on pollen count is adopted:
What is the appropriate % of pollen to indicate a monofloral honey?

- Would assume 70% aligned to Codex
- Would prefer lower level in interim guidelines until a NPA/pollen relationship can be established or dispelled. Eg 50%

What, if any additional parameters should be included

- Total pollen count needs to be included and defined in conjunction with pollen %. These two parameters need to be considered, not just one in isolation.

Examples where both pollen count and NPA has been measured for the same honey sample

Batch 7682 NPA13.3 Manuka pollen 63% Total pollen 520,000

**Would this pass or fail??**

## Option 2: Definition Based on Methylglyoxal Content

Q7: What are the likely impacts of Option 2 for businesses?

- Depends on where the defining level is set MGO85 (NPA5+) or MGO263 (NPA10+). Or somewhere in between?
- It is likely that NPA 5+ honey and higher is already being separated out for special packing and labelling.
- 'Table manuka' below the standard would have to be labelled as blend even if pollen % was high.
- The 'growth'or conversion of DHA to MGO takes time whereas pollen is defined and unchanging.
- Retail pricing and trading in bulk honey is already structured using MGO levels.
- Some species of manuka are thought to produce higher levels of DHA means this standard would lead to regional advantages for some beekeepers. More crowding out of hive sites/areas.
- Blending with non manuka honey eg diluting NPA8.5 down to NPA5.0 would still meet the standard even if 1/3 non manuka added..
- Maintaining the current value structure of MGO/NPA (5+, 10+, 15+ etc) has greater worth than the trade off of having to call 'low active' manuka as a blend. This could be different if NPA5+ was not accepted as high enough.

Q8: What are the likely impacts on Option 2 for consumers?

- Probably status quo except for 'table manuka' having to be labelled Blend if it doesn't make the standard.
- Could still be purchasing heavily 'diluted' product if NPA5+ is the allowable limit.

Q9: What practical steps are required to effectively implement Option 2?

- Largely in place but MGO is an evolving substance that is changing.
- Maturing time could be 12 month – 18 months to gain maximum value.

Q10: If a definition based on methylglyoxide is adopted:
What are the appropriate levels of methylglyoxal to include?

- Should be MGO263 NPA10+ as a minimum due to the ability to heavily dilute in producing a NPA5+ product. A high % of honey currently sold as Manuka would have to be labelled Blend.

  What, if any, additional parameters should be added?

- DHA correlation to potential MGO conversion would be valuable for honey trading but not required for retail labelling.

## Option 3: Definition Based on Methylglyoxal Content and Pollen Count

Q11: What are the likely impacts of Option 3 for businesses?

- Will reduce the volume currently sold as manuka honey. Depending on where the levels are set, could severely reduce the volume.
- Additional testing costs but a lower volume for sale
- 'Manuka'will be a real premium and 'Manuka Blend'will be a widely variable product.
- Will need to label and define 'Manuka Blend' to communicate value

Q12: What are the likely impacts of Option 3 for consumers?

- Will need to understand the concept of manuka blend
- Compliant honey will be high in price
- Confidence that there is a standard.

Q13: What practical steps are required to effectively implement Option 3?

- A robust and reliable pollen test.
- Good data base on pollen to MGO ratios of current 'manuka'honey.
- Due to the need to meet both a pollen and MGO minimum, then lower levels for each parameter should be applied eg >50% pollen and >85MGO = minimum standard. Companies could then label/advertise any tested attributes above the minimum as they see fit.

The purpose of this email is to serve as our company's submission regarding the MPI discussion document 'Options for Defining Monofloral Manuka Honey'. Our response to your questions is given below in bold.

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?
**We support the existing BPSC parameters as being appropriate for the identification of manuka honey.**

Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?

Option 1
Q3: What are the likely impacts of Option 1 for businesses?
**We contend that the continued use of pollen counts will have little impact on business. There will be an element of market education as the transition from 'pure manuka' to 'pure manuka and kanuka blend' descriptors occurs.**

Q4: What are the likely impacts of Option 1 for consumers?
**Little impact.**

Q5: What practical steps are required to effectively implement Option 1?

Q6: If a definition based on pollen count is adopted:
• what is the appropriate percentage of pollen to indicate a monofloral honey?
**It is our opinion that >70% pollen be used to support a monofloral claim.**

• what, if any, additional parameters should be included?
Information Sought:
Examples of internationally traded honey that includes multiple genera but is marketed under a common name.
Datasets where both pollen count and MG and DHA levels have been measured for the same honey samples.

Option 2
Q7: What are the likely impacts of Option 2 for businesses?
**We contend that MG is not a suitable biomarker of manuka purity as the NPA activity can be variable as a result of the particular variety of L. scoparium harvested (Stephens, 2006). As such, without a solid linearity in relationship between MG content and honey purity, that it is patently unsuitable.**

Q8: What are the likely impacts of Option 2 for consumers?
**As above**

Q9: What practical steps are required to effectively implement Option 2?
Q10: If a definition based on methylglyoxal activity is adopted:
• what are the appropriate levels of methylglyoxal to include? (Please provide any

available data or scientific evidence to support your submission).
• what, if any, additional parameters should be included? e.g. DHA.

Option 3
Q11: What are the likely impacts of Option 3 for businesses?
Q12: What are the likely impacts of Option 3 for consumers?
Q13: What practical steps are required to effectively implement Option 3?
Content claims
Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?

References:
The factors responsible for the varying levels of UMF® in mānuka (*Leptospermum scoparium*) honey. Jonathan McD C Stephens. Doctorate thesis. 2006

Kind regards

-ends-

**Options for defining Monofloral Manuka Honey**

MPI Discussion Paper No: 2013/38 refers.

understands the necessity for and also appreciates the difficulties in providing a definition for Monofloral Manuka Honey.

Our membership includes not just primary producers of honey who have a direct interest in defining Monofloral Manuka Honey, but also other member companies that have an interest in the wider generic issues at stake.

Clear standards for the production and manufacture of animal and plant products into food are the cornerstone of commerce and trade in these products with enforcement appropriate to enable 'commercial certainty' and ensure a 'level playing field'. strongly believes that Codex standards should be used to the maximum extent possible.

Truthfulness in labelling is paramount in preserving the trust between the New Zealand food industry and consumers (wherever they are) and MPI must do all it can to protect the integrity and credibility of New Zealand's regulatory standards and the overall regulatory programme that underpins 'Brand New Zealand'.

MPI needs to ensure risks to 'Brand New Zealand' are mitigated and other sectors operating under its 'umbrella' are not prejudiced by shortcomings in the programme operating within New Zealand. MPI should also do all it can to assist importing countries in detecting fraudulent activity in the marketplace for the same reason.

In this regard the regulator's dedication to appropriate investigation and enforcement is of paramount importance. There have been reports of examples of unscrupulous operators (domestic and international) undermining the image New Zealand has in the market place and encourages MPI to do all it can to provide clear and science based standards for food production and manufacture. New Zealand's regulatory programme must have a robust compliance programme as well as active enforcement where these rogue operators are involved in what is clearly illegal activity and prejudicing the sustainable commerce and trade in our food products.

Specifically and in relation to Monofloral Manuka Honey discussion paper agrees with the objective of "Ensuring New Zealand Manuka honey is true to label and that consumers are not misled", and that a robust definition for Manuka honey and clear parameters for making content claims are required.

agrees with defining our own honey and using Codex standards as a sound basis and starting point for both this and the processing/manufacturing standards.

This international standard is already the basis for international trade and major local producers have been adhering to this international standard over many years and for some decades.

Codex is clear in its requirements for defining Monofloral honey and acknowledges the difficulty in using chemical profiles in this regard.

understands the Food Standards Code is consistent with this approach and further that labelling requirements, particularly around health claims, if enforced will prevent consumers being misled by New Zealand producers. It's our view that the assessment criteria for judging the options are sound.

appreciates that there is a need for more science to make good decisions but agrees that MPI may need to act now to provide an interim guideline or standard to help mitigate potential reputational risk issues as indicated above.

In terms of the options listed in the Discussion Paper, would like to make the following observations:

• While the increased value of Manuka honey over many other honeys is based on a supposed 'Unique Manuka Factor' (UMF) with properties purported to give various health benefits including having an antibacterial effect, most consumers recognise it by its organoleptic features and to this end Manuka and Kanuka are the same thing (Myrtaceae family rather than the genus *Leptospermum*). For by far the majority of consumers both are traditionally regarded as 'Manuka'. To this end pollen counts are an important determinant of Manuka honey and should be the primary

determinant of whether honey is Manuka or not along with other descriptors described by Codex for Monofloral claims.

• There is some discussion/debate on what makes up the UMF with a general view that dihydroxacetone (DHA) in flowers of plants within the *Leptospermum* genus converts to methylglyoxyl (MG) as a part of the chemical activity within honey. The levels of these chemicals are not stable within a honey with conversion going on as well as 'decay' of MG over time. There is also increasing discussion and claims around the 'peroxide and/or non-peroxide' effect of constituents within honey sourced from plants in the *Leptospermum* genus.

• The levels of UMF in Manuka honey varies both within the Myrtaceae family (present in some members of the *Leptospermum* genus but absent within the *Kunzea* genus) but also within *Leptospermum scoparium* itself.

Given this situation, would it not make more sense to closely follow the Codex standard in defining a Monofloral honey and in addition require the level of any chemical of interest (e.g. MG) to be stated at a 'front of pack' level in conjunction with the term Manuka honey, rather than using MG as a part of defining Manuka honey?
This could take the form of 'greater than' levels and would as the discussion paper points out, need to be above the stipulated level for the time that the honey is 'in commerce'. Usually this would be covered by a 'best before' date. In effect this is a similar approach taken to general labelling for nutrients.

would therefore advocate MPI providing an interim guideline (or requirement) defining Manuka Floral Honey using descriptors as per the Codex standard.
This would largely rely on pollen counts (recognising the standardisation of testing required) as a primary determinant of Manuka Floral Honey. An additional requirement should cover the situation where there is a claim that specific chemicals e.g. MG, are present and the minimum level could be stipulated on the label in conjunction with the name Manuka Honey. This requirement and how it is achieved and tested for, built into operators Risk Management Plans. Where there is no UMF claimed, the name 'Manuka Honey' would stand alone.
In advocating this approach recognises this puts the choice in the hands of consumers with products priced according to for example MG, with discerning buyers/users making their choice appropriately and in accordance with their expectations of the honey.
As a final comment while New Zealand producers and regulators can concentrate on improving local regulation and we must do our best to adhere to high standards, it is important not to exaggerate the ability that any action we can take will stamp out all mislabelling and potential food fraud in the world. As we have seen internationally in other food categories such as infant formula and wine, some unscrupulous firms with no link to New Zealand whatsoever can attempt to fraudulently trade on New Zealand's good name as a producer of high quality food products. New Zealand take further steps to put its own house in order, but there will unfortunately always be some fraudulent activity which is completely beyond New Zealand's control therefore requiring regulators in our main markets to be equally vigilant in enforcing their own local truth in labelling laws to catch such lawbreakers.

**METHYLGLYOXAL CONTENT**

Question 7.

*The idea to simplify the marketing of a product, aka Manuka, companies have used propaganda materials to mislead the consumers in believing only one single component is responsible for the activity of Manuka honey when we know they are more than one. The biggest predicament with the option 2 here is that nothing will change in terms of the manipulation of methylglyoxal of Manuka honey and it can only encourage more beekeepers and businesses to manipulate it some more until the media and the public becomes aware of it. We are aware of it, the industry is aware of it, how long it is going to take to worldwide governments to catch up on the manipulation of Methylglyoxal and DHA in Manuka honey? Using a cytotoxin, which gets more bad publicity in the scientific community does not help the use of Manuka honey as a food, which I believe is MPI primary goal here. According to scientific data, the methylglyoxal produced from one shrub originating from the South Island of New Zealand or the North Island should not produce more methylglyoxal from one another. It would be like saying one orange produces more vitamin C than another. As MPI indicated the control over the manipulation in this case is very weak. does not see how this option can be viable, especially when bees can be be fed DHA to increase the methylglyoxal content. Methylglyoxal can be added to the honey.*

Question 8.

*The consumers have been bombarded with various registered or unregistered trademarks like UMF, Methylglyoxal, MGL, OMA, TPA, NPA and many more over the last decades. People are already confused with the lack of consistency in the Manuka honey world. Experience has shown that people do trust Manuka without the activity numbers. If the honey was marketed as pure Manuka without the use of methylglyoxal content, then the public should trust one brand based on quality, taste, effectiveness and freshness, not based on manipulation, genetic modification (which seems to be the idea with the patent Comvita have to grow shrubs with higher activities. The public and government-alike are becoming anti-GMO or manipulation. Not controlling this side of the equation in New Zealand will not only affect the reputation of the GMO free country that people believe about New Zealand and anti-GMO or bio-engineered honey will be boycotted by many agencies. Canada is working on this right now, for example. If the government do not do their job by passing laws to this effect, the public has and will continue to lobby for change, demanding the stores to label their products as GMO, if this is the case. Ensuring a standardized honey marketed clearly and solely as Manuka honey would be sufficient to stop the greed happening with businesses and bring more confidence in the public eye to buy a non-manipulated honey, which has the reputation to work, regardless. A common Manuka honey label sold as a food, should not bear any claims of methylglyoxal anyway, as it would be promoting a cytotoxin, making the public believe that the more they take the better for them. Yet, they are no long-term effect on high potency Manuka honey affiliated with cancer, genetic mutation, etc. People understand more about this and the long-term side-effects of manipulated or genetically modified foods. Please do not allow New Zealand to follow this route.*

Question 9.

Although testing exists that test centers need to be validated to ensure they are using the same testing methodology, standards and criterion. Indications of manipulation and adulteration must also be present by the measurement of additional markers. For example HMF, DHA and diastase. The time point at which measurements are taken must be standardized. For example a ratio of DHA:Methylglyoxal from freshly extracted honey and then at an agreed time point, for example +30days, to establish an additional ratio and Methylglyoxal level. In order to market a honey at a particular Methylglyoxal level which remains stable throughout its shelf life the DHA level needs to

be saturated, this would be the "natural" peak of the Methylglyoxal. Stability testing should also be put in place to ascertain the shelf life of the honey if the honey is to remain at that Methylglyoxal level throughout its shelf life. In addition tolerance limits should also be assigned to stability studies to address batch specific differences. A DHA and Methylglyoxal level needs to be ascertained at extraction, the time point of the tests needs to be consistent for all suppliers.

**Steps**

**1) DHA:Methylglyoxal**

Assertain the saturation point with tolerance limits of DHA for a supplier measuring the number of days saturation was reached. At the saturation time point the DHA:Methylglyoxal level needs to be ascertained, the ratio should be 2:1. This level could be used as the MG level in honey.

**2) Stability Studies**

Stability studies determine the shelf life of a product and studies the activity of components over a period of time. The Methylglyoxal level should be added to the stability protocol for manuka honey and it should remain within tolerance limits during its shelf life. Additional factors that may be measured are HFM and diatase levels.

Question 10.

- *What are the appropriate levels of methylglyoxal to include (evidence) Normal levels of methylglyoxal between 70 and 80 mg/kg should be standard in the industry, as the "free" methylglyoxal content normally increases as the glucose breaks down. Samples tested after 1 year shows levels of non-manipulated honey of up to 200 mg per kg. How companies manage to get up to 1400 mg/kg freshly produced is certainly a mystery to unless manipulation has taken place. Above tests demonstrate in the majority of high levels of methylglyoxals that honey has been manipulated.*

The amount of MGO can vary depending on a number of factors.

a) Species variation (Jonathan M Stephens 2009).
b) Cultivar (Jonathan M Stephens 2009).
c) Geographical Location (Jonathan M Stephens 2009).
d) Age at assay (Jonathan M Stephens 2009).
e) Heat treatment (Jonathan M Stephens 2009, Atrott, Haberlau et al. 2012).

To establish the proposed acceptable specifications:

a) Market range of a-c must be established.
b) The age at which Methylglyoxal assayed must be established.
c) Manipulation of honey must be ascertained (i.e. reviewing HMF and DHA levels
d) simultaneously).

*Literature shows a range of values (Mavric, Wittmann et al. 2008, Adams CJ 2009, Jonathan M*

*Stephens 2009) and very few data presents details of sample age and floral contamination.*

***Additional Parameters***

**1) DHA:Methylglyoxal ratio**

Atrott et. al. (2012) quantified Dihydroxyacetone (DHA) and methylglyoxal in both freshly extracted honey (6) as well as commercially available honey (18). The DHA ranges were 600 to 2700 mg/kg in the fresh samples and 130 to 1600 mg/kg in the commercial samples. These findings confirm that DHA levels are comparatively higher in fresh honey. The corresponding Methylglyoxal contents varied from 50 to 250 mg/kg in fresh and 70 to 700 mg/kg in commercial manuka honey samples. The study showed a linear relationship in the commercial honey with a DHA:Methylglyoxal ratio of 2:1, and although it was much higher in fresh honey it equated to a 2:1 ratio as it ripened. The study shows possibility of using a DHA:Methylglyoxal ratio to determine whether there has been any manipulation, however needs to be compared to the levels at extraction. DHA and Methylglyoxal can serve as suitable unique quality parameter for manuka honey. However, since DHA can also be fed to the bees during the pollination process, it would still be challenging to control the manipulation in all active beehives by the government.

**2) Diastase activity and hydroxymethylfurfural content (HMF)**

Codex Standards states that diastase activity measured using the Schade scale should be no less than 8, and hydroxymethylfurfural content of no more than 40mg/kg and not more than 80mg/kg in honey sourced from regions of tropical climate. These measures can also be a factor in determining whether a honey has been manipulated by heat application to increase the amount of MG in a shorter period of time. The HMF would rise and enzyme activity would be reduced.

**HMF**

There is a comparative rise in the HMF levels in fresh and aged honey, approximating to a 10-fold increase over 5 years (Jonathan M Stephens 2009). This marker can be used to assess the age of the honey at which time the Methylglyoxal level was ascertained. In addition it has also been theorised that an increase in Methylglyoxal levels after the natural saturation of DHA comes from its release from sugar compounds as they breakdown overtime (Jonathan M Stephens 2009, Atrott, Haberlau et al. 2012).

**OPTION 3: DEFINITION BASED ON**

**METHYLGLYOXAL CONTENT AND POLLEN COUNT.**

Question 11.

*While MPI suggests this option minimizes the potential for fraud, agrees strongly as while the pollen count covers one aspect, pollen count can also be added. How many times have we received and tested samples of honeydew or Beechwood honey coming from New Zealand, in a liquid base, without pollen count and with an activity added? Since the Beechood pollen count does not show, it is easy to crush some Manuka pollen into a honey base and calling it Manuka. The lack of pollen from Beechwood, makes it an easy base. All concerns related to methylglyoxal and its manipulation remains the same as option 2. The combination of the two makes it harder for businesses to manipulate the honey but if greed comes to play, it does not make it impossible. Since Option 3 is a combination of Option 1 and option 2, I have to rest my case on what has been mentioned above. What MPI should realize is that Methylglyoxal is certainly not the only factor contributing to the activity of Manuka since labs only compared the so-called activity to only one type of antiseptic solution, ignoring any other factors contributing to the effectiveness of the product. If the product is sold as a food, methylglyoxal content should be ignored and discarded as more and more regulations are coming to play to address these claims. Canada and the United States of America are not allowing the use of MGO on the label anymore. A plain Manuka honey label should be a standard for the whole industry, avoiding tampering with the product. The honey is rare in the first place. How many more manuka honey jars New Zealand wishes to sell if the country is saturated*

*with the product. More and more attempts are made in other countries to grow Manuka shrubs and to produce Manuka honey from the same species. The monopoly of New Zealand may disappear over time.*

Question 12.

*Once again, the impact on consumers is maximized. People do not know about pollen count and less about methylglyoxal. For many years, they were used to UMF, as the simplicity of the number indicated that an antiseptic solution of 10% was equivalent to a UMF 10+. This simplicity is being replaced with a more complex, yet more negative aspect in the name of methylglyoxal. In people's minds, methylglyoxal will remain methylglyoxal. It would be like telling them: "Eating high levels of rat poison is bad for you but little is ok." In the contrary, adopting methylglyoxal as a measure of Manuka honey activity would be interpreted as "eating higher levelsof poison is good for you. Too little is not enough!" Where is the therapeutic aspect in this?*

Question 13.

In order to implement Option 3 the issues highlighted in options 1 and 3 would still need to be addressed. Furthermore addressing the issues in Options 1 & 2 would make Option 3 more robust.

**CONTENT CLAIMS**

Question 14.

Studies have shown that hydrogen peroxide activity is not a feature of manuka honey the way it is marketed. If hydrogen activity is being claimed, then the measure of hydrogen activity would have to be taken at a pre-defined time point, for example at the pre-determined time point for Methylglyoxal testing. If hydrogen peroxide is present in an amount that has been shown to have bioactive efficacy then it should appear on the label. Further comments on the overall proposal: While this proposal ignores International Honey regulations, how about the regulations within New Zealand of all Manuka drums sold overseas and labeled overseas? How does MPI suggests to control the export of Manuka honey in bulk?

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## Executive Summary

In an international nutraceutical market that is tightening due to increasing market regulation and consumer expectation; the New Zealand honey is presented with an opportunity to rise above the challenge and redefine manuka honey by chemical markers. This approach would be driven through contestable science.

In this paper a series of options are presented to define manuka honey. We propose MPI should adopt the following positions –

- Support independent collection and scientific analysis to provide the robust data necessary to define predominantly manuka honey;
- And publish an interim guideline defining the minimum acceptable criteria for manuka honey. The current industry consensus appears to be :
    - A non-peroxide activity level of not less than 5; or,
    - A methylglyoxal level of not less than 100 mg/kg; or,
    - A pollen count of not less than 70%

## Abstract

The options for defining manuka honey put forward by the Ministry of Primary Industries do not address many of the inherent difficulties regarding this honey type.

Option 1 suggests a pollen standard be enforced, however it is widely recognised that pollen in honey harvested in mixed floral environments will not necessarily reflect the nectar that was gathered to produce the honey, and furthermore the standard microscopic analysis for pollen counting in honeys does not differentiate *Leptospermum scoparium* and *Kunzea ericoides* pollens. Thus pollen in manuka honey cannot be expected to reliably reflect the nectar collection that occurred to produce the honey, and is unlikely to address market concerns.

Option 2 suggests using a minimum methylglyoxal concentration in manuka honey as a standard. This option does not address two important points, firstly the concentration of methylglyoxal is not stable in manuka honey and therefore this marker is not particularly suitable. Secondly, it is very likely that there are significant differences between manuka honeys harvested in different regions or from different *Leptospermum scoparium* varieties regarding the honeys inherent ability to produce methylglyoxal. Thus a honey from some regions may be predominantly monofloral manuka but carry significantly less methylglyoxal than a manuka honey from other regions/varieties.

Option 3 suggests employing a pollen standard in association with a minimum concentration for methylglyoxal. Data from honey samples where methylglyoxal has been quantified and pollen counts completed demonstrates the current manuka honey crop falls into four distinct categories. There are honeys that have more than 70% manuka/kanuka pollen content; and this group includes a range of manuka/kanuka honey blends as well as more monofloral representatives of these floral types. However around half of manuka honeys with less than 70% manuka/kanuka pollen contain appreciable concentrations of methylglyoxal; this supports these honeys being labelled as manuka honey. The balance of the honeys contains neither 70% manuka/kanuka pollen content nor measurable non-peroxide activity, in that they contain less than 100 mg/kg methylglyoxal. These honeys should not be labelled as manuka.

The New Zealand honey industry has tended to describe manuka, kanuka, and manuka/kanuka honey blends as manuka honey. As these honey types exhibit very different bioactivities this is most probably a historic misnomer that should be addressed. To readily differentiate these honeys chemical fingerprinting would appear to be the most suitable method.

However in an interim a combination standard would remove the manuka label from honeys currently being retailed as manuka that do not exhibit non-peroxide activity or contain 70% manuka/kanuka pollen. Therefore it is suggested that a honey must either contain more than 70% manuka/kanuka pollen and/or more than 100 mg/kg methylglyoxal to be labelled as manuka honey.

## Consideration of Parts 1 & 2, Introduction & Standards for Honeys

Any review of honey being currently retailed nationally or internationally as manuka honey reinforces the need for enforceable standards.

**Question 1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?**

The BPSC organoleptic and physicochemical characterisation includes honeys that are sourced from *Kunzea ericoides* and *Leptospermum scoparium* and blends thereof. Therefore it could be suggested that independently collected monofloral honeys are subjected to these tests to examine whether these characterisations could be improved. For example, the standard deviation around manuka honey colour appears fairly large, however it is not relative to the other honeys with a colour rating in the New Zealand Honey Guidelines. It is probable the colour scale was designed to incorporate blend honeys of the major floral types to some degree, so more accurate chemical definitions may reduce the acceptable ranges.

**Question 2: Are there alternative options for defining manuka honey (i.e. not based on MGO content or pollen count), and what scientific evidence supports this?**

The early work mostly completed by Professor Wilkins at the University of Waikato typing New Zealand honeys by chemical fingerprinting demonstrating there were significant differences in the profiles of the New Zealand honeys, and there were a number of publications. More recently Stephens and others demonstrated differences in phenolic acid and ester profiles between manuka and kanuka honeys.

this technology for differentiation of the New Zealand honeys using honey samples from a nationwide collection of the principal honey types.

UMFHA, ; has demonstrated the New Zealand honey crop is divisible into floral types The laboratory is using liquid chromatography-mass spectrometry technology (LC-MS). In the order of 60 compounds were identified that discriminated manuka and kanuka honeys from the other floral types in New Zealand, and a subset of six of these discriminated manuka and kanuka honeys.

This method allows the use of stable independent chemical markers over and above the typical methods of identification of manuka honey, for example physicochemical and organoleptic characteristics, some of which are fairly subjective, methylglyoxal and dihydroxyacetone concentrations, or pollen counts.

Scientifically this method is attractive, it is objective, a clear nt for manuka honeys can be established which is expected to over-ride regional and *Leptospermum scoparium* variety differences encountered in some markers such as dihydroxyacetone; the definition of other major floral sources

allows the presence of certain unique compounds to be routinely examined that would indicate a major floral contribution from secondary sources; the contribution of these other floral types could be quantified; and importantly the removal of these compounds is economically unfeasible meaning chemical adulteration would become difficult.

In effect, in a genuine manuka honey, there are a suite of compounds that should be present in the correct ratios, and the chemicals that give rise to non-peroxide activity should be correlated. If markers for other honey types are present there should be a proportional reduction of the concentration of the manuka marker. For example, if a honey contained the chemical signature of a kanuka or other forest honey, that honey would not be expected to carry elevated levels of dihydroxyacetone or methylglyoxal.

Accordingly the absence of chemical markers is as important as the presence of markers.

## Consideration of Option 1: Definition based on pollen count

The use of pollen analysis to identify the floral nectar composition has been challenged by a number of authors. Most importantly in the terms of this document is the review by Professor Peter Molan describing the shortcomings of melissopalynology from a range of factors that vary from the pollen contribution of the flowers to the attractiveness of the pollen to honeybees. Furthermore it is well recognised that the worker bee population in a hive forages for nectar and pollens independently and will utilise the best available source in an energy-efficient manner.

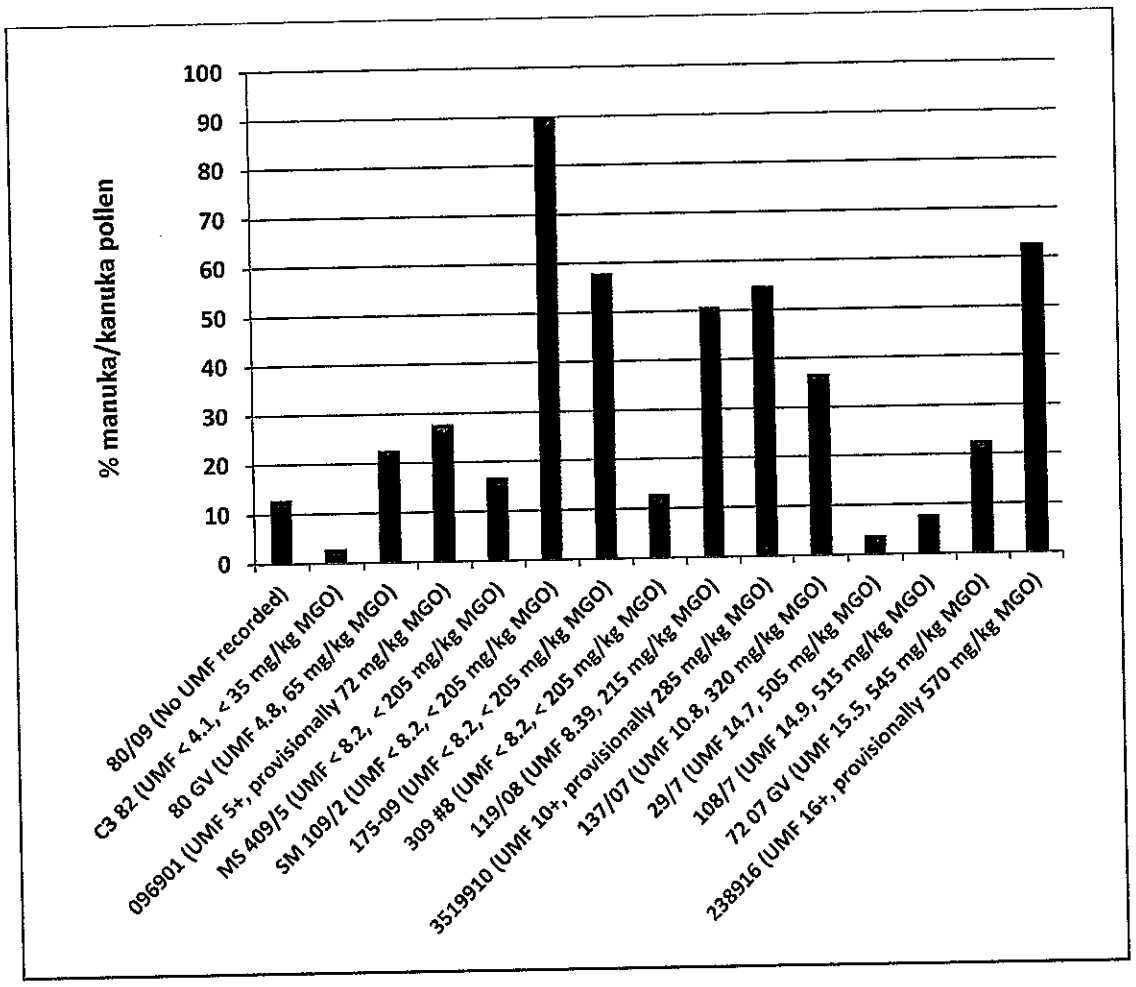
In New Zealand these underlying deficiencies are compounded by the inability of melissopalynological techniques to distinguish *Leptospermum scoparium* and *Kunzea ericoides* pollen grains. This point is well recognised by a New Zealand honey company that publicly advises "the pollen of both manuka and kanuka are indistinguishable from each other under a compound microscope" (http://www.airborne.co.nz/manuka.shtml). Indeed, even the New Zealand government research organisation the Institute of Geological and Nuclear Science (GNS), which could be considered the premier and most authoritative institution regarding this subject, shows on Honey Pollen Analysis sheets manuka/kanuka pollen are not divisible.

Therefore even to uninformed observers it would appear that pollen analysis is very unlikely to be representative of the nectars incorporated into a honey, and additionally if pollen was representative, *Leptospermum scoparium* and *Kunzea ericoides* pollens cannot be differentiated. It should be noted that laboratories overseas carrying out pollen analysis on New Zealand honeys are well aware of this deficiency. Yet typically both laboratories in NZ and overseas continue to describe this morphological pollen form as manuka pollen (*Leptospermum scoparium*) and are willing to certify pollen content; it is questionable why these organisations are unwilling to describe this pollen as kanuka (*Kunzea ericoides*).

The risk analysis around Option 1 in the MPI document needs further consideration. Honey derived from solely *Kunzea ericoides* does not carry the unique set of bioactivities that honey derived from *Leptospermum scoparium* exhibits. Therefore labelling manuka honey based upon pollen content gives the consumer no protection on true *Leptospermum scoparium* nectar content. Subsequently the protection against the potential for fraud is minimal. It has not been noted in the MPI document that the addition of pollens to honeys during processing is not unknown in the beekeeping industry, and certainly the filtering of processed honey will also skew subsequent pollen counts. As far as the author is aware, only GNS provides independent pollen count analysis in New Zealand. The author is unfamiliar with any ring trials completed in New Zealand. In view of above comments regarding reliability of pollen analysis the evidence of pollen content predicting floral purity in a honey in the New Zealand forest and scrub environments is very low. The cost and benefit analysis is considered below.

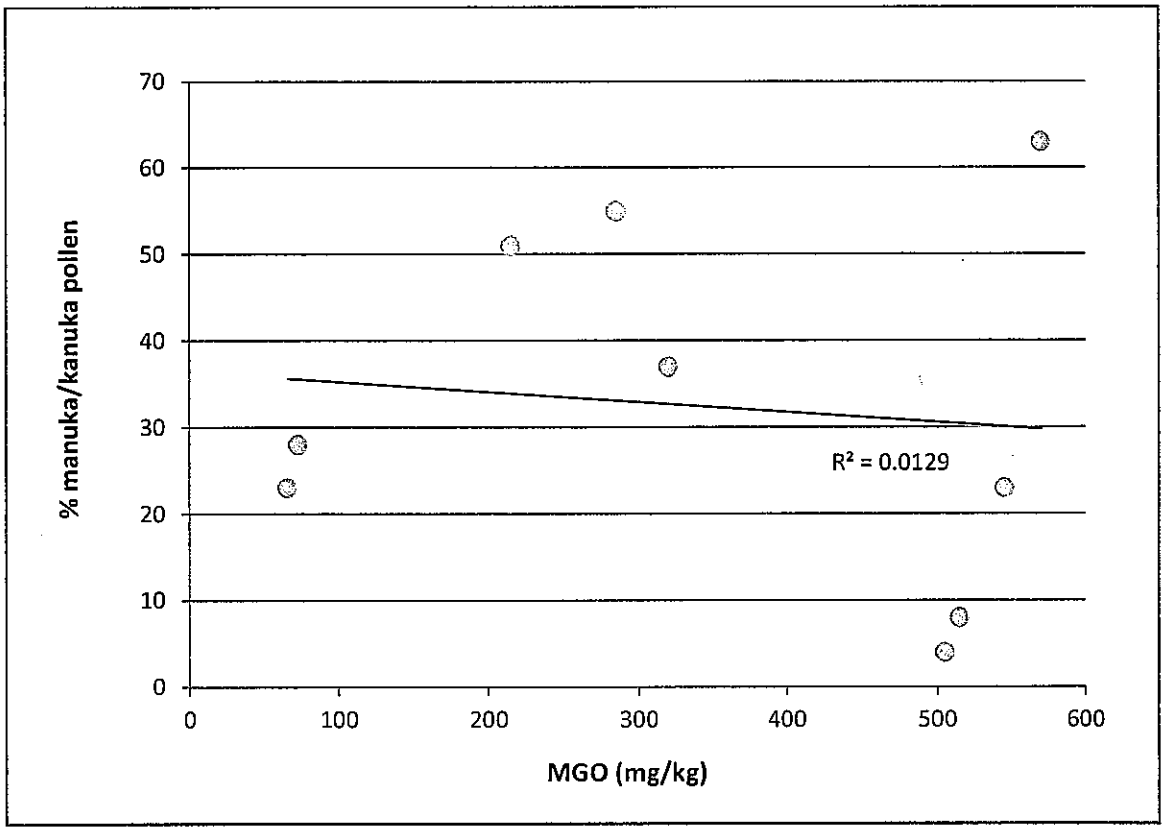
have supplied a set of historic pollen results which that company had completed in 2008, 2009, and 2010 on honeys that had also been analysed for non-peroxide (UMF) activity.

Figure 1 illustrates the pollen count of manuka/kanuka pollen in relation to the UMF activity for each sample.




However in some cases here the non-peroxide activity was not defined as it fell below the detectable limit by the testing method. There is no positive correlation between pollen content and increasing non-peroxide activity.

The same data can be reinterpreted in a scatter plot in Figure 2. Here the five samples that did not have detectable non-peroxide activity or the single sample with no recorded non-peroxide activity have been removed. Methylglyoxal (MGO) content is calculated from the non-peroxide activity using the MGO/NPA calculator.



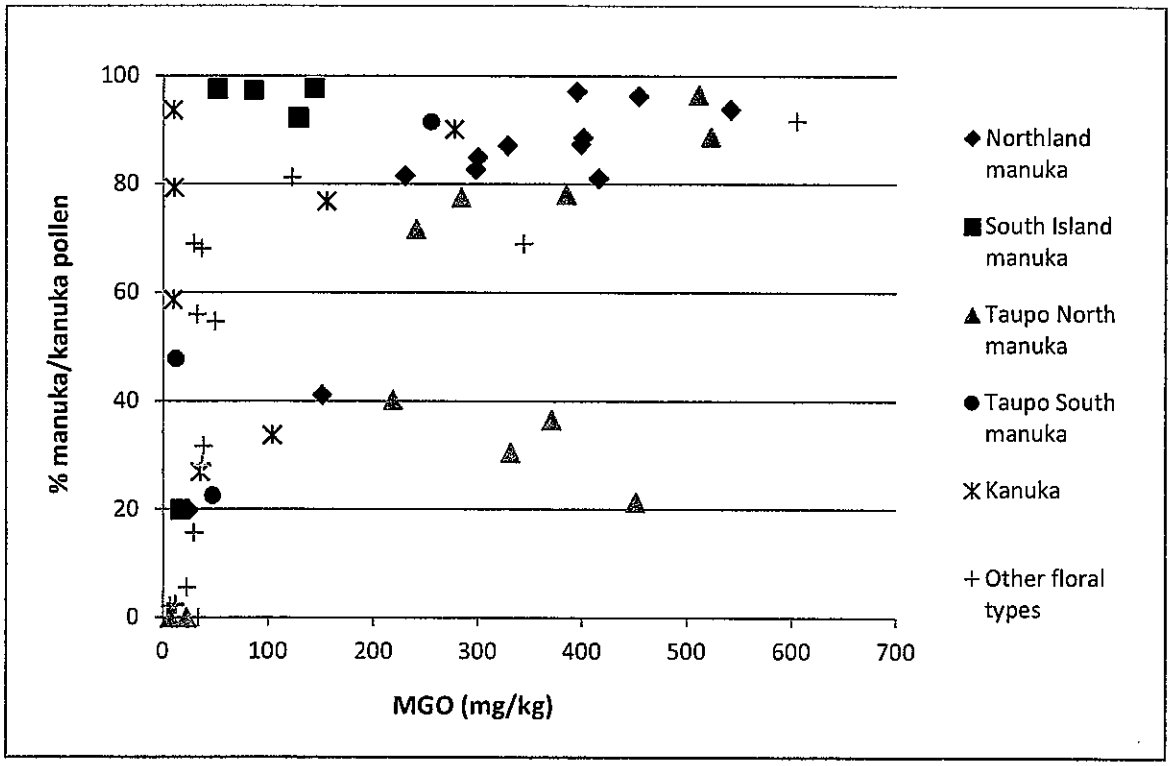

Five of the nine honeys in this set contained more than 300 mg/kg MGO at the time of analysis yet none of these four contained 70% manuka/kanuka pollen. Two honeys contained between 200 and 300 mg/kg MGO and again failed to have 70% manuka/kanuka pollen. It is likely the remaining two samples with less than 100 mg/kg MGO and less than 30% manuka/kanuka pollen were honey blends.

Clearly however in these honey samples pollen was not a suitable predictor of monoflorality.

A similar analysis can be carried out on the . The geographic origin of these samples is broadly described, floral source was attributed by the beekeeper, pollen content was determined by GNS, and the MGO and DHA quantification was completed by Hill Laboratories.

Clearly in environments where the bees are collecting manuka/kanuka pollen there is a preponderance of these pollens in many honeys. Consequently the manuka/kanuka pollen content and MGO concentration in these honeys does not correlate. The Northland manuka honeys typically carried more than 80% manuka/kanuka pollen and had a range of MGO above 200 mg/kg. The South Island manuka honeys typically had more than 90% manuka/kanuka pollen yet less than 200 mg/kg MGO. The Taupo North and Taupo South honeys; an area that includes the East Coast, Wairarapa, Whanganui and Central North Island, Waikato and Coromandel, provides less convincing results. Four out of ten manuka honeys with more than 200 mg/kg MGO had significantly less than 70% manuka/kanuka pollen. In some respects this data mirrors that of in that honeys sourced in these regions often have alternative pollen sources utilised by the bees and consequently do not have the manuka/kanuka pollen counts seen in other regions where the bees are harvesting this pollen source.

The MGO, DHA, and percentage manuka/kanuka pollen are listed in .



The cost and benefit analysis in the MPI document may prove to be considerably misleading. The evidence strongly suggests that there is a considerable volume of manuka honeys harvested in the North Island that carry appreciable concentration of methylglyoxal yet do not have 70% manuka/kanuka pollen content. This would mean that these honeys, despite the fact that the bioactivity is present that is sought by the consumer and is driving the retail prices in the international market, would not be classified as manuka honeys.

The questions under Option 1 of the MPI document are considered below.

**Question 3: What are the likely impacts of Option 1 for businesses?**
It is most likely that up to half of the non-peroxide active manuka honeys being harvested throughout the North Island would not contain 70% manuka/kanuka pollen. By using volumes produced in these regions by businesses and and the proportion of the total crop that this represents within these areas, we estimate up to and perhaps exceeding 800 tonnes of NPA manuka honey would be excluded. The cost to smaller apiary operations could in many cases lead to business failure.

**Question 4: What are the likely impacts of Option 1 for consumers?**
Option 1 would result in biologically NPA non-active honeys being classified as manuka honey with a pollen count of 70% manuka/kanuka pollen. Currently non-peroxide activity claims are made based upon a MGO/NPA correlation or an agar diffusion assay. In this case the consumer is receiving a honey that has a measurable biological effect. Pollen analysis would not give this assurance and therefore must be considered a step backwards for consumer protection.

**Question 5: What practical steps are required to effectively implement Option 1?**
A number of independent certified laboratories offering this service would be required in New Zealand to provide competition and verifiable ring-testing results.

**Question 6: If a definition based on pollen count is adopted:**

**What is the appropriate percentage of pollen to indicate a monofloral honey?**
The author would suggest that there is insufficient evidence to establish this. The 70% figure that is commonly used is drawn from Moar's paper in the 1980s, the samples were poorly defined in this publication. Certainly non-peroxide activity or any other chemical test of monoflorality was not applied.

**What, if any, additional parameters should be included?**
This has been considered earlier in this submission.

**Information sought:**

In the author's opinion, the Eucalyptus honeys from Eastern Australia are often broadly described under a genus definition. Clearly these species are more closely taxonomically related than *Kunzea* and *Leptospermum*. Interestingly these Eucalypt honeys do have similar flavours and bioactivities; and again this is in direct contrast to *Leptospermum* and *Kunzea* honeys. Another group of honeys often used as an example of different species-floral sources grouped together a single commercial name are the clover honeys, but again the honeys have very similar flavours and bioactivities.

## Consideration of Option 2: Definition based on methylglyoxal content

Methylglyoxal (MGO) most probably forms from dihydroxyacetone (DHA) in *Leptospermum* honey due to the acidic conditions (Adams), and this conversion behave like a typical chemical reaction so is influenced by heat. Furthermore, it would appear that the majority of antibacterial non-peroxide activity is due to the MGO content of the honey. It should be noted MGO & DHA are present in the Australia *Leptospermum* honeys. The author considers most members of the honey industry would accept these statements.

Therefore the relative concentrations of DHA & MGO in manuka honeys are of interest. In aging honey the author (Figure 4) has noted the MGO concentration in the honey is directly attributable to the DHA concentration. In other words, a honey with twice the DHA concentration will generate about twice the MGO concentration as the relative ratio between the compounds appears constant at any given time in a honey's maturation provided the honey has not been subjected to elevated storage temperatures.

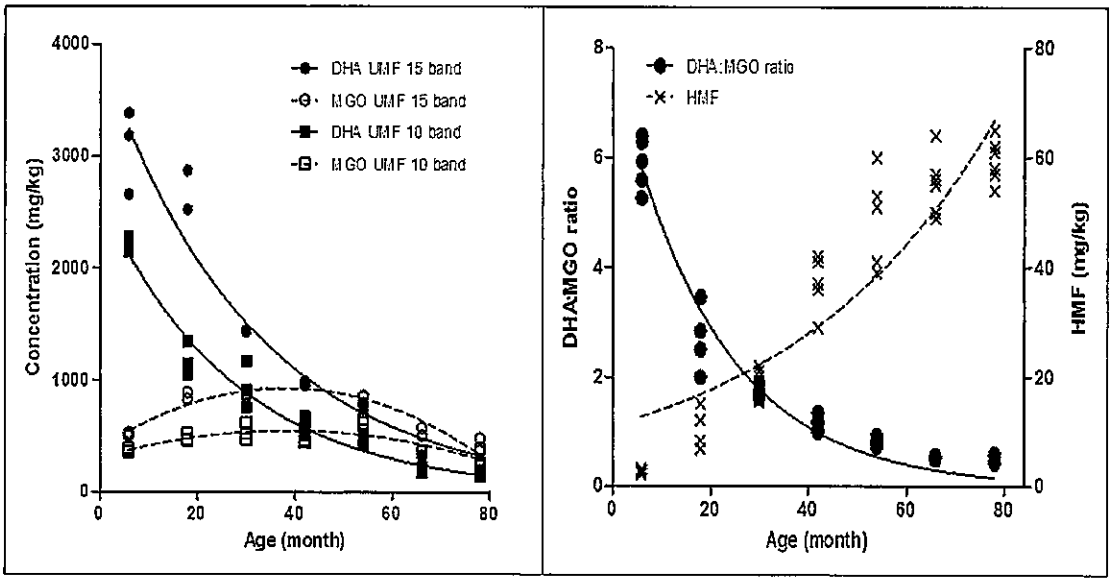



Figure 4. The concentration of methylglyoxal (MGO), dihydroxyacetone (DHA), hydroxymethylfurfural (HMF) and the ratio of DHA:MGO in maturing manuka honeys. (From Stephens J. M., Greenwood, D. R., Fearnley L., Bong J., Schlothauer, R. C,' & Loomes, K. M. 2013. Honey production and compositional parameters. *In* Food Processing and Impact on Active Components: A Modern Approach, *Ed.* Preedy, V. R. Academic Press).

The data from a number of independent samples (Figure 5 ) re-affirms this model, namely the DHA:MGO ratio adjusts as the honey matures, and drum trials of approximately 6-month old honeys recently carried out over relatively short period to date demonstrate similar data (Appendix 1).

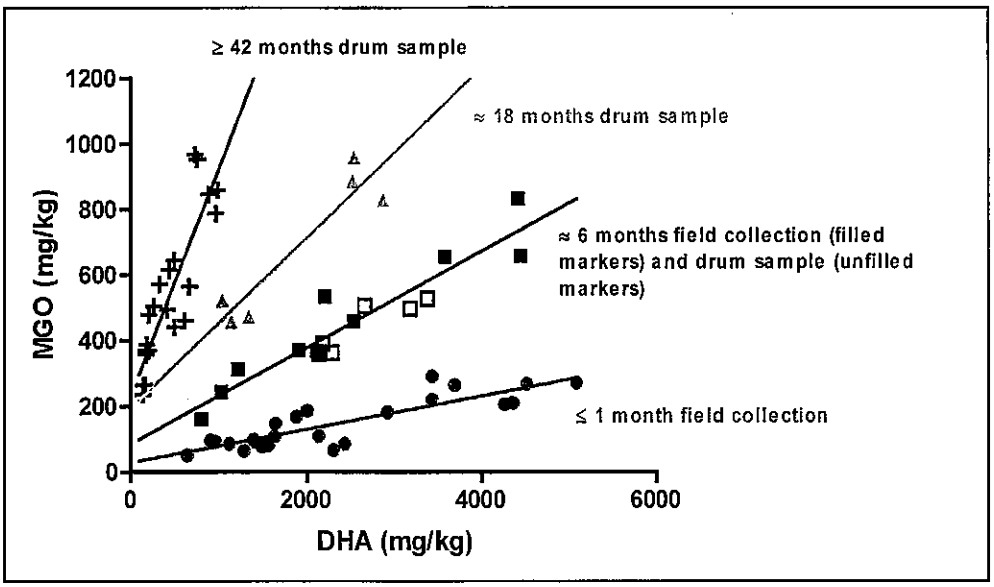



Figure 5. The DHA & MGO concentrations in manuka honeys of various ages harvested in Northland from *Leptospermum scoparium* var. *incanum*.

Therefore the concentrations of MGO and DHA in a manuka honey are not constant. In very fresh honey there is a relatively high concentration of DHA and little MGO, yet as the honey ages the concentration of DHA decreases exponentially and MGO concentration increases in a more logarithmic fashion until beginning to decline. The decline is likely to be due to an absence of DHA reservoir in older honeys.

Whilst aging ratio and HMF concentration do appear to be correlated, there is insufficient data at this point to quantify the MGO, DHA, and HMF in a manuka honey and establish age precisely or identify accelerated aging due to heating. The author considers this would be likely to be achievable with data from aging and heating experiments.

Accordingly the MGO concentration in a manuka honey does not provide an accurate estimation of the monoflorality of that honey.

Furthermore, there would appear to be different DHA potentials in the nectar of different varieties of Leptospermum scoparium growing throughout New Zealand. A very monofloral fresh manuka honey harvested from *Leptospermum scoparium* var. *incanum* growing on the gumlands of Northland may contain around 4-5000 mg/kg DHA, but an equally monofloral fresh manuka honey harvested from *Leptospermum scoparium* var. *myrtifolium* present on the hill-country of the Wairarapa is expected to contain around 2-2500 mg/kg DHA. This pattern can be seen in other regions, and it should be noted that *L. scoparium* var. *myrtifolium* or related sub-varieties are often found in the spines of hills that are present throughout New Zealand.

However it would appear that manuka honeys from these regions appear to have very different inherent DHA concentrations. If the DHA concentration is scaled against the relative fluorescence, it is apparent that there are very marked differences (Figure 6). Relative fluorescence uses signal intensity at a distinct excitation/emission wavelength to detect the manuka honey component in a honey sample. As expected from the earlier comment on variety distribution, there will be some overlap encountered between regions. The northern and southern North Island samples are field collections arranged or completed by the author, the South Island samples were from the Honey Vault collection.

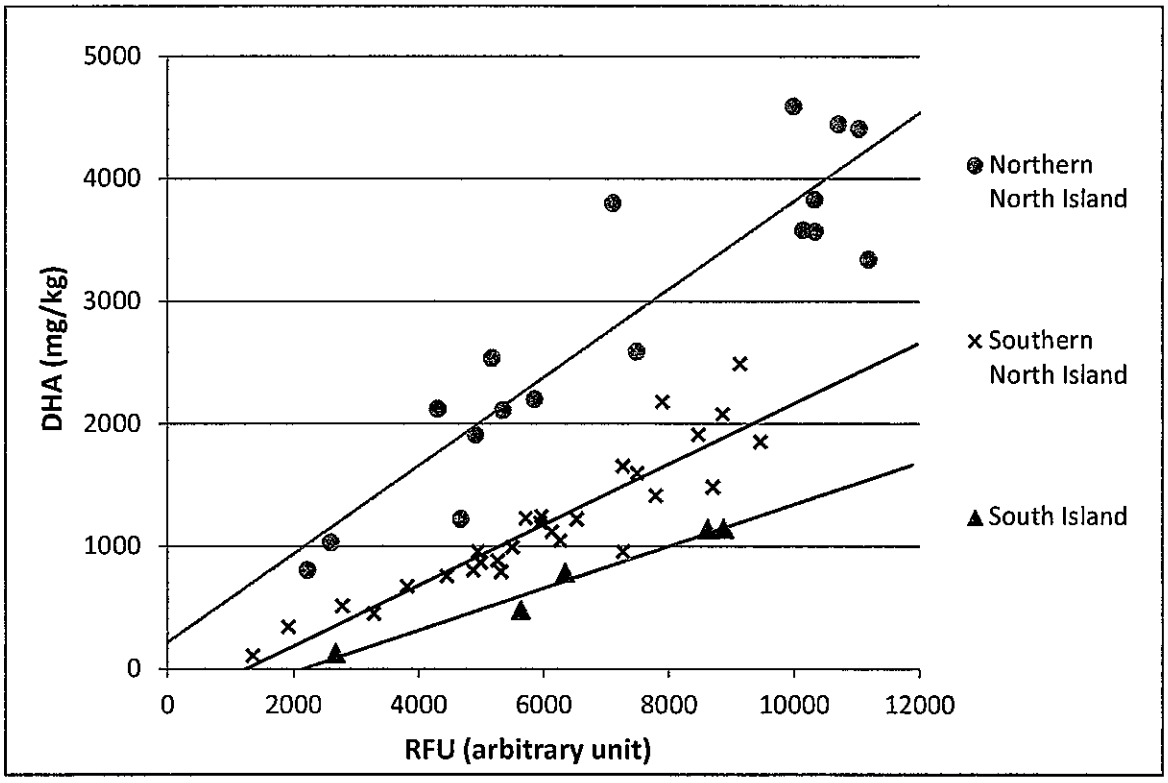



Figure 6. Dihydroxyacetone (DHA) content of manuka honeys in relation to relative fluorescence sourced from three regions in New Zealand.

Thus a honey that is predominantly manuka from these regions would be expected to contain significantly different levels of DHA, and because of the conversion of DHA to MGO, significantly different concentrations of MGO. Honeys that are predominantly manuka harvested in these regions have proportionally lower concentrations of DHA and therefore proportionally lower concentrations of MGO.

The risk of apiarists adding either chemical DHA or MGO either in bee feed or post-harvest adulteration is considered to be a significant industry threat. Whilst a fractionation will most probably detect compounds produced from the petrochemical chain, fermentation products from C3 sugars will remain difficult to detect. This is one of the many reasons why full chemical fingerprinting outlined prior in this document remains the better solution to this problem in the future. Chemical fingerprinting will allow the establishment of ratios of a range of compounds which would make chemical adulteration almost impossible.

Because of the premium that high grade manuka honey commands in the market it is unlikely that honey packers would blend to produce large volumes of lower grade product.

The risk analysis around Option 2 in the MPI document is considered. False or misleading label claims around MGO have been made in the market. Furthermore the concentration of MGO in a manuka honey is not a good indicator of monoflorality status. Additionally the Australian *Leptospermum* honeys cannot be reliably separated from the New Zealand manuka honey using MGO as a marker. Selecting MGO as the sole marker for manuka honey does increase the potential for fraud as the honey may be adulterated with a relatively accessible chemical. This would encourage the industry generally to meet the required concentration of MGO in packaged product and there is evidence from other industries which show the use of a single marker promotes unethical behaviour. MGO testing is available at a number of laboratories. The instability of DHA and MGO in manuka honeys and the variance within *Leptospermum* in New Zealand combine to make these chemicals unsuitable.

The cost and benefit analysis indicates that monofloral kanuka honeys would be excluded using MGO as a marker. However monofloral kanuka honey is rarely harvested and kanuka is often blended with manuka in the hive. The cut-off level for MGO in manuka honey would most probably vary between regions. This would be difficult to police and therefore it is best to consider the New Zealand harvest as a whole. However at this stage there is not enough evidence to confirm the level of DHA and MGO in manuka honey from all regions, and furthermore the Codex description of predominantly would need to be factored into this cut-off level. Nevertheless setting a MGO lower limit, which would also determine the lower limit for non-peroxide activity on the agar diffusion assay, would remove from the market forest honeys that are being currently labelled as 'active manuka'. These honeys have neither the non-peroxide activity nor carry the manuka/kanuka pollen signature of the manuka/kanuka blends.

**Question 7: What are the likely impacts of Option 2 for businesses?**

The current minimum expectation for a honey to be labelled manuka is that it will have measurable non-peroxide activity on the agar diffusion assay. This means the honey will contain around 100 mg/kg MGO. If this lower limit is was raised to 200 mg/kg MGO this would equate to non-peroxide activity of 8 UMF. This would exclude roughly half the predominantly manuka honey that is being harvested in regions such as the Central North Island, Whanganui and Wairarapa.

**Question 8: What are the likely impacts of Option 2 for consumers?**

Genuine manuka honey should carry a measurable non-peroxide activity and thus will contain at least 100 mg/kg MGO.

**Question 9: What practical steps are required to effectively implement Option 2?**

There are a number of laboratories providing methylglyoxal testing.

**Question 10: If a definition is based on methylglyoxal activity is adopted:**

**What are the appropriate levels of methylglyoxal to include?**

If the New Zealand manuka honey crop is going to be treated as a whole the regions where manuka honey inherently contains lower concentrations of DHA and MGO must be taken into account. Figure 7 illustrates data from a little less than 800 drums harvested in Wairarapa, Whanganui, and Northland (Appendix 1). These drums were supplied as manuka honey by the beekeepers.

Clearly a significant proportion of the crop falls within the MGO 80-200 mg/kg bracket, and to dismiss this category would mean that those honeys sourced from regions with inherently less DHA would be inappropriately excluded as these would be predominantly manuka honeys.

Therefore the author would suggest, until a full independent honey collection is analysed, the minimum level of methylglyoxal should be 100 mg/kg. This concentration is detectable on the agar diffusion assay as non-peroxide activity.

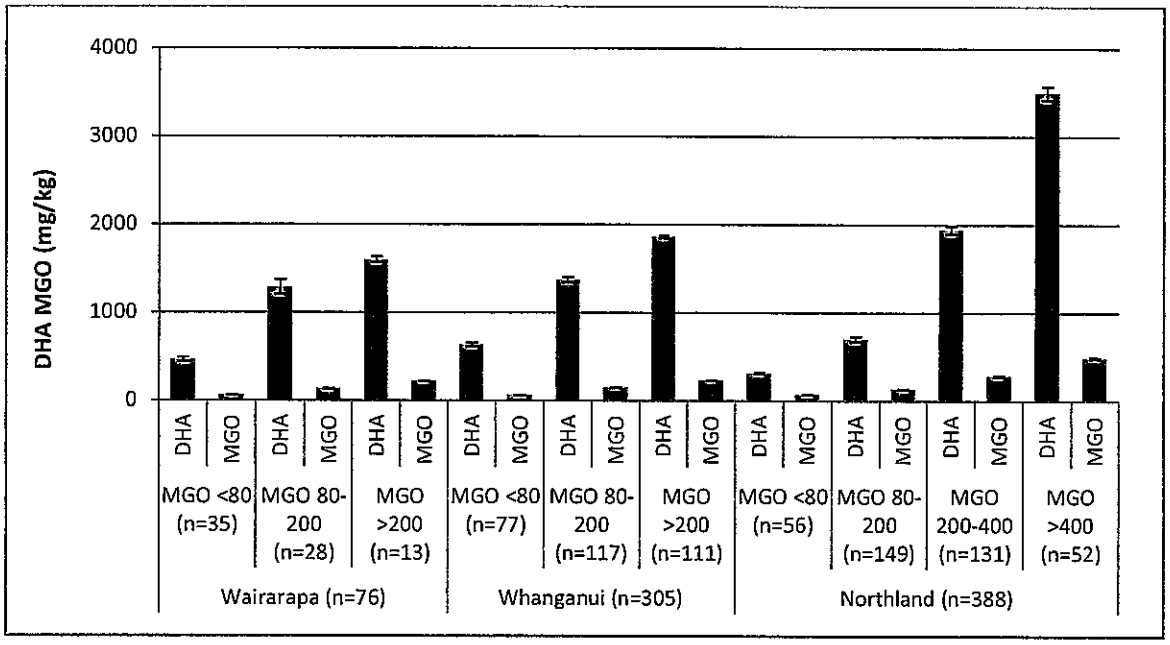



Figure 7. The concentration of DHA & MGO in drum samples of manuka honey from three regions detailing the frequency within MGO bands.

**What, if any, additional parameters should be included?**

As described previously, chemical fingerprinting with a range of compounds is most likely to provide a robust method of identifying manuka honey.

## Consideration of Option 3: Definition based on methylglyoxal content and pollen count

Combining two methods that are fraught with difficulties is unlikely to promote a robust and contestable method for defining manuka honey monoflorality status.

Figure 8 draws together the data the author has described where MGO and pollen counts have been completed on honeys that were described as manuka. Here the data is divided into four quadrants defined by the pollen content and MGO content; there are 40 observations in total.

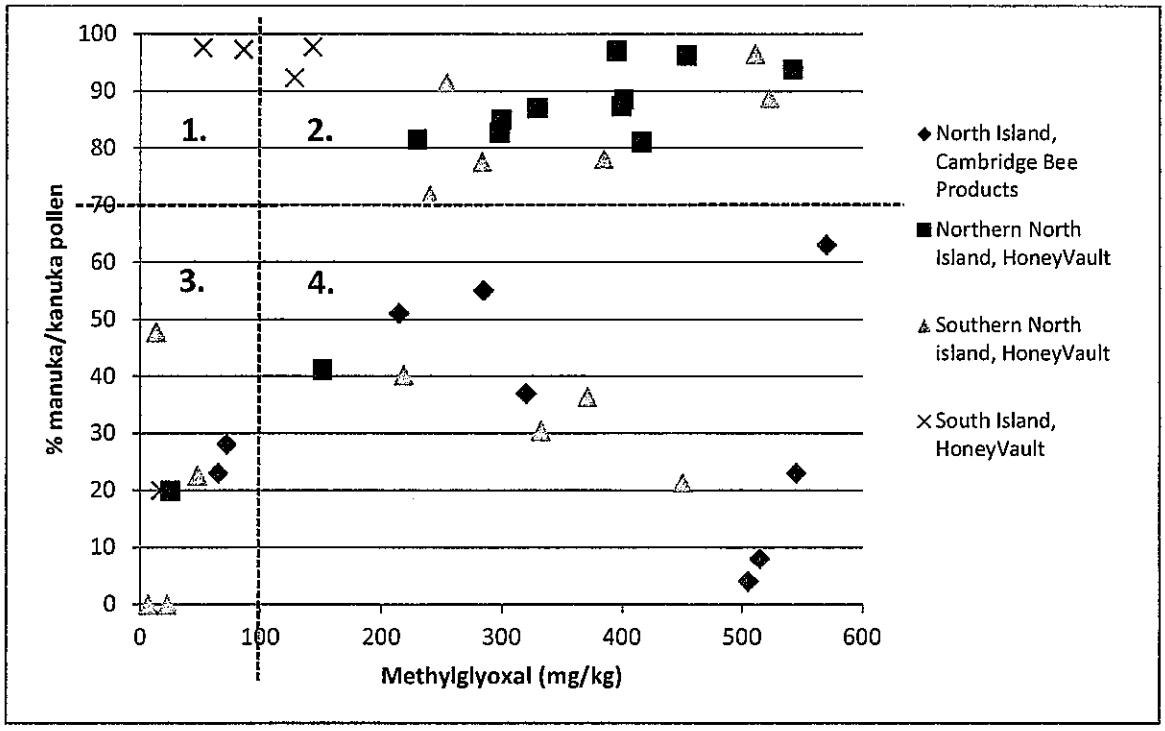



Figure 8. Honeys supplied as primarily manuka by apiarists, detailing quadrants defined by 100 mg/kg methylglyoxal and 70% manuka/kanuka pollen content.

Quadrant 1 defines honeys that contain <100 mg/kg methylglyoxal and >70% manuka/kanuka pollen; these are produced predominantly from *Kunzea ericoides* nectar. These honeys do not contain elevated levels of DHA or MGO, though there is often some evidence of a minor

*Leptospermum scoparium* nectar contribution. These honeys typically carry high levels of manuka/kanuka pollen. 5% of the samples fall into this group.

Quadrant 2 defines honeys that contain >100 mg/kg methylglyoxal and >70% manuka/kanuka pollen. These honeys are most likely to be predominantly manuka with pronounced kanuka nectar contribution in some cases. 45% of the samples fall within this group.

Quadrant 3 defines honeys with <100 mg/kg methylglyoxal and <70% manuka/kanuka pollen content. These honeys are neither predominantly manuka nor kanuka, and represent the non-active non-peroxide group that appear to be often retailed internationally as 'active manuka'. 20% of samples fall within this group.

Quadrant 4 defines honeys which contain >100 mg/kg methylglyoxal and <70% manuka/kanuka pollen. These honeys are most probably predominantly manuka but the bee has sourced other pollen types, often *Lotus* species, they are commonly harvested throughout the North Island. 30% of the samples fall within this group.

Table 1 illustrates the distribution of these samples when the 'minimum' cut-off line is altered for methylglyoxal. Because of the way in which bees gather pollen, in that a preferential sort is sourced and brought into the hive, reducing % manuka/kanuka pollen count does not alter the dataset significantly.

Table 1. The percentage distribution of samples demonstrating the effect of altering minimum cut-off concentrations for methylglyoxal in manuka honey.

| | **>100 mg/kg MGO >70% M/K* pollen** | **>200 mg/kg MGO >70% M/K* pollen** | **>300 mg/kg MGO >70% M/K* pollen** |
|---|---|---|---|
| **Quadrant 1 (fail MGO, pass pollen)** | 5% | 10% | 22.5% |
| **Quadrant 2 (pass MGO, pass pollen)** | 45% | 40% | 27.5% |
| **Quadrant 3 (fail MGO, fail pollen)** | 20% | 22.5% | 30% |
| **Quadrant 4 (pass MGO, fail pollen)** | 30% | 27.5% | 20% |

*M/K; manuka/kanuka

However increasing the minimum requirement to >300 mg/kg MGO would mean the volume of manuka honey being retailed with non-peroxide activity would be significantly reduced. The comment on Page 10 of the MPI discussion paper that manuka honeys with >300mg/kg MGO will contain >70% manuka/kanuka pollen is misleading. If >300mg/kg MGO was adopted as a minimum, the data demonstrates around half of all MGO-containing manuka honey harvested currently would have less than the suggested 70% manuka/kanuka pollen content. This figure is most probably an

under-estimate; it does adequately factor in the large volumes produced in the central & lower North Island.

Generally, it is estimated the imposition of a standard requiring >300mg/kg MGO & >70% manuka/kanuka pollen content would reduce overall current volume of non-peroxide activity manuka honey by around three-quarters. Furthermore it is considered this option would exclude genuine manuka honeys.

The risk analysis in the MPI discussion document is reviewed. The risk of adulteration with pollen and chemicals remains. Implementation would require independent pollen testing laboratories. The evidence for pollen counts in the non-peroxide active manuka honeys harvested especially in the North Island would need to be established. It is suggested that a lower proportion of manuka/kanuka pollen may be appropriate for these honeys. It is concluded that this option would considerably reduce the volume of manuka honey if prohibitive minimums are set.

**Question 11: What are the likely impacts of Option 3 for businesses?**
The imposition of this standard would reduce supply if an 'and/and' system is adopted. It is very probable that a significant amount of honey that is predominantly manuka derived would be excluded.

**Question 12: What are the likely impacts of Option 3 for consumers?**
This standard would eliminate the 'Quadrant 3' honeys referred to above provided adulteration is policed. To control this effectively chemical profiling of honeys, beyond DHA & MGO, would be required.

**Question 13: What practical steps are required to effectively implement Option 3?**
If the minimum MGO content is raised, it would be prudent to assess the manuka honey crop on a regional basis as it is likely this proposed standard would eliminate many manuka honeys that are predominantly composed of manuka nectar.

However if immediate adoption is sought, it would be suggested that an 'either/or' approach be employed. The standard could be that manuka honey would '... either exceed 70% manuka/kanuka pollen and/or 100 mg/kg methylglyoxal'. Kanuka & manuka monofloral honeys would be included, kanuka/manuka blended honeys be included, and reasonable grades of manuka honey blended with other honey types would be included.

## Consideration of Section 4: Making content claims

**Question 14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?**

Manuka honey will carry non-peroxide activity, so other claims regarding 'peroxide' or 'total' activity appear misleading and may be designed to mislead the consumer.

**Options for Defining Monofloral Manuka Honey**

**SEPTEMBER 2013**

This response paper provides our opinions for the parameters that define monofloral manuka honey, and how these should be measured. In addition to the discussion questioned posed by MPI we have provided additional rationale for methodology and a review of the data that has been generated.

Question 1. Additional Parameters for organoleptic and physicochemical properties of manuka honey.

In addition to the parameters currently measured the following should also be considered.

**1) Sugar Content**

Manuka honey has an average glucose of 29.7%, fructose of 37.9%, maltose of 1.2% and sucrose of 0.5% (HPLC method, 775 samples) (ref).

**2) Conductivity**

The mineral content of honey can be measured by conductivity (ohms/cm x 10-4), manuka has an average of 5.8 ± 1.54 ohms/cm x 10-4.

**OPTION 1: DEFINITION BASED ON POLLEN COUNT**

Question 3. Impact for business.

1) The pollen is important but the proposal barely supports the international standards on honey. Pollen count for Manuka honey should be 70% in order to be called Manuka honey. However, any honey with a pollen count below 50% in Europe should be called multi-floral honey. The term Manuka blend will not be accepted in Europe.

2) If MPI wishes to control this part, any honeys with a pollen count between 50% and 69% should be called Manuka blends. Any honeys with a pollen count below 50% should be called multi-floral. This is if the Codex Alimentarius follows International standards on honey. If not, other governments will apply their laws in their own countries. 3) Since the manipulation of Manuka honey has been known for over 2 decades in New Zealand, the impact for businesses will be major since the greed coming from the industry has been focusing on one single component, ignoring other aspects of Manuka honey, which will affect many businesses who focus solely on activity level, selling diluted honey. who have been caught selling Manuka honey with a lower pollen count and/or with C4 sugars in it. Question 4. Impact for consumers.

*The consumers will be made aware of the pollen count. . i is already doing it. New Zealand should be able to receive and handle complaints coming from consumers regarding fake Manuka honeys coming from New Zealand. Professor Molan, on behalf of Manuka Health has clearly stated on Youtube videos that no one should use the pollen count to identify Manuka honey. This is a big mistake! It is also ignoring International regulations on honey.*

Question 5. Practical Steps.

Based on pollen count it is not possible to define manuka honey without including kanuka pollen using existing methodology. Labeling honey "Manuka" has generally and historically encompassed both species due to the inability to differentiate them melissopalynologically. MPI has deemed that labeling honey from both *Leptospermum scoparium* and *Kunzea ericoides* would be perceived as misleading, in order to mitigate this a distinctive marker would have to be identified between the two different pollens, this marker must be molecular in nature and not morphological.

**Steps.**

**1) Manuka/Kanuka**

Discussion on the feasibility and practicality of distinguishing kanuka pollen from manuka based on market history, consumer recognition, testing costs.

**2) Current Methodology**

Initial investigation into industry methodology for pollen count would be helpful to assess the following.

a) Methodologies that have been unsuccessful thus far in making the distinction between manuka and kanuka pollen.

b) Survey the range of methodology and standards being used currently to review the variation in results.

**3) Standardized Methodology**

Counting methodology used must be universal and the operating procedure the same between facilities. A standard should be made available for process validation. The "standardized" methodology should be reviewed subsequent to further review of counting kanuka pollen as manuka. If a distinction between the pollens is to be made, the methodology should reflect this.

**4) Methodologies to consider**

Research has shown that there are a number of techniques available for counting and classifying pollen that is able to distinguish between genera.

- Diffuse Reflectance Infrared Fourier transform (DRIFTS)
- Vibrational spectroscopy
- Chemical characterization
- Surface-enhanced Raman scattering for protein detection.
- Terminal Restriction Length Polymorphism
- ELISA
- Quantitative SNP analysis
- Microscopy (specify type)

Question 6.

The Codex Alimentarius states that "honey may be designated according to floral or plant source if it comes wholly or mainly from that particular source and has the organoleptic, physicochemical and microscopic properties (our emphasis) corresponding with that origin." In which case if 50% of the pollen count is from one source it should be considered monofloral.

**OPTION 2: DEFINITION BASED ON**

Manuka Honey Submission

Preamble: I run 1000 hives mainly : producing a Manuka/kanuka honey that has not been tested positive for activity. The manuka generally flowers before the kanuka but their flowering overlaps. I dont know what the proportions of manuka and kanuka are, and up to now it hasnt mattered. If the pollencount is high enough, it tastes right and it is thixotrophic, then the buyers have been happy and presumable the consumers.

Question 1.

The colour parameters for Ka/Ma nuka is darker for what I produce even ifthe pollen count is up in the 80% range.

The thixotrophic properties vary in a sample over time as it firstly cools, then starts to crystalise. Some science could be done to test honey that is heated for a standard time /temperature to melt the crystals , then cooled, then tested for its thixotrophic properties.

There is a problem with honey dew with some manuka content

Question 2.

I dont know of any way to define manuka/kanuka better. BUT we could keep track of of world Scarce product with a registration, transport and eventually a packer. Hey, we alreADY DO IT WITH THE eCERT SYSTEM. That packer could then BE ACCOUNTAB;LE TO WHERE THAT HONEY ENDS UP AND IN WHAT CONCENTRATIONS. A lot of the dilution and mis selling of "Manuka" TAKES PLACE BEYOND THE BEEKEEPING BUSINESS.

Option 1.

The best most workable logical method. How can a manuka plant secrete nectar, have bees collect it, beekeeper extract it, and it not be Manuka if it is not active

Question 3.

For businesses if honey has additional properties then they should be dealt with as such. Active Manuka should be both manuka and active. I can't see it being sensible trying to block future developments in honey as a phamecutical or therapy products and their acceptance in the market. If I can get over the hurdles then why block that. Eg. Honey dew for its antiinflamitary properties. Or its antibacterial properties. If it is found to have MG then does it become Manuka.

Question 4.

Consumers. They will be confused to hear that kanuka and manuka are not being separated. If their pollen is not distinguishable then maybe they are still of the same genus and the scientist who separated them made a mistake.

When Dr Peter Molan did his original activity in honey study , he called for samples of Manuka honey to be sent to him. He took the senders word for it that it was Manuka that he was testing. Probably some of his early study samples were in part kanuka. Who knows. I dont think he got pollen tests done on the samples that he received. Pers comm.

Question 5.

Educate consumers as to the relationship of Kanuka and Manuka.

Get a study done on how closely related kanuka and manuka are. DNA testing perhaps.

Question 6.

70% pollen count works. What is critical is the enforcement of the limit set.

Option 2.

I cant see how this could work. Activity is an extra description of a honey , not its floral source. Dont confuse the two.

Question 7.

This would favour the producers of activity at the expence of all the other manuka/kanuka producers.

Question 14.

Claims for any honey that have scientific backing are appropriate for any honey. Why should mg activity be the only special claim about honey. Or block any other claim.

-ends-

**Options for Defining Monofloral Manuka Honey**

MPI Discussion Paper No: 2013/38

I would like to make a submission regarding the proposed options for defining monofloral manuka honey.

In summary, I believe the issue is that Manuka Honey is being blended or watered down particularly outside of New Zealand and the issue is one of Traceability as opposed to Science. I believe that an approach based on defining Manuka on either Pollen/MGO or both will result in onerous costs, remove valid Manuka/Kanuka from the market and will not necessarily remove the issue of honey being blended to increase the quantity. The in their sampling activities have previously found unbranded, untraceable honey in Singapore purporting to be NZ Manuka. What is needed is a Quality Assurance framework that ensures all batches of NZ certified Manuka can be traced to the source.

If all packed jars of honey could be identified by a batch ID that could be traced back to the Harvest ID then there would be no way for quantities to be watered down and overseas agencies would be able to audit this. I believe this is the best approach for dealing with the issue of Manuka Honey Fraud.

The approach of looking at Pollen Counts is expensive (in the order of $350 per sample) and misleading. This has been well documented by Airborne Honey (refer to Pollen Analysis on the attached page http://www.airborne.co.nz/manuka.shtml ).

MGO is not always present in Manuka honey and therefore it would be wrong to use this as a marker for Manuka honey. The BPSC's definition of Manuka based on colour, smell and taste is the correct definition. I don't believe there is any evidence that MGO is being added to Manuka in New Zealand, therefore a traceability or Quality Assurance system should include records of the MGO level of the batch as per the Harvest ID so that any later fraud can be checked. Any dramatic changes in MGO levels (which can be predicted by existing test regimes) and/or dramatic volume increases will indicate fraud.

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?

Broadly these are appropriate

Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?

I would support the development of an alternative marker for Manuka honey if one exists. What is important is that, if the Manuka is table grade it should meet the existing BPSC definition. If it is being marketed as having MGO (or activity) the MGO must be authentic.

The reality is that table grade Manuka is only worth a small premium on other pasture or bush honey, therefore for the many small producers out there it will not be cost effective for them to carry out pollen testing on small batchs of Manuka that have no NPA reading. Should Pollen testing be required this honey may well be sold as "BUSH" by smaller producers reducing the overall supply of Manuka.

Option 1

Option 1 is often flawed for the reasons outlined by Airborne Honey as referred to above. It will result in valid Manuka being rejected. It is also expensive and time consuming for small batches. If there is no NPA in the honey it is likely to be cost prohibitive to test on small batches.

Q3: What are the likely impacts of Option 1 for businesses?

Q4: What are the likely impacts of Option 1 for consumers?

Q5: What practical steps are required to effectively implement Option 1?

Q6: If a definition based on pollen count is adopted:

- what is the appropriate percentage of pollen to indicate a monofloral honey?
- what, if any, additional parameters should be included?

Information Sought:

Examples of internationally traded honey that includes multiple genera but is marketed under a common name.

Datasets where both pollen count and MG and DHA levels have been measured for the same honey samples.

Option 2

MGO/NPA are methods to define the activity of Manuka honey - but they are not always present. It would therefore be wrong to use MGO as a definition for Manuka - it is a characteristic of only a percentage of Manuka honey.

What is needed however is a standardised definition for NPA that all markets and consumers understand, one name and one definition. I understand the BPSC has asked MPI to support the process of legislating this so that there is one defined measure for Manuka activity.

As mentioned above, almost all producers of Manuka in NZ do the existing NPA tests as Manuka with NPA is worth more then non NPA Manuka. This data is already available and could be registered with a tracability system. Further I understand many NZ Honey packers who blend up multiple batches of Manuka for export also have the final batches retested. This data is already available.

New Zealand Manuka Honey is likely being treated with MGO - probably outside of New Zealand. It's not obvious how using MGO to define Manuka honey reduces this fraud.

A comprehensive Quality Assurance system that allowed Manuka batches to be traced would enable MGO levels to authenticated.

Q7: What are the likely impacts of Option 2 for businesses?

Q8: What are the likely impacts of Option 2 for consumers?

Q9: What practical steps are required to effectively implement Option 2?

Q10: If a definition based on methylglyoxal activity is adopted:

- what are the appropriate levels of methylglyoxal to include? (Please provide any available data or scientific evidence to support your submission).
- what, if any, additional parameters should be included? e.g. DHA.

Option 3

As per previous comments, Pollen Analysis is expensive. If Option 3 were adopted, the sequence would be a beekeeper would get the honey tested for NPA. If it failed to register any activity then the honey would probably be sold as BUSH as quite a lot of manuka honey would likely fail a pollen test and for smaller beekeepers it would be too expensive or cost neutral.

The net outcome I see is that the ~1800 tonnes of manuka produced annually in NZ would likely fall and given the market is consuming 10,000 tonnes today, there would be a major problem with market perception and supply. This could be extremely damaging to the overall industry.

Option 3 does not actually address the real problem, which is one of authenticity. A comprehensive system of tracability would be far more effective at reducing Fraud.

Option 3 would not stop non NPA Manuka Honey being exported and then repackaged/modified offshore and sold as NZ Manuka.

Q11: What are the likely impacts of Option 3 for businesses?

Q12: What are the likely impacts of Option 3 for consumers?

Q13: What practical steps are required to effectively implement Option 3?

Content claims

Q14: Are claims related to peroxide activity appropriate for manuka honey

No I don't believe peroxide Activity is appropriate for Manuka Honey. As above I would support NPA being formalised and defined under the appropriate legislation.

In summary, I propose that MPI replace their existing tracability system(s) with a purpose built Quality Assurance Framework that allows NZ Honey, in particularly Manuka Honey to be traced from Harvest to Consumer. I envisage that all parts of the supply chain would need to belong to this framework – whether they are located in New Zealand or overseas. This approach would achieve the desired outcome without reducing supply, or significantly increasing the level of testing. It should also be extensible to include other monofloral honeys.

-ends-

## Options for defining monofloral manuka honey

We comment on the "Questions for Submitters" as follows:

*Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?*

In our view, the current BPSC parameters are appropriate.

*Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?*

In our view, consumer expectations concerning manuka honey mainly focus on its characteristic properties (ie antibacterial activity). We understand that the nationwide alert which has been issued by the UK Food Standards Agency in August 2013 was due to the observation that numerous jars of manuka honey labelled as "active" were found which did not contain "the active ingredient" (which is methylglyoxal) and did not show antibacterial properties. From that point of view, it seems to be of primary importance to establish a labelling system which gives reliable and scientifically sound information about the content of the antibacterial compound, which is unique for manuka honey *(Leptospermum scoparium)*. Methylglyoxal MG (together with its precursor dihdroxyacetone or DHA) has not been found in substantial amounts (above 10 mg/kg or so) in any other honey *(Mavric et al., 2008)*. Meanwhile, it is generally accepted by the scientific community that MG is the unique compound in manuka honey, which is directly responsible for the unique non-peroxide antibacterial activity of this honey *(Mavric et al., 2008; Adams et al., 2008; Atrott et al., 2009, Al-Habsi & Niranjan, 2012)*. No other compound with an "additional activity" or "synergistic activity", which may enhance the antibacterial activity of MG, has been found yet. Therefore, we suggest that labelling theconcentration of MG in the final product (in mg MG per kg honey) is the only way to unambiguously show whether and to which extent a consumer can expect a possible benefit from the product.

Assuming that (high-price) manuka honey is bought by the consumer mainly due to the above mentioned antibacterial properties, we suppose that the question whether manuka honey is "100 % pure" or "monofloral" is of secondary importance for the consumer as long as the quality (here: antibacterial properties) is guaranteed. We assume that even in New Zealand, most consumers will not be able to distinguish between manuka and kanuka plants. We, therefore, see no *alternative* options (ie not based on MG content) for defining manuka honey.

According to the scientific literature, several compounds have been identified which are "more or less" unique for manuka honey and which may serve as *additional* indicators for manuka honey. Some compounds are mentioned below (this list does not claim to be exhaustive):

- Methylsyringate *(Weston et al., 2000)*
- Abscisic acid *(Yao et al., 2003)*
- Trimethoxybenzoic acid, 2-methoxybenzoic acid *(Stephens et al., 2010)*
- A precursor of 3,4,5-trimethoxybenzoic acid, not yet identified *(Fearnley, 2012)*
- Leptosin, methylsyringate *(Kato et al., 2012)*
- Confirmation of studies mentioned above plus identification of some further compounds *(Oelschlägel et al., 2012)*

Some of these compounds (methylsyringate, leptosine, 2-methoxybenzoic acid) might be promising candidates as additional indicators for manuka honey, but further research is necessary in order to unambiguously characterize these substances as "100 % unique" for manuka honey. One major problem for the use of the compounds as indicators is their biological variation, meaning that the concentration of all compounds may vary significantly between honeys of different regions. Furthermore, none of these compounds was found to be exclusively present only in manuka honey. Therefore, it will be merely impossible to use a "chemical marker" as a basis for quantifying the relative amount of manuka honey in a mixture. Analysis of numerous samples of known origin is needed in order to obtain information of natural variations before defining possible threshold levels. In conclusion, chemical markers may be useful to indicate the presence of manuka honey and then may serve as addition parameter to MG, but at present none of the compounds mentioned above can be used to unambiguously identify monofloral honey.
Further strategies to unambiguously identify manuka honey may be based on biochemical techniques from molecular biology, such the polymerase chain reaction (PCR) or immunological methods. None of these has been applied for honey identification up to now

*Q3: What are the likely impacts of Option 1 for businesses?*

*Q4: What are the likely impacts of Option 1 for consumers?*

*Q5: What practical steps are required to effectively implement Option 1?*

*Q6: If a definition based on pollen count is adopted:*

- *what is the appropriate percentage of pollen to indicate a monofloral honey?*
- *what, if any, additional parameters should be included?*

It is well known that pollen from manuka and kanuka are indistinguishable. Implementing option 1 would mean to accept that "manuka honey" is a blend containing both manuka and kanuka. Based on pollen analysis, manuka honey cannot be called "monofloral". A definition based on pollen analysis would mean that even 100 % kanuka honey could be labelled as manuka honey. Therefore, option 1 is not sufficient to meet the expectations of the consumer.

A definition based exclusively on pollen count is not recommended.

*Q7: What are the likely impacts of Option 2 for businesses?*

*Q8: What are the likely impacts of Option 2 for consumers?*

*Q9: What practical steps are required to effectively implement Option 2?*

*Q10: If a definition based on methylglyoxal activity is adopted:*

- *what are the appropriate levels of methylglyoxal to include? (Please provide any available data or scientific evidence to support your submission).*
- *what, if any, additional parameters should be included? e.g. DHA.*

Among the three options, option 2 may provide sufficient security both for business and consumers. The "nationwide alert", issued in U.K., August 2013, would not have happened if honeys were labelled according to option 2. Due to the fact that manuka and kanuka pollen are indistinguishable, we agree that the uniqueness of manuka honey can at present only be substantiated by MG measurement (plus DHA, see below). According to our data we suggest that MG concentrations starting from 100 mg/kg are sufficient in order to label the product as "manuka honey". In our own studies, we identified some samples of manuka honey having rather high pollen count (up to 80-90 % manuka/kanuka pollen) but rather low MG concentration (between 100 and 200 mg/kg). Further studies with manuka honey of certified origin are necessary in order to prove that "100 % manuka honey" may contain MG even below 100 mg/kg. Due to fact that MG is not found in comparable

concentrations (starting from 100 mg/kg) in any other food, we suggest that a minimum value of 100 mg/kg methlyglyoxal should be the limit to meet the criteria of option 2.

In addition to MG content, the amount of dihydroxyacetone (DHA) is a suitable parameter to further strengthen the identification of a honey as "manuka honey". DHA is the precursor of MG. During ripening of fresh manuka honey, DHA is converted to MG. Studies in our laboratory *(Atrott et al., 2012)* showed a good linear correlation between DHA and MGO values in commercial manuka honeys, resulting in a mean ratio of DHA to MGO of 2:1. In contrast to this, the DHA-to-MGO relation was much higher in fresh manuka honeys but approximated to a ratio of 2:1 while honey ripening.

Based on this, we suggest a minimum value for MG of 100 mg/kg *plus* a minimum value for DHA of 200 mg/kg as appropriate levels to include in the Option 2.

MG AND DHA content can be quantified by several methods published in the scientific literature and, therefore, can be checked by any control lab all over the world with sufficient accurateness. Any other labelling such as "active whatever" or calculation of a "factor" based on MG content is either scientifically not justified or irreproducible for control laboratories. *(Note: Direct labelling of MG as the "unique" compound of manuka honey can be compared with labelling of the ethanol content of alcoholic beverages: Any consumer understands that beer containing "5 % alcohol" is less "active" than a red wine with "13 % alcohol" or whisky having "40 % alcohol". Nobody would even think about a labelling system based on the calculation of an "activity" or a "makes-you-drunk-factor" based on alcohol content...).*

As practical steps to effectively implement Option 2, ring tests are required in order to prove accuracy of methods for measuring MG plus DHA. It will be necessary to define minimum levels for both compounds and to define limits of variation during storage. For this, storage experiments are necessary.

Q11: What are the likely impacts of Option 3 for businesses?

Q12: What are the likely impacts of Option 3 for consumers?

Q13: What practical steps are required to effectively implement Option 3?

As mentioned above, pollen analysis is not a suitable tool to identify manuka (besides kanuka) honey. We, therefore, do not see any further benefit if MG analysis is combined with pollen analysis. It is known that manuka honey in general has low pollen count. We consider it as a significant risk for manufacturers if honeys with high MG levels (500 mg/kg and above) but low pollen count may be excluded, whereas honeys with high kanuka (!) pollen but low MG levels may be included. Therefore, we do not suggest implementation of option 3.

*Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?*
Claims related to "peroxide activity" are not appropriate to manuka honey (and are not appropriate to any other honey). Peroxide is formed in all honeys due to the activity of the enzyme glucoseoxidase. Amount of peroxide formed in various honeys may vary due to varying glucoseoxidase activity as well as due to varying catalase activity, another enzyme present in honey, which degrades peroxide. Both enzymes originate from the bees. Studies in the literature and in our laboratory have shown that even high amounts of peroxide (significantly higher than the amounts found in honey) by far do not have the antibacterial activity when compared with amounts of MG present in manuka honey. Antibacterial activity of honey due to peroxide is insignificant. Peroxide is not unique for manuka honey. Claims on any activity due to peroxide are not scientifically justified and should be banned as they are misleading the consumer.

A big deliberate contamination of manuka honey is kanuka honey by packers.

Kanuka is not manuka.

Consumers pay that big price for the honey Molan found those special properties in. Manuka.

Kanuka has far more pollen than manuka in it so a pollen count alone is out of the question. Just helps guys like Airbourne Honey and overseas packers lie to the consumer.

MGO or DHA tests alone is out of the question. These can be added.

from Comvita presented a programme at NBA conference in nelson showing ways to differentiate between manuka and kanuka by phenolic compounds.

This needs to be confirmed by independent labs. And tested in different locations throughout NZ. Comvita may be true but may not be. We need to know.

We need a test that does not allow Kanuka to be sold as Manuka. Disallow all reference to Total Peroxide Activity.

If the honey is a blend of less than 80% manuka (NZ standard) then it should be labelled a blend, not 5+NPA. 100MGO or 5+ AMHA label.

Heated honey.

Finding an optimal temp to hold honey with minimum spoilage while converting DHA to MGO was the motivation in my end of this trial. We have not found it but have good data to go forward with.

Holding foods at different temps is common in a lot of foods in the market so, refridgeration, freezing, cooking even. So having honey held at a certain temp to maximise the activity should not be judged harshly. If nothing happens at 0Celcius and the wrong things happen at 32C or 36C then where should we hold it.

After the heat should active honey be refrigerated to maintain the activity level for the shelf life of the honey? I think so for such a valuable product.

Please accept this as my submission. I know this is not the format you asked for but please realise just how busy we are this time of year.

-ends-

I own and operate a producing both active Manuka honey (MG 100 to MG 700, with the majority under MG 250) and high pollen count Kanuka honey (80–95 %). My total crop is split about 20-40% Manuka, 60-80% Kanuka.

I think the discussion paper should have had a Option 4 : Definition based on methylglyoxal content or pollen count. This option would allow for 2 "types" of monofloral Manuka honey to be recognised.

Type 1 : Standard Manuka Honey. This honey would need to have a minimum pollen count of 70% and a total pollen content (TPC) of 20,000-500,000 grains per 10 grams of honey.

The MG content of this honey is irrelevant.

Standard Manuka Blend Pollen count between 20 and 70% and irrelevant TPC

This honey cannot have any health or medicinal claims made on the label, and it should be stated that it might contain kanuka honey as well.

Type 2 : Active Manuka Honey This honey would need to have a minimum MG content of 300 mg/kg.

The pollen count of this honey is irrelevant.

Active Manuka Blend MG between 100 and 300 mg/kg

This honey can have a MG or NPA level stated on the label, as well as the usual health and medicinal claims.

A honey with less than MG 100 cannot be labelled Active Manuka blend and would need to pass the 20% pollen count to be labelled Standard Manuka Blend and cannot have any health or medicinal claims made on the label.

One issue relating to MG content is there needs to be a standardised NPA/MG conversion formula set and published, even Hill Laboratories differs from the UMF Associations, not to mention some other wildly conflicting conversions on the internet.

Also there should be no place for Total Activity claims in association with Manuka honey. Only MG or NPA numbers should be allowed to be printed on the label.

-ends-

**Options for Defining Monofloral Manuka Honey**

In Southland we don't have Kanuka so when we get a pollen count it is pure Manuka with an 80-90% pollen count.

Our Manuka does not have a high MG - 5% would be top.

If Manuka is classed by MG and not Pollen Count our Manuka Honey would be down graded even though it is pure Manuka Honey.

Just basing Manuka on activity and not pollen count would open it to having other honeys in it and would not be pure Manuka Honey

My option is **Option 3**

-ends-

Decisions sort:

To postpone setting a standard, voluntary or otherwise, until there is sufficient science to substantiate and consistently analyse the definitions set out in the standards. We understand that there is considerable work currently being carried out to this end with results expected shortly.

Discussion:

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka appropriate? Can they be improved?

ORGANOLEPTIC – Aroma, flavour, colour more to do with purity and regional differences

PHYSICOCHEMICAL – Sugar – there is still ongoing discussion regarding the sugar testing methods (new and old) and the effect activity is having on test results. There needs to be a level set for our honey which is based in science and may well be above the current level. Manuka with higher activity appears to be giving different results to low activity and other floral types

Moisture. No argument here. 21% max

Q2: Are there alternative options for defining manuka honey(ie not based on MG content or pollen count), and what scientific evidence supports this?

Manuka is uniquely thixotropic. There are only a few honeys in the world which have this property and the others, Ling Heather and Australian Jelly bush taste very different. This has to be the number one defining property.

We should be developing a shear test – currently available in Germany from Intertek Laboratory – and a rating scale for our high value honeys like Manuka. This is a physical property which along with thixoptropy can easily be tested for.

Q3: What area the likely impacts of Option 1 for businesses?

Although the pollen look alike the two plants are not only different species but also from different genus. This makes using pollen as a characteristic for a monofloral honey nonsense.

The opportunity for adulteration is huge here with pollen being farmed and added to all sorts of honey. Some manuka has very low pollen counts especially from north island producers but is definitely thixotropic, has activity, tastes like manuka and passes shear tests.

There will be impacts on business when pollen count is no longer recognised as a defining characteristic however these could become positive in the mid to long term as manuka is properly defined and customers grow confidence in all of our honey products.

Q4: What are the likely impacts of Option 1 for consumers?

They will have a greater level of confidence in the label if option 1 is removed from the standard. Left in adulteration and consumer misinformation remain which will have a negative effect on not just honey but all NZ products.

For example South Island honey dew which has no pollen could be adulterated to meet the pollen count and increase its value which being fraudulent to the consumer.

Q5: What practical steps are required to effectively implement Option 1

To implement this option there must be a way of differentiating between the pollen from the 2 different species. The current industry practice does not do this.Ttherefore an invalid option.

Q6: If a definition based on pollen count is adopted:

What is the appropriate percentage of pollen to indicate a monofloral honey?

What if any additional parameters should be sort.

This is an invalid question as percentage pollen using current testing methods will not differentiate between Kunzea ericoides (kanuka) and Leptospermum scoparium (manuka) therefore cannot be used as an indicator of monofloral honey.

Q7 – 10:

The opportunity to adulterate honey if MGO is part of a standard is too big a risk to take.

There needs to be an activity component to the standard and this should encompass all current comparable measures. –(MGO; NPA;) with an agreed table of comparison.

Q11 – 13:

Because of the issues with the previous two options these questions are invalid.

Options proposed.

The number one defining factor should be thixotropic.

The honey then needs to taste and look like manuka.

The third definition is activity.

To have the quality mark of manuka, product must be thixotropic, meet organoleptic qualities and activity ratings which will vary from season to season and meet other requirements such as C4 sugar contents.

New Zealand should be setting standards for our C4 sugar levels so that genuine high activity manuka does not fail. This is our honey and we should be setting the standards which suit our honey not the Codex.

There is currently no place for pollen in a sensible standard and activity alone is also too open to adulteration.

-ends-

**Options for Defining Monofloral Manuka Honey. MPI discussion paper 2013/38**

Decisions sort:

To postpone setting a standard, voluntary or otherwise, until there is sufficient science to substantiate and consistently analyse the definitions set out in the standards. We understand that there is considerable work currently being carried out to this end with results expected shortly.

Discussion:

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka appropriate? Can they be improved?

ORGANOLEPTIC – Aroma, flavour, colour more to do with purity and regional differences

PHYSICOCHEMICAL – Sugar – This is the subject of ongoing research. The focus should on defining what NZ honeys C4 sugar characteristics are. It appears there is a case for high activity manuka honey to have a higher acceptable level. We should not be bound by the Codex but put forward a science based case for exception and acceptance for our honey.

Moisture. No argument here. 21% max

Q2: Are there alternative options for defining manuka honey(ie not based on MG content or pollen count), and what scientific evidence supports this?

Manuka is uniquely thixotropic. There are only a few honeys in the world which have this property and the others, Ling Heather and Australian Jelly bush taste very different. **This must be the number one defining property.**

We should be developing a shear test – currently available in Germany from Intertek Laboratory – and a rating scale for our high value honeys like Manuka. This is a physical property which along with thixoptropy can easily be tested for.

Q3: What area the likely impacts of Option 1 for businesses?

Although the pollen look alike the two plants are not only different species but also from different genus. This makes using pollen as a characteristic for a monofloral honey nonsense.

Left in as a definer of manuka honey then we will see a huge increase in adulteration as pollen is added to honey to increase its value. Ultimately this would lead to the demise of the entire honey export business as customers lose confidence in the quality of manuka.

There will be impacts on business when pollen count is no longer recognised as a defining characteristic however these could become positive in the mid to long term as manuka is properly defined and customers grow confidence in all of our honey products.

Q4: What are the likely impacts of Option 1 for consumers?

They will have a greater level of confidence in the label if option 1 is removed from the standard. Left in adulteration and consumer misinformation remain which will have a negative effect on not just honey but all NZ products.

For example South Island honey dew which has no pollen could be adulterated to meet the pollen count and increase its value which being fraudulent to the consumer.

Q5: What practical steps are required to effectively implement Option 1

**This is not currently a valid option.**

To implement this option there must be a way of differentiating between the pollen of the 2 different species. The current industry practice does not do this therefore is an invalid option.

Q6: If a definition based on pollen count is adopted:

What is the appropriate percentage of pollen to indicate a monofloral honey?

What if any additional parameters should be sort.

This is an invalid question as percentage pollen using current testing methods will not differentiate between Kunzea ericoides (kanuka) and Leptospermum scoparium (manuka) therefore cannot be used as an indicator of monofloral honey.

Q7 – 10:

The opportunity to adulterate honey if MGO is part of a standard is too big a risk to take.

There needs to be an activity component to the standard and this should encompass all current comparable measures. –(MGO; NPA;) with an agreed table of comparison.

Q11 – 13:

Because of the issues with the previous two options these questions are invalid.

Options proposed.

The number one defining factor should be thixotropic.

The honey then needs to taste and look like manuka.

The third definition is activity.

To have the quality mark of manuka, product must be thixotropic, meet organoleptic qualities and activity ratings which will vary from season to season and meet other requirements such as C4 sugar contents.

New Zealand should be setting standards for our C4 sugar levels so that genuine high activity manuka does not fail. This is our honey and we should be setting the standards which suit our honey not the Codex.

There is currently no place for pollen in a sensible standard and activity alone is also too open to adulteration.

-ends-

**Manuka submission**

Sorry I am sending this from my iPad, as we are 8 -10 hours from home doing early Manuka honey.

so see a large variance in Manuka by colour & flavour but one characteristic is constant in real Manuka / Kanuka is its gel (Thixotropy) Thixotropy should be the number one method for confirming Manuka / Kanuka . Only two other honeys in the world have the same gel properties - these being Ling Heather ( Calluna Volgarus ) and Australian Jelly Bush . Which can be easily distinguished from Manuka on taste alone. Thixotropy/Gel + MGO/ UMF = Manuka Thixotropy - No MGO/UMF = Kanuka ( Kanuka still has a gel , but it is not as thick as Manuka ) Pollen counts are not an accurate measure of Manuka , North Island Manuka is a nectar source ( not a pollen source ) so can be extremely low ie: 4 or 5% but still have good gel Zander MGO. Pollen can be manipulated & so can MGO , but Thixotropy can not. The gel can be tested doing a Shear Test in a laboratory ( like Intertek in Germany ) Otherwise the you can liquify the honey and see if it forms a gel . We have seen many samples of poor quality supposed " Manuka" with over 70 % pollen that are little more than poly flora with a hint of manuka & sometimes low level ( 5 active ). New Zealand produces real Manuka so why let this inferior poly formal be sold as Manuka ?

-ends-

We would like to confirm our agreement with the submission made by the , with one exception. A monofloral (wholly or mainly) manuka honey should be defined as a 10+ NPA manuka honey or higher, not a 5+ NPA Manuka honey or higher. 5+ Manuka honey should be labelled as a manuka honey blend.

-ends-

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# response to MPI Discussion Paper No. 2013/38 "Options for Defining Monofloral Manuka Honey"

## 1. Executive Summary

Thank you for the opportunity to respond to the discussion paper circulated for comment in September 2013. The responses below to the questions asked in that paper are submitted on behalf of . If there are any further questions/ clarifications relating to this submission please contact or .

supports the separate submission made by the New Zealand Manuka Honey Exporters' Collective of supports the development of regulations for the definition of Manuka Honey for both International and NZ markets.

recognise that there are three major categories of false labelling of manuka honey:

1. Kanuka honey or manuka/kanuka blends supported by pollen count or peroxide rating on the label
2. Honeys drawn from NZ native trees, commonly called a 'bush blend', supported by a peroxide rating on the label
3. Non-NZ 'dark brown' honeys

The characteristics which we recommend be included in the definition of manuka honey are:

**Colour:** (Pfund mm): 84, s.d. 11.8

**Aroma:** damp earth, heather aromatic

**Flavour:** mineral, slightly bitter, tangy

**Viscosity/ thixotropy:** characteristic thixotropic profile

**Methylglyoxal (MG):** MG levels of ≥ 100mg/kg

**DHA/MG :** ratio of ≥ 1:1

2. **Standards for Honey**

**The following parameters are currently used by the NZ Bee Products Standards Council for the definition of Manuka honey:**

- **Colour (Pfund mm): 84, s.d. 11.8**
- **Aroma : damp earth, heather aromatic**
- **Flavour: mineral, slightly bitter, tangy**

**Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?**

In opinion these parameters are acceptable for inclusion in the MPI Guidelines.

Viscosity / thixotropy measures should also be considered as an additional parameter as:

- Thixotropy is measured by a routine test using a rheometer (instrument cost ~ NZ$5,000) which can readily be automated and a validated test method developed. Please see Appendix 2 for further details.
- Manuka honey is well known to be thixotropic and demonstrates highly distinctive behaviours with respect to viscosity. This is manifest practically by the difficulty bee keepers experience in spinning the honey combs to extract the honey and heating/pumping manuka honey.
- While published evidence (Stephens 2006b) suggests that thixotropy can be used to distinguish between manuka and kanuka honey, internal experts have indicated that kanuka honey also demonstrates thixotropic behaviour.
- Thixotropic behaviour will readily identify non-manuka/ kanuka honey and in the future may also be able to distinguish between manuka and kanuka honeys.

## 3. Options for Defining Manuka Honey

### Option 1: Defining manuka honey based on pollen count.

- recognises that kanuka/ manuka pollen counts (considering all the identification issues below) is likely to increase the barrier to general 'dark-brown' honeys being falsely labelled as being New Zealand Manuka honey in international markets. Pollen is a good indicator of country of origin.
- Pollen is not an option to determine a monofloral claim because of issues with identification and quantification. These issues are well known and not restricted to manuka honey. The issues include:
    - Most honeys contain a spectrum of pollen types, because bees can collect pollen independently of collecting nectar. Tuberoso et al (2009) illustrates the problem for a European mono-floral honey from Ashphodel where the honey contains very high levels of the floral marker compound, methyl syringate (> 122 mg/kg compared to 11 honeys where levels are < 5 mg/kg), which was demonstrated to originate from the nectar of the flower. However, levels of Ashphodel pollen were < 6 % of total pollen in all samples analysed.

- Moar (1985) found that many mono-floral native NZ honeys had < 50 % of the eponymous flower pollen.
- Molan (1998) explains in detail why pollen % and count are unsuitable for defining honeys as monofloral.

- There is no apparent correlation between total manuka + kanuka pollen count and MG content or 'activity'.

Identification issues:

- Pollen is not a monofloral identifier.
- It is not practical to differentiate between manuka and kanuka pollens and especially so in a commercial setting. Manuka pollen is indistinguishable from kanuka pollen under a microscope, any conventional pollen counting techniques will likely count both as 'Manuka'. A test to differentiate between manuka and kanuka pollen may be possible, however requires development and such testing would likely be costly to undertake in a commercial setting.
- So as not to mislead consumers this option would necessarily lead to the product being labelled as a blend or, at best, have a duo floral claim: 'manuka/ kanuka blend'.
- It is likely that Jellybush pollen (and related Australian honeys), being from the same *Leptospermum* family as manuka, is also indistinguishable from manuka and thus honey could be marketed as manuka honey. However the presence of non-NZ pollens such as Eucalyptus will mitigate this risk and can be used to support the country of origin.

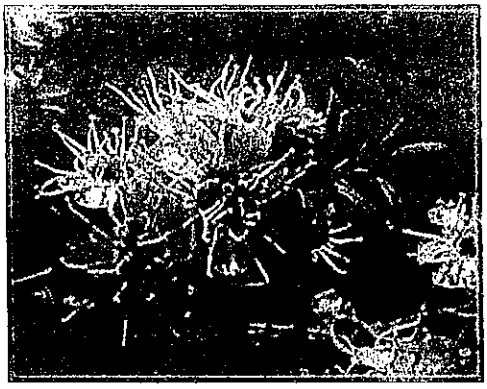
Quantification/ pollen count issues:

- Pollen can easily be added to honey to manipulate the desired pollen count
- Extraction methods such as filtering can vary the pollen count considerably. Manuka and kanuka pollen grains are very small and so the percentage of both can be increased relative to other pollen types simply by good filtration.
- Setting an appropriate level of pollen, either as a % of total pollen, or total pollen count is practically impossible with literature data);
- Pollen counts in true manuka honey are very low. Manuka (and kanuka) pollen are a poor food source for bees, so are not preferentially collected. Bees will source better pollen from other plant sources whilst collecting nectar from manuka flowers, or if none are available, will require feeding with a pollen substitute to maintain the health of the hive. Small quantities of manuka and kanuka pollen are picked up 'by chance' during the collection of nectar. Further, kanuka pollen is over-represented in this accidental collection because of the differences in the flower structure. Manuka has small anthers and the filaments and pollen sit within the flower. Kanuka has more anthers and longer filaments promoting the pollen above the flower meaning a bee collecting nectar will come into contact with pollen far more than with manuka.

[1] The authors of this work confirmed to us by e-mail that their pollen test did not differentiate between manuka and kanuka pollen

- When there are no suitable pollen sources for bees to collect pollen (i.e. the foliage is exclusively manuka within the foraging range of the bee), a honey will result that has very low levels of pollen, but the pollen will be mostly manuka. The work of Stephens and Molan (2008) and associated PhD (Stephens, 2006a,b) shows clearly that the pollen count and % of pollen being manuka + kanuka has no relationship to NPA/UMF. This is also shown in appendix 1.

Manuka flower showing anthers



Kanuka flower showing anthers

- Honey with high manuka/kanuka pollen count is sourced from regions where the flowering overlaps e.g. South Island, Coromandel. In most manuka regions of New Zealand there is a clear gap in the flowering periods between manuka and kanuka. The result is there is a far lower manuka/kanuka count/percentage in the honey. The largest manuka regions by area and the best producers of MG have the manuka flowering overlapping with rewarewa, lotus and pasture flowers. These pollens are more desired by the bees and the pollen is produced in large quantities reducing the manuka to a low percentage.
- has received expert advice which indicates that bees have a bias against manuka pollen because there is not much of it and as it is hard for them to extract, they can get it more easily from other species.
- There are wide variances in the procedures to measure bee pollen. This would result in discrepancies between laboratory results and provide no assurance to consumers the product meets any set standard
- Pollen is one of the contributors to failure in the C4 adulteration test, and so being incentivised to maximise pollen count could result in greater failure rates
- We do not accept the argument that combining manuka and kanuka pollens has been common industry practice for years and therefore should continue. It is of the essence of new science that it often disproves previously held beliefs; simply because a belief (such as manuka and kanuka being of the same genus) has been held to be true in the past does not justify sustaining that belief after it has been disproven.

**Q3: What are the likely impacts of Option 1 for businesses?**

- Pollen counts will raise the hurdle for non manuka/ kanuka honey being sold as monofloral manuka honey.

- The use of pollen count will not address the differentiation of manuka honey, with its unique MG activity, from kanuka which does not produce MG and does not have the stable, anti-bacterial activity of manuka honey. The result is that 'manuka honey' identified based on pollen count is highly likely to contain significant levels of kanuka honey. This is misleading customers who associate the name 'Manuka' with activity and health benefits.
- At best, honey identified by pollen count should have a duo floral claim: 'manuka/ kanuka blend'.
-

- If pollen count or the percentage was used as a standard then it is possible over 50% of the honey with high methylglyoxal content would necessarily be labelled manuka blend. In contrast honeys with low methylglyoxal content and high manuka/kanuka content could be labelled as a monofloral manuka. This conflicts with consumers understanding of the benefits delivered by manuka honey. It could seriously undermine the credibility of all manuka. Consumers would be seriously misled since they choose manuka honey expecting a health benefit however a large percentage of product labelled manuka would not have this capability. Ironically the price for a manuka blend with high MG would have to be higher than a monofloral honey with low MG and prices would be higher for honey with high manuka/kanuka pollen count with low MG whereas the opposite more truly reflects how prices should be positioned.
- Labelling a product manuka based on the kanuka/manuka pollen count is not true to label and breaches the laws of Fair Trading in most markets including New Zealand. Since testing methods cannot distinguish between manuka and kanuka pollen, by default any product labelled as a monofloral is really a blend. Using pollen count technically places a company in breach of the Fair Trading laws.
- Pollen count is typically used by European honey buyers wishing to purchase drums of honey using the same criteria as used in their home countries. These criteria are useful when there are large fields of one type of flower, however this situation does not exist in New Zealand where there are multiple plant types in any area flowering at the same time. New Zealand is not a cropping country like many offshore markets where bee-keepers can have access to large areas of mono-floral types and pollen count is, therefore, a useful measure.
- Consumer awareness of manuka honey only became established initially due to the research carried out by Professor Molan. This has resulted in a substantial price premium for honey with the active compound and this is the characteristic consumers have come to associate with manuka. This is why they are prepared to pay the price premium over table honeys, not due to the fact it has a high pollen count.
- If pollen count were used the profitability of the industry would decline and become less attractive for investors. A major reason for the growth of the industry in recent times has been the influx of professional investors and establishment of well organised businesses. This is leading to the industry maturing from what was previously a cottage-type industry.

Professional investors are attracted because they can see the ability of the industry to compete internationally because the honey is unique. A move backwards to categorising the honey based on pollen count, which allows table honey to be categorised as manuka honey, will likely reduce the attractiveness of the industry , result in the withdrawal of investor funds and an industry decline.

- Similarly those companies with professional investors are those investing in research and development leading to the introduction of value added products. If this investment were to decline then there will be a corresponding reduction in research and development and innovation.

**Q4: What are the likely impacts of Option 1 for consumers?**

As noted in the response to Q3, the use of pollen count as the identifier for manuka honey will result in consumers being misled. Customers are likely to receive kanuka or manuka/kanuka honey mistakenly identified as manuka honey. They will be paying for the premium, manuka product and not receiving the product they expect.

**Q5: What practical steps are required to effectively implement Option 1?**

- The adoption of pollen count does not achieve the objective of introducing a mono-floral standard since it includes two different honeys. In addition, it will not protect or enhance the manuka brand because a large amount of product labelled manuka will not have the health benefit consumers expect. A bee pollen standard for manuka honey is unlikely to be successfully defended in a Court due to the fact the manuka pollen cannot be identified

- A number of major exporters of manuka honey do not currently collect pollen counts as it is recognised as not being an indicator of mono-florality. New processes and procedures would need to be developed, taking time and adding costs to the business with no increased value in return.

**Q6: If a definition based on pollen count is adopted:**

- **What is the appropriate percentage of pollen to indicate a monofloral honey?**
- **What, if any, additional parameters should be included?**

Pollen count or percentage adoption is not supported by If a percentage was to be introduced the standard would not be defensible since the pollen count varies greatly on a per unit basis. 70% of a very small pollen count has no meaning at all.

**Option 2: Defining manuka honey based on methylglyoxal (MG) level.**

supports the use of the levels of Methylglyoxal (MG) as the primary identifier of manuka honey when used in combination with the physicochemical characteristics listed earlier in this document. This is based on the following facts:

- The biological activity of manuka honey is principally due to the naturally occurring compound methylglyoxal (MG) (Mavric et al, 2008 and Atrott et al. 2009). MG is the basis of the antibacterial properties on which the manuka brand value has been built.
- MG is unique to manuka honey and is not present in any other New Zealand honeys including kanuka (Adams et al. 2009, Stephens et al. 2010).
- MG testing is already an established measure (mg of MG/kg of honey) used in international laboratories to rate the 'activity' of manuka honey.
- The MG assay is an accurate, fast, inexpensive, reproducible and validated assay initially developed and published by Prof T Henle from the Technical University of Dresden (Mavric et al. 2008).
- The assay method is accepted internationally in NZ major markets e.g. China and UK
- Over 80% of labelled manuka honey exported from New Zealand is tested for MG levels.
- One criticism against the adoption of MG is that levels change over time. There is an initial increase in levels followed by a decrease. In house data for MG dynamics, and its relationship with DHA (discussed later in this response), is shown in figure 3. The decline in MG occurs only after excessive drum storage time and/or exposure to high storage temperatures and thus is unlikely to have a practical impact on honey producers who follow best practice.
- A requirement to measure and record MG and DHA levels in a honey barrel over time prior to final bottling will raise the hurdle for adulteration. A sudden change in levels or MG/DHA ratio would need to be explained.
- The relationship between the precursor compound dihydroxyacetone (DHA), originating in the nectar, and MG is now well understood from the scientific literature and also in-house data at (Adams et al. 2009). DHA is a potential additional marker for manuka honey which is discussed later in this response.
- When the MG assay is used, the result should be presented as MG mg/kg. It is not best scientific practice to determine levels of a compound using a validated test (such as MG mg/kg) and then to present the result in different, derived and less precise units. Feedback from BPSC members (BPSC meeting, Wellington, 18th September 2013) confirmed verbally that when they submit a honey sample to Hills Laboratories for activity testing, Hills completes the MG assay and then transposes the result using an unpublished correlation to a different (Non-Peroxide Activity, NPA) result. This practice should not be allowed. Results should be expressed in the units of the actual test undertaken. Further comments on the issues associated with the use of the NPA test are included later in this response.
- Although MG levels can be adulterated either by the direct addition of MG or via feeding of DHA, feedback from other members of the NZ Honey Exporters Collective indicated that it is possible to detect this adulteration. Such adulteration is illegal and covered under existing legislation.

- proposes that 'manuka honey' should only be stated on the product label when the MG level is ≥ 100mg/kg (please see response to Q10). This is consistent with current practice at
- The ideal would be to add several other chemical markers alongside MG and DHA to obtain a better standard. This will require further investment and research preferably at a cross-company level (please see response to Q2).

**Q7: What are the likely impacts of Option 2 for businesses?**

- The value of manuka lies in the brand which is a function of the monofloral name "manuka honey" (not a blend) and a number depicting bioactivity. It is not possible to de-link the monofloral name on the product and the bioactivity. The monofloral name needs to be linked to New Zealand i.e. manuka only comes from New Zealand. Developing credibility around this, such that manuka can only come from New Zealand, is key to this product having a sustainable commercial future and developing into a major New Zealand industry.
- The fundamental commercial issue is that the "manuka brand" needs to be protected and developed. It is no longer possible to trademark "manuka" and obtain protection. We strongly support a New Zealand Government endorsed quality mark to achieve the protection from product being passed off as manuka and not containing the active compound. This is the best way forward given the inability now to trademark manuka.
- From a regulatory perspective manuka honey is a food. The product label needs to show its composition and be honest with consumers in showing its key contents. Showing methylglyoxal concentration is making a content claim NOT a health claim.
- Marketing manuka honey on methylglyoxal content is easy for consumers to understand. They are used to purchasing natural health products based on the concentration of the active components e.g. with fish oil they look for EPA and DHA.
- Labelling a product with a number based on its anti-bacterial strength could be considered (e.g. by EFSA) as a health claim.
- From a consumer perspective it is difficult to understand how phenol numbers are derived.
- The medical and scientific communities understand structure/function relationships. Since the announcement that methylglyoxal was responsible for the stable anti-bacterial activity in manuka honey, there has been an explosion in the number of science publications focussing on the anti-bacterial activity of manuka honey. Methylglyoxal is a well understood compound by these communities and provides the honey with credibility to encourage scientific investigation. Prior to the discovery, the research on manuka honey tended to be restricted to a few passionate scientists but did not have widespread support from the international science community.
- From a marketing perspective, the focus on methylglyoxal content allows independent auditing of the product.

**Q8: What are the likely impacts of Option 2 for consumers?**

- If the recommendations made here are implemented, the consumer will consistently be able to identify genuine NZ manuka honey and choose the price point/ MG level they wish to purchase with certainty that the product is 'true to label'. The consumer will be get what they pay for.

**Q9: What practical steps are required to effectively implement Option 2?**

- The MG assay is already widely used by laboratories in preference to the NPA test. Thus the impact for implementation will be minimal. The cost of the test is relatively cheap, so the impact on cost of goods will be minimal.
- Many major honey producers and exporters already measure MG levels in their manuka honey. Thus the impact of making this a mandatory test will, in our opinion, be minimal.

**Q10: If a definition based on methylglyoxal activity is adopted:**

- **What are the appropriate levels of methylglyoxal to include? (Please provide any available data or scientific evidence to support your submission).**
- **What, if any, additional parameters should be included? e.g. DHA.**

- The key question is what is required to define the honey as a monofloral? MHNZ believes the minimum value for the labelling of product as a monofloral manuka honey should be set at 100 mg/kg. This is a different question to what minimum MG level may be required for health applications. There is a different answer to each question.
- has considerable experience identifying manuka honey based on taste and thixotropic properties (in addition to testing for MG); a definite change in these properties occurs around the MG 100mg/kg level.
- The classification of manuka should be rational and able to be applicable to all ages of the honey i.e. from fresh honey stored in the comb through sales and consumption. Manuka Health has detected the existence of methylglyoxal in the nectar of the manuka and has analysed samples taken directly from the comb of the honey box in the field (Appendix 3). Virtually every sample tested was over 100mg/kg methylglyoxal. If the minimum threshold was to be set higher than MG 100mg/kg then it could take sometime after extraction before the honey reaches the MG threshold. The honey should be able to be classified as manuka as soon as it becomes honey in the hive.
- We believe those promoting 250mg/kg as the minimum threshold may be: (1) focussing on the level required for a health/ clinical application, which is not the right question in this instance, or (2) are looking to reduce the amount of honey labelled manuka and forcing up the price on the remaining qualifying honey. This may suit some businesses that focus on producing 250mg/kg and above.
- has data (submitted for publication) demonstrating the *in-vitro* activity of manuka honey at MG 100mg/kg against a number of bacteria including *Helicobacter pylori, Staphylococcus aureus* and *Streptococcus pyogenes,* even at low concentrations in the range of 2-4%.

## Option 3: Defining manuka honey based on pollen count and methylglyoxal level

This option is not supported due to the issues stated under Option 1.

**Q11: What are the likely impacts of Option 3 for businesses?**

The issues identified for Option 1 all apply here. The combination of pollen count AND methylglyoxal testing will be considerable. Testing costs will increase considerably without any improvement in quality of the product being supplied.

**Q12: What are the likely impacts of Option 3 for consumers?**

This option may reduce the likelihood of non-manuka/non- kanuka honey being falsely sold as manuka honey. However it will not address the equally significant issue of kanuka honey currently being labelled as manuka honey.

**Q13: What practical steps are required to effectively implement Option 3?**

As listed for Option 1 and Option 2.

**Alternative (transitional) Option:**

**Define manuka honey based on pollen count OR methylglyoxal level**

- recognises that a number of New Zealand exporters currently use pollen counts to substantiate their monofloral claims and may not currently collect MG levels routinely. To allow these companies time to modify their processes and procedures to collect the appropriate MG data, we recognise that it may be appropriate to allow a transition period during which either pollen count (as currently defined as >70% manuka/ kanuka pollen) OR MG level (≥ 100mg/kg) are allowed.
- proposes that a 6-month transition period should be sufficient for companies to make this transition as the MG assay is already widely available at contract laboratories and utilised by the major exporters.
- also recognises that kanuka/ manuka pollen counts (considering all the identification issues summarised under Option1) is likely to increase the barrier to general 'dark-brown' honeys being falsely labelled as being New Zealand Manuka honey in international markets due either to not being manuka/ kanuka honey or not being sourced from New Zealand (pollen is a good indicator of country of origin).

**Q2: Are there alternative options for defining manuka honey (i.e. not based on MG content or pollen count), and what scientific evidence supports this?**

recommends that further marker compounds be added to the definition in due course and once scientific data are established to support their relevance. These markers should be focussed on the separation of manuka honey from kanuka honey.

The ideal is to have a number of chemical (five?) markers to define manuka honey. Two markers, MG and DHA (see summary below) are already well characterised. Other markers are currently being evaluated by a number of companies, including :

Moving to the use of two markers, MG and DHA, now will eliminate the majority of honeys falsely labelled 'manuka'. A (lower) risk of adulteration will remain; MG and DHA can be added to honey. However this is illegal and could be detected by requiring bee keepers/ producers to track MG/ DHA levels over time and by auditing suppliers of these compounds. There are a limited number of suppliers of MG in NZ. Sales to non-laboratory customers could be identified.

a) **DHA**

- The compound dihydroxyacetone (DHA) is recommended by to be used **in addition** to MG as a marker for manuka honey.
- Rather than an absolute number being set as a minimum level for DHA, proposes that a ratio (≥ 1:1) between the compounds is determined for regulation/ guidelines.
- The relationship and ratio between the precursor compound DHA, originating in the nectar, and MG is well understood in the scientific literature and in-house at (Figure 3, Adams et al. 2009, Atrott et al, 2012).
- There is an inverse relationship between the levels of MG and DHA; DHA converts to MG over time resulting in an increase in MG levels and a corresponding reduction in DHA.
- In-house work shows that MG increases with time almost independently of DHA content until the ratio of DHA to MG reaches a critical level whereby there is insufficient DHA for MG to continue to be produced. Data for the decline in ratio of DHA to MG is shown in figure 3. Thereafter, DHA and MG both decline. This decline occurs only after excessive drum storage time and/or exposure to high storage temperatures, and thus is unlikely to have a practical impact on honey producers who follow best practice.
- A validated test method to quantify DHA will be required.
- The addition of a second test will increase costs of product testing but as this will be a chemical assay the costs are far lower than previously used NPA methods.

**b) Non-Peroxide Activity (NPA)**

does **not** support the use of NPA labelling for monofloral honey due to the following issues:

- NPA was developed as a general indicator of the activity of manuka honey before the compound conferring this activity (ie MG) was known.
- NPA is an indirect measure of the amount of MG present in a honey sample.
- The non-peroxide activity level of a honey solution is determined against the bacterium *Staphylococcus aureus* by measuring (e.g. using a ruler) the size of a clear (inhibition) zone which develops over 24-hours on an agar plate inoculated with *S. aureus* - agar diffusion method'. This result is then compared to the inhibition seen by a phenol control solution to determine the 'phenol equivalent'.
- The NPA assay is highly variable as a consequence of a number of constraints: biological (heat, diffusion rate) and operational (inconsistency of 'reader' measuring zone of inhibition) and the minimal level of detection (originally 8.2 phenol equivalents). Thus any NPA result should be expressed along with the appropriate standard deviation/ variance. E.g. NPA 10 (± 5). It is misleading in our opinion to express NPA as a single value.

- Any activity rating determined using the NPA method has limited accuracy and considerable variability for a known MG level.
- This assay is time-consuming to perform and expensive to undertake as the plates require individual measurement.
- The NPA assay is out-dated and has now been superseded following the identification (in 2008) of MG and the development of a direct quantification method. This is recognised by the majority of NZ bee keepers and exporters of manuka honey. It was confirmed (BPSC meeting 18th September 2013) that many laboratories contracted by bee keepers to undertake NPA testing actually perform the MG assay and then use (an unpublished) conversion to express the results as NPA.
- The NPA assay tests the honey specifically against *Staphylococcus aureus*. It is not appropriate to extrapolate the results of an NPA test to imply the rating applies to other bacteria. This is misleading to the public.
- NPA (or UMF) does not inform the consumer of the anti-bacterial effect it will have *in-vivo* on their bodies. Instead a content claim is far more appropriate particularly in a food or beverage. For example, a beer manufacturer indicates the alcohol content on the label, say 4%. They do not state the Unique Drunkenness Factor (UDF) to indicate the effect it will have on the individual, say 10% drunk.
- **Why use an indirect, variable measure of activity such as the NPA test when there is a more accurate, reliable, cheaper and validated assay to directly measure the compound (MG) driving the antibacterial activity already available in the market and in wide use? To continue the use of the test NPA is not good science.**
- If manuka honey companies wish to continue to use an NPA rating on their labels, it should be mandated that the data are actually generated using the NPA method, not converted from a measured MG level. If MG is measured, the MG level should be recorded.
- There should be a single accepted correlation used by all parties with respect to the equivalent levels of MG and NPA. Currently there is one correlation published in a peer reviewed journal (Atrott 2009). The aim of this analysis was to demonstrate NPA was dependent on MG content not to use MG content to estimate NPA levels or vice versa. A different, as yet unpublished, correlation is currently being used by Hills laboratories. In this case MG is tested and used to estimate NPA levels. The difference between these correlations has been driving considerable friction between companies. The adoption of MG as the primary test and the development of definitive correlation (if still needed) should be a priority for the manuka honey exporters to ensure that we present a single, aligned position to overseas markets. Nevertheless, , has a view at best a NPA range has to be used to cover the possible outcomes from any methylglyoxal level. The testing systems are very different, measuring different parameters and it is not possible to estimate one parameter from the other to single figure accuracy.

**c) Phenolic floral markers**

- Phenolics may prove to be good alternatives to pollen for identifying manuka honey. There is current research work being conducted to establish a fingerprint of phenolic floral markers for manuka honey, which may enable it to be differentiated from kanuka honey.
- Analysis of work already published on honey phenolics (Oelschlaegel et al, 2012; Fearnley et al, 2012; Kato et al, 2012; Stephens et al, 2010; Yao et al, 2003; Weston et al, 2000; Russell et al 1990) suggests that 2,3,4-trimethoxybenzoic acid, 2-methoxybenzoic acid, and leptosin are characteristic floral markers for manuka.
- More work is required to define these markers and to confirm their relevance to manuka honey (Are they present in Australian jellybush honey?).
- The use of an appropriate test method to determine the presence and levels of identified phenolic compounds is likely to be cost effective and could be performed in contract analytical laboratories.

**Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?**

does not support the use of general 'Activity' labelling for manuka honey.

- Peroxide activity per se cannot be used to establish a honey as being a mono-floral manuka honey.
- Methylglyoxal (MG) is the distinguishing characteristic for manuka honey and is primarily responsible for its unique **stable** antibacterial properties.
- All honeys have **unstable** antibacterial properties due to the presence of hydrogen peroxide. However these properties rapidly disappear and do not confer long term antibacterial benefits and are, thus, unlikely to be stable over the shelf life of the product. Labelling such honeys as 'active' brings risk to the Manuka brand.
- The peroxide and NPA activity are not additive[2].
- Hydrogen peroxide is destroyed by catalase enzymes in the body (hence its instability). MG is not affected by catalase (hence is stable activity).
- As all honeys have peroxide activity, allowing a peroxide claim for manuka honey removes the differentiating value proposition for manuka and increases the risk of consumer confusion
- The labelling of manuka honey as "active" without stating that the activity is only due to peroxide activity is extremely misleading to consumers, who may believe they are purchasing a manuka honey with MG- attributed activity.
- Hydrogen peroxide is difficult to quantify with any reliability e.g. by a simple chemical assay

[2] Personal communication, Professor P. Molan

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30 September 2013

**Options for Defining Monofloral Manuka Honey**

Manuka Honey is an important export for New Zealand companies, including a number of our members, and we welcome MPI developing guidelines for its definition. Given the additional premium available on Manuka Honey and the fact it is strongly identified with this country we believe it is important to have a reliable definition which is adhered to by the industry for New Zealand to retain its reputation for integrity. It is also important to ensure that companies maintaining high standards are not placed at a competitive disadvantage.

Because Manuka Honey is sold both on the source of the honey and its biological activity we support the option of using both pollen content and methyl glyoxal content to define honey as Manuka Honey. If manufacturers and distributors cannot afford the additional testing costs imposed then they should not be expecting to receive the premium that Manuka Honey commands.

However, we believe that the science on certain identification of honey as Manuka Honey is not complete and that methyl glyoxal alone is not a sufficient chemical marker and neither is pollen identification sufficiently reliable to be 100% sure. We therefore recommend that the use of pollen and methyl glyoxal be used as an interim standard and further work on developing a reliable chemical signature of Manuka Honey be undertaken by the industry.

Thank you for the opportunity to comment on the Consultation Paper and should you require any more information or wish to discuss points raised further please do not hesitate to contact me.

-ends-

## Manuka Honey Standard Submission

This submission uses Hyperlinks extensively (Ctrl Plus Left Click on the Hyperlink) with 40 documents attached and some web references requiring an internet connection.

The submissions sought and questions asked by MPI in the "Options for Defining Monofloral Manuka Honey" discussion paper are laid out in a format that contains some errors and assumptions that are not factual or supported by the evidence thus making many questions redundant. This submission is therefore laid out in an information providing style putting as much context and history around that information as possible. It attempts to answer the questions posed by the discussion document at the end of this submission.

The provision of a considerable amount of documentation supporting this submission will be a difficult task for the reviewers to assess. We make no apology for this. The industry has attempted to implement standards 3 times since 1995 and not achieved that goal at every instance. It is safe to say that the complexity of this issue and vested interests involved has been the root cause of this failure. Only by understanding all of the issues can the best solution be reached.

**UMF/MGO/NPA**

In this submission these three terms are used synonymously. The letters UMF are a trademark owned by the UMFHA (formerly AMHA). These letters however are ubiquitously used to denote the Phenol **rating** (percentage phenol equivalent) of a honey's Non Peroxide Activity and it is in

this context that they are used in this submission and all its supporting documentation and references.

**A History of Manuka.**

Manuka honey has been produced in New Zealand for over 100 years, from two closely related plants (Leptospermum scoparium and Kunzea ericoides (changed from Leptospermum ericoides in 1983).

Manuka honey is a thixotrophic honey (meaning it is jelly like) making it difficult to extract from the combs. This feature is documented as being exponentially affected by dilution (dilutions with a small amount of other honey produce a large decrease in thixotrophy).

It has a long history of being a poor quality honey due to its strong unpleasant flavour, with this being reversed over the last 25 years due to the marketing of "special" properties found in some manuka honey. While popular belief is that manuka is a preferred flavour, blind tastings (conducted by both of manuka and manuka blends show that the flavour preferred by consumers is a mild flavoured blend rather than pure manuka. This is consistent with a "Target" TV program that rated the honeys with the lowest manuka pollen percentages the most preferred flavours. Comb honey sold from New Zealand to Europe would often contain manuka honey and for many years this resulted in European purchase contracts for comb honey specifically stating "without manuka flavour".

The first research alluding to some differences in antibacterial activity in Manuka honey (i.e. not Hydrogen Peroxide) was in 1987. It was not until 7 years later in 1994 that manuka was found to inhibit Helicobacter pylori **in vitro** – Al Somal et al). A further unpublished clinical study by Al Somal failed to show any effect on H. pylori in vivo and this result was repeated in **1999 "it was shown to not be effective for H. pylori" in vivo.** (UK study). There have subsequently been no clinical studies that have shown a benefit with H. pylori 14 years later. To the current day there is no clinically proven benefit for manuka honey's antibacterial activity other than a topical application.

Efforts to market manuka with special properties did not start to gain momentum until the mid 1990s and the first successful PR was initiated by the NZ Beekeepers Assn marketing efforts. The key PR sound bite to get media traction was the story about Helicobacter pylori i.e. this was after the 1994 in vitro research was published. It was this belief that manuka would cure stomach ulcers and by inference even stomach cancer that is at the core of the belief of manuka's benefit. This was promoted by large organizations with marketing material e.g. one tourist shop brochure from a major manuka seller specifically stated "for stomach ulcers" a

stated dose and frequency, after it had been shown to be ineffective for this purpose. Supporting website information to this day serves to perpetuate these mythical properties and beliefs surrounding manuka honey.

Prices and export volumes did not increase until after 2000 (NZ$ 11.5 million) –

Prior to about 1982, honey exports from New Zealand were regulated by the NZ Honey Marketing Authority (NZHMA) which enjoyed sole right of export to that point. Export efforts of differentiated New Zealand honeys did not gain momentum until some time after this date as private companies developed markets. The increasing value of manuka honey due to its unique property is a significant factor in increasing prices and volumes of NZ honey after 2000, but **it is not the only one**. Future differentiation may well provide further opportunities, and these should not be limited by one faction trying to impose a monopoly over the rest of the honey industry.

**Codex Alimentarius Honey Standard**

World standards for honey are laid out in the Codex Alimentarius honey standard. The Codex Alimentarius is the United Nations organization responsible for food standards ensuring food safety and facilitating World trade. The signatory countries to the Codex Commission (including New Zealand) represent over 99% of the World's population. New Zealand is a signatory to Codex.

The Codex honey standard has been adopted by the EU. Its principles and language are incorporated into the EU Honey Directive. The EU imports approximately 50% of all World Trade in honey. Member countries such as the UK have developed their own honey standards based on the EU and thus the Codex standard. New Zealand's honey standard changed from the 1984 Food regulations to the current ANZFA honey standard in 2002. This change moved the description of honey closer to the wording of the Codex honey standard in line with the principles of harmonizing our food standards to those of the Codex. It is unsurprising that importing countries already apply the Codex when assessing the quality of importing manuka honey.

The key principles of the Codex standard as applied to monofloral honeys are:

- It must be honey
- If it is to be named as a monofloral honey, one can use the **common** or **botanical** name of the plant source.
- It must be **"wholly or mainly"** from the named source.
- Its characteristics must be **consistent with the source.**
- These characteristics must be established by examining three categories being **organoleptic, physicochemical and microscopic.**

The Codex honey standard does not have provision for additional claims about a honey such as antibacterial activity, anti inflammatory action, prebiotic effects etc. But for a honey with these claimed additional properties, named as coming from a specific plant source, **it must firstly**

**meet the Codex requirement of "wholly or mainly"** and characteristic "properties corresponding with that origin". This is in line with common sense consumer expectation.

**Antibacterial Activity in Honey**

Many honeys have antibacterial activity. Much of this antibacterial activity is from Hydrogen peroxide ($H_2O_2$) in turn produced from an enzyme (Glucose Oxidase – GOX) added to the honey by the bees. The level of $H_2O_2$ is highly variable (like the MGO activity in manuka) but the strongest $H_2O_2$ activity is at least as antibacterially active as the highest manuka activity when compared using the same laboratory method (Agar Well Diffusion Assay) with levels of over 30% phenol equivalent routinely found as measured by Eurofins in Hamilton

**MGO/NPA/UMF**

It was first reported that manuka had an additional source of antibacterial activity in 1987 and this was termed the Non Peroxide Activity – NPA. 19 years later (2006) it was suggested most of this was due to Methylglyoxal (MGO). This was elaborated on and confirmed in 2007 and in 2009 this was shown to originate from Dihydroxyacetone (DHA) that was shown to originate in the nectar of Leptospermum scoparium **at varying levels**. To quote from the above linked paper:

> "that there is **variation in the amount of dihydroxyacetone** in the nectar and that certain manuka trees have the potential to produce honeys with high nonperoxide antibacterial activity, **whereas others do not**".

Additionally the research showed that adding MGO and DHA to honeys would produce the Non Peroxide activity in other honeys including clover honey.

The current science and knowledge shows that:

- DHA/MGO has been found in the honey from at least 7 Leptospermum species (6 from Australia – which has over 80 species of Leptospermum – **none of which have a history of "manuka" as a common name**).
- DHA is variable in the nectar of L. scoparium plants (see above) and from limited data, seems to be affected by subspecies variability and environmental factors.
- DHA turns into MGO over time – 200-300% increase of MGO in four months at 37°C.
- Reported levels of MGO in some honey samples (over 1,500 ppm) can be diluted by more than 5 times with other honeys and still have over 300 ppm (considered high quality manuka) yet this would represent a blend of only 20% manuka. This small linked spreadsheet allows one to play with pollen and MGO parameters to show that the "wholly or mainly" requirement is not met by MGO content.
- DHA is the key ingredient in sunless tanning products and is commercially available at around $100 per kilogram. Therefore $0.10 to $0.50 worth of added DHA would provide the same level of DHA (1,000 – 5,000ppm) found in most NPA active manuka honeys. Most commercially available DHA is isotopically the same as the DHA found in manuka i.e. at this time there is no analytical mechanism able to differentiate between the two sources of DHA (natural or added). NPA active manuka conservatively sells for more than $10.00 per kilo more than other honeys.

Additionally, companies involved in the NPA manuka honey market have publicly invested in growing manuka subspecies with high DHA/MGO levels supported by $850,000 of government money, and data from ) shows considerable DHA variability over North Island apiary sites. (reported to BPSC by
A slide from a UMFHA presentation states some manuka from L. scoparium has NPA (implying some does not). i.e. these companies know that DHA/MGO is highly variable in L. scoparium and cannot have escaped the conclusion that DHA/MGO is not a good indicator of whether a honey is wholly or mainly "manuka".

Our recommendation based on the above, is that **MGO is definitely not a suitable marker to define manuka.** It is not sufficiently related to proportionality to give any guarantee of "wholly or mainly" and is not used by European labs for that purpose. A quote from Gudrun Beckh of QSI (and chairman of the International Honey Commission) puts it succinctly: *"For the honey market in the EU **neither MGO nor UMF is legally interesting for declaration Manuka,** can just be one characteristic additional to microscopic and sensory, thixotrophy"*

**Manuka (L. scoparium) vs Kanuka (K. ericoides) – Common Name**

The honey from these two plants is accepted by most as having the same colour, flavour and physical properties. Prior to this century, no attempt was made to differentiate between honey from the two species. Numerous botanical texts list the common name of both plants as manuka along with kanuka, white tea tree, red tee tree, red manuka, white manuka, tree manuka, kahikatoa, heath like manuka etc. This is elaborated on towards the bottom of page 2 in this document - published in the New Zealand Beekeeper in 2008. It is notable that there was not one response to this article's main point - that the common name "manuka" refers to both L. scoparium and K. ericoides. At the time we were unable to find a botanical text that did not list "manuka" as one of the common names of K. ericoides. This is different on the internet now, but much of this is due to concerted editing/lobbying of resources such as Wikipedia by those wanting to alter history and must be viewed with a healthy dose of skepticism.

**The Use of the "Common Name" provision of the Codex honey standard.**

> "Where honey has been designated according to floral or plant source (6.1.6) then the **common name or the botanical name** of the floral source shall be in close proximity to the word "honey"."

Because manuka honey has been produced in New Zealand from two plants for more than 100 years and sold as manuka honey domestically and internationally for well over 50 years, it would seem that this is not a difficult issue. Both plants have a variety of names including manuka, kahikatoa, tea tree, red tea tree, white tea tree, red manuka, white manuka, tree manuka etc. Both plants were in the Leptospermum genus. In 1983 K. ericoides was re classified into the Kunzea genus.

When this tree (left) was planted in 1982 its botanical name was Leptospermum ericoides. Honey from it was called manuka honey. Now its botanical name is Kunzea ericoides. **This scientific reclassification will not affect the use of the common name or the honey that comes from this plant.**

There are numerous cases around the World where the use of a common name is applied to a monofloral honey. This is the very reason this provision exists in the Codex.

Some examples (not an exhaustive list) of honeys that use a common name with different species name are:

"**Heather**" is applied to species of Erica and also to Calluna vulgaris. C. vulgaris was once an Erica, but has been put in its own genus, similar to what has happened to K. ericoides.
"**Lavender**" is applied to different species of Lavendula - In Spain they distinguish e.g. Cantueso and Espliego ( 2 different lavender species) but for the German market both are Lavender and the honey is different
**"Thyme"** is applied to a number of different Thymus species, with significant differences in taste.
"**Acacia**" is a common name along with "wattle" for species from the Acacia genus (over 800 species in Australia, but one of the World's most well known honies is "Acacia" honey, is not from the Acacia genus, but from the Robinia genus.
**"Sage"** from California is not a sage at all.
**"Borage"** is applied to two plant species in New Zealand – Echium vulgare (also called "Vipers Bugloss" or "Blue Borage") and Borago officinalis (also called "Blue Borage")
"**Clover**" is the largest named honey source in the World, with honeys from New Zealand, Denmark, Germany, Argentina, Canada, USA, Australia and others, all being called clover. Here, our impression is "clover" is a term for species of the Trifolum genus. The US is one of the largest honey producers in the World, the largest importer in the World and one of the largest honey markets. Their single largest named floral source honey is "clover". Two of the largest honey producing states are North and South Dakota and "clover" is the single largest crop in those states. See references 1, 2, 3 Here, "clover" is produced almost entirely from "sweet" clover. "Sweet Clovers" are from the Melilotus genus, with two species M. alba and M. officinalis (yellow and white). Honeys from these species are listed on the National Honey Board website as "Clover" here:
http://www.honey.com/honey-at-home/learn-about-honey/honey-varietals/ with the following description:

> "There are a few different varieties of Clover - look on Honey Locator for White Dutch Clover, Sweet Clover, White Sweet Clover and Red Clover"
>
> Dutch White Clover – Trifolium repens
> Red Clover – Trifolium pretense
> Yellow Sweet Clover – Melilotus officinalis
> White Sweet Clover – Melilotus alba

Clover honey is marketed by individual US brands in consumer retail packs using the term "clover" on the front of pack without qualification. This is routine and commonplace as shown by the following examples : 1, 2, 3, 4, And here is a list of labels from the US showing the extensive number of brands, pictorial flower representations (or lack of) and front of pack

descriptions. Most of these clover honeys are from Melilotus species, even when depicting a Trifolium like flower.

We could elaborate further on these examples above, but trust that the limited evidence supplied is sufficient to demonstrate the principle. Should more evidence be required, we would be happy to research and supply further examples.

The use of the term "common name" in the Codex has been selected because of this diversity of common name usage. The common name usage of "manuka" for the honey that comes from two very closely related plants is yet another very good example of why the "common name" provision in the Codex exists.

**Pollen Analysis**

There is significant opposition to pollen analysis of manuka (this must be examined under the Codex honey Standard's – "microscopic" category). Published research (Moar - 1985) recommends a 70% level of manuka pollen to consider a monofloral manuka backed by pollen analyses of thousands of samples of manuka since by at least 4 other people/organizations

A key reason for this opposition to pollen analysis is that honeys that have "high" MGO levels sometimes have low manuka pollen. However this outcome is explained and even **to be expected** given the 20% blend example noted above. Before MGO was discovered (in 2006) as the active ingredient, it was believed (due to some very poor science) that UMF(NPA or MGO) = Manuka purity. This incorrectly implied that high MGO with low manuka pollen proved pollen was a flawed method – a hypothesis invalidated by the research findings of MGO being the active ingredient and its high variability in manuka honey. It is unfortunate that lobbying based on this false premise has prevented the introduction of a manuka standard for over 10 years.

Based on over 50 manuka samples of competitors' products taken from supermarkets over the last 2 years, over 67% of honey sold in supermarkets in New Zealand fail to meet the 70% level with some having less than 10% manuka pollen. It is likely that the opposition to pollen analysis stems from companies that only measure MGO/NPA as a measure of manuka. By doing so they are mostly selling product that is not "wholly or mainly" from plants commonly called manuka due to the problems of using MGO as a measure of manuka purity as detailed above. The introduction of pollen analysis would seriously compromise these companies' current activities.

Taking their opposition further, it is argued that K. ericoides pollen is not able to be differentiated from L. scoparium pollen so it's not possible to determine between honey from the two species using pollen analysis. Further since only L. scoparium has DHA/MGO and K. ericoides does not, selling K. ericoides honey as manuka is fraud. And further any honey without MGO must therefore be K. ericoides.

These arguments fail to take into account the following cumulative information:

1. Honey from both plants has been sold as manuka for over 100 years, **including by all the current NPA manuka sellers.** Some of the largest sellers are knowingly buying large

quantities of honey from K. ericoides areas. None of them have a "Kanuka" label on the market and to our knowledge there is not one significant seller of "Kanuka" honey in the market.

2. Both plants have a long history of being called manuka (starting with Maori who in turn had different names for the same plants due to regional and tribal dialects etc. e.g. According to J.T. Salmon's book *Trees and Shrubs of New Zealand*, the naming convention for *Leptospermum scoparium* north of Auckland is kahikatoa and for *Kunzea ericoides* it is "manuka", while elsewhere "manuka" is more common for *L. scoparium* and "kanuka" for *K. ericoides*.) This aspect is dealt with in detail in this document.
3. The two honeys are indistinguishable by flavour and appearance.
   While there is some work on distinguishing in the laboratory, this has huge difficulties as all the compounds so far examined suffer from a **lack of stability over time ("The concentration of the phenolic components increased with maturation in both honey types")** and proof of presence that the compound is always proportional irrespective of cultivar or environmental factors is a near impossible task. This discussion amongst the BPSC highlights some of the difficulties with floral markers.
4. Pure L. scoparium honey can have negligible MGO (little DHA in the nectar). From a personal communication , it is evident that even cultivars associated with high values of DHA (e.g. L. scoparium var incarnum) can have lower values indicating environmental influences.
5. L. scoparium honey can be correctly identified by the 70% pollen test. i.e. if it has more than 70% L. scoparium pollen it will be manuka honey.
6. Lower than 70% "manuka" pollen is not manuka honey regardless of which species it comes from.
7. The NPA/UMF honey sellers label their product with its level of activity, and educate their consumers to look for this rating. The following shows how a honey with more than 70% manuka pollen would be labeled.
   a. If it meets the Codex definition of wholly or mainly (determined by colour, pollen, taste, chemical composition etc) then it could be L. scoparium, K. ericoides or a mixture of both, but the consumer will get a honey that tastes and looks like "manuka" always has. i.e. is not defrauded.
   b. If there is an additional label claim on this honey, as long as that claim is met, the consumer is not defrauded.
   c. If a honey does not reach 70% manuka pollen and thus not meet the wholly or mainly requirement, then no amount of additional label claims will prevent the consumer from being defrauded. They have not received a product that is what it claims to be, namely wholly or mainly "manuka" honey.
8. Australian honeys with MGO (7 species to date) will be able to be excluded if pollen analysis is used because of the presence of other Australian pollens not found in New Zealand.

The arguments against pollen analysis descends into a purely academic one. But these arguments are applied by the NPA sellers more to defeat its use. As shown in 7. above, the application of pollen analysis in conjunction with other Codex required measurements will have a better outcome for the consumer that currently exists now where over 67% of retails packs fail to meet the Codex pollen requirements. Current manuka sellers are not meeting the wholly or mainly requirement by using NPA/MGO/UMF measurements.

**Pollen Analysis Issues.**

Different nectar sources have varying levels of pollen that gets into their resultant honey. Reasons for this include structure of the flower, size of the pollen grains and time of pollen dehiscing vs. nectar production. But it is important to understand that these values are consistent for each species. How this relates to manuka is discussed here particularly in relation to under represented pollen species.

Another issue is that of stored pollen in and around the brood nest being incorporated at extraction time into the honey. This can be significant with manuka due to the use of honey looseners or "prickers" to disturb the jellied nature of manuka. This stored pollen is collected separately by pollen foragers and may bear no relationship to the honey collected by nectar foragers. This is discussed in detail here.
The answer to this problem is that any extraneous pollen introduced by extraction will show up as **an increase in total pollen numbers**. Also this issue is under the control of beehive management practices. Not removing honey from close to the brood nest, using queen excluders and selecting for breeds of bees that do not store pollen well above the brood nest, using extraction techniques that do not incorporate stored pollen into the honey (don't plane the combs back to the mid ribs etc) are all things that can be done to improve the analytical quality of the honey.

The value of 70% manuka pollen is only one of two numbers that need to be assessed. The total amount of pollen (numbers are expressed as pollen grains per 10gms of honey) must also be looked at. If a honey with little or no pollen is incorporated into a honey with a lot of pollen, then the latter appears (in percentage terms) to be the dominant nectar. The answer is to look at the total pollen count. In the case of manuka, it needs around 500,000 pollen grains per 10 grams and therefore would have 350,000 manuka pollen grains if 70% are manuka. A high total pollen of e.g. 3,000,000 and a 40% manuka pollen would have 1,200,000 manuka pollen grains and therefore enough to satisfy the possibility that this was manuka honey but had a contamination of extracted pollen. This identifiable exception would then be assessed on the other remaining parameters of colour, conductivity, sugar spectrum, thixotrophy, MGO flavour etc.

The suggestion of filtering honey to retain the [slightly smaller] manuka pollen will be prevented by the **reduction of total pollen**. i.e. if there are only 200,000 pollen grains /10g it is not manuka. Additionally most prevalent pollens from the NI are lotus, a very similar size to manuka and clover is not dramatically larger than manuka so I t is highly doubtful that any filtering techniques will be able to uniformly remove non manuka pollen grains.

**Other Measurements Required Under the Codex Honey Standard**

Additional parameters that should be looked at under the Codex for manuka honey include colour, conductivity, glucose, fructose, maltose levels and total pollen. This aggregate table of analyses from provides levels of these. The raw data is available on request subject to certain confidentiality guarantees that will be dependant on the nature of the request.

There are two honeys associated with manuka production where special note will have to be taken. These are with **beech forest honeydew** and **rewarewa.** Both have low pollen values and similar colour to manuka. Rewarewa manuka blends will usually have low total pollen numbers i.e. less than 400,000 with less than 300,000 being a noteworthy level. Rewarewa also has a flavour note that can be identified readily and the presence of this in manuka should count against a monofloral determination. Unfortunately this is not "measureable" and leaves it in the hands of an "expert" honey grader. Not a desirable outcome, but maybe someone that adjudicates difficult samples where all the other analyses are inconclusive may be an option. This is in fact how the laboratories in Europe operate, where the analyses are presented and a summary of these including a comment on the flavour is given leading to an assessment of whether the honey is "typical for" or "not typical for" the designated honey type.

Beech honeydew can be determined as the conductivity will show increased levels and there will also be a decrease in glucose and fructose along with an increase in oligosaccharides. Manuka honey conductivity at 0.62 (SD 0.14) is close to the European level of 0.8 for honeydew. However Beech honeydews typically have conductivity over 1.0 and glucose levels below 27.0% compared with manuka at around 30% glucose. The presence of Honeydew Elements (HDE) in the sample will also be a clue. Honeys with a mid point of these values for conductivity and glucose should be considered a blend regardless of the pollen percentages. However this raised another issue of honeydew produced from manuka. There are a number of scale insects that inhabit K. ericoides and L. scoparium and reports of manuka honey being produced after the flowering had stopped could be attributed to this. Honeydew determination outside the South Island Beech forest areas may be manuka honeydews and more work on this area is required.

**QUESTIONS AND ANSWERS**

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?

Yes they are adequate. Should a key marker compound or compounds be found that has little variation over multiple subspecies, samples, latitudes, altitudes, soils, climates, microclimates or years is stable and not found in other non manuka plants, it would be a useful addition.

Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?

There are other methods, like NIR or any other multivariate analysis type system, however they only recognize what they have been told to recognize as manuka. i.e. the original determinations have to made by some other system. Notably to date, this has only been with traditional Codex based methods. They are thus a derivative of these traditional methods. It is notable that none of these pattern recognition methods are used anywhere, even after 30 years of investigation.

**Option 1**

Q3: What are the likely impacts of Option 1 for businesses?

Option 1 must be based on all the parameters **required** in the Codex, not just the percentage of manuka pollen. The Codex by its very nature requires at least 3 measurements. This will

increase the cost for most businesses as few measure anything now. Those that measure now only measure MGO and this is to make their additional label claims. It's safe to say that few businesses make enough measurements to satisfy the Codex standard so the outcome will be a huge change in measurement and costs for most businesses. In we have been doing this for years and the costs associated with this have been a sloped playing field. Making other companies pay the same costs we take for granted to provide true to label product will level the playing field.

Q4: What are the likely impacts of Option 1 for consumers?

Assuming that the Codex principles other than pollen are applied, the consumer will actually get manuka honey, rather than a manuka blend as they are getting most of the time now. Or they will be faced with new labels that say "manuka blend". If they are only interested in the special properties as claimed by the NPA manuka sellers, then they will probably see no change. i.e. a blend of manuka honey with some claim or number denoting its "efficacy"

Q5: What practical steps are required to effectively implement Option 1?

Set the levels, publish those levels with guidelines for interpretation and advice, ratify methods and facilitate accredited laboratories. Harmonize methods (total pollen needs work – from ring trials).

Q6: If a definition based on pollen count is adopted:

- what is the appropriate percentage of pollen to indicate a monofloral honey?

70% - all available research and data on this matter support figure. If anything it is slightly on the low side.

- what, if any, additional parameters should be included?

To satisfy the Codex the following need to be looked at: total pollen, sugar spectrum, conductivity, colour, and a description of flavour that uses terms that are internationally understood and applied. Advice should be sought from other countries applying the Codex standards in this respect. E.g. Germany, UK.

**Option 2**

Q7: What are the likely impacts of Option 2 for businesses?

For most of the NPA manuka sellers, this would be "business as usual". As more "manuka honey" was able to be sold, so a pool of high MGO honey could be blended to produce more manuka honey thus solving the potential of future shortages. One thousand tones of carefully produced and aged manuka with 1,500ppm could be used to produce 5,000 tonnes of "manuka". Additionally high MGO honeys from Australia could be sold as manuka or blended with New Zealand or even honeys from other countries to further increase the supply to meet demand and thus enabling T&E's "Export Double" goal to be met. Perhaps a little whimsical and tongue in cheek, but on a much more serious note, due to the Cost benefit of adding DHA to honey, the incentive to "manufacture" manuka honey (by anyone in the World) would be extremely high and would be **a significant risk to the integrity of New Zealand's reputation.**

Q8: What are the likely impacts of Option 2 for consumers?

Wholesale fraud, licensed and condoned by the New Zealand Government.

Q9: What practical steps are required to effectively implement Option 2?

We see no way of this being implemented under the existing legislative framework. It does not satisfy the Codex, The EU honey directive (half of our export market) or any consumer protection legislation or the provisions for truth in labeling in the Animal Products Act. See the extensive section on this topic previously in this submission.

Q10: If a definition based on methylglyoxal activity is adopted:

- what are the appropriate levels of methylglyoxal to include? (Please provide any available data or scientific evidence to support your submission).
- what, if any, additional parameters should be included? e.g. DHA.

This is answered by our answer to Q9.

**Option 3**

Q11: What are the likely impacts of Option 3 for businesses?

We found the logic of this option flawed. If pollen analysis is used, there will be both K. ericoides honey and L. scoparium honey that has no or little MGO/DHA that would fail to be called manuka when it clearly comes wholly or mainly from plants that are commonly called manuka thus preventing its rightful use of the manuka designation under Codex principles. One either accepts the Codex honey standard, or does not.

However taking this option at face value, most honey labeled manuka at present would not be able to use the monofloral designation and would completely eliminate over 80% of the current trade (roughly half of the trade is non NPA manuka and nearly 70% of current trade is less than 70% manuka pollen i.e. half of the remaining 30% is all that is left to call manuka – 15% - meaning 85% isn't!), much of which is genuine manuka under the Codex i.e. wholly or mainly from plants commonly called manuka.

Q12: What are the likely impacts of Option 3 for consumers?

Consumers would only be able to purchase honey labeled as manuka if it had MGO and came from plants commonly called manuka. They would be prevented from buying honey labeled manuka that did not have MGO. Virtually all the manuka currently sold in domestic supermarkets would fail to meet this specification.

Q13: What practical steps are required to effectively implement Option 3?

We see no practical steps...

**Content claims**

Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?

The Semantics:
The word "active" is a derivation of Antibacterial Activity. This is disputed but virtually all research into the antibacterial activity of honey uses this terminology and all the lab reports have always used "Total Activity" and "Non Peroxide Activity". They can both be shorted to "active" and still denote their meaning. No-one can claim ownership of this word or trademark it. And our international competitors will not have any barrier to them using it to promote their honeys. To limit this word's use to only manuka with MGO is an effort to hijack the English language to retrospectively "brand" one's marketing activities. This area is best left to the intellectual property lawyers.

The Efficacy.
Some manuka has MGO. On the Agar Well Diffusion Assay (AWDA), this is compared to a percentage of the antiseptic phenol. Levels in fresh manuka get as high as 20% phenol equivalent and in aged manuka as high as 30% (1,600ppm MGO). Manuka with this activity has been clinically shown to be effective in wound therapy and perhaps as a topical application for other ailments/skin infections and perhaps at a stretch in the mouth/throat. However there is no evidence of any benefit derived from MGO once ingested. In fact the opposite is true. MGO is a toxic substance that has been shown to cause cancer in mice at 3,000 ppm. One of the key reasons that manuka is famous is because of the beliefs created in consumers' minds by false

claims made for manuka being a cure for H.pylori, stomach ulcers, stomach cancer and cancer by the incumbents in the industry. Variations of these claims are still in existence on websites as previously documented in this submission. In fact it is now understood that MGO is a by product of Glycolysis and is mopped up by the Glyoxalase enzyme system, which may account for a significant reason MGO has no benefit (or detriment) once ingested.

**Hydrogen Peroxide Activity. (PA)**

This is found in many honeys but, like MGO, is highly variable between honeys and within them. However the AWDA using phenol shows that some fresh honeys have over 30% phenol equivalent and aged honeys (over two years old) can still retain levels of over 20% phenol. There is a reduction over time of PA but this is variable between honeys. The opportunity to select honey types with higher PA levels and then within those honey types individual honeys with high PA levels is an opportunity very similar to MGO in manuka. The fact is that many manuka honeys fit this category i.e. have high PA. These peroxide honeys inhibit at levels equal to and higher than the best NPA honeys when compared on the same test (AWDA), have a stable enough shelf life to be significantly active after a two year use by date, and have been shown in numerous wound trials to be highly effective. And in a trial at Waikato (The effect of gamma-irradiation on the antibacterial activity of honey. Molan-PC; Allen-KL , 1996. Journal-of-Pharmacy-and-Pharmacology. 1996, 48: 11, 1206-1209; Bc.) it was shown that PA was as stable as NPA when subjected to gamma irradiation used for sterilization even when the dose was doubled to that needed for sterilization.

A hypothetical argument put forward is that blood has catalase and therefore this will neutralize any PA in honey. However the PH of blood is also hypothetically suspected to eliminate MGO. The only clinically proven benefit of NPA and PA is as a wound or topical application. When honeys are measured for "efficacy" for this using the AWDA, they come out with the same results i.e. numbers that are comparable.

Should the same numbers be used on pack? MGO is there in the honey ready to be used from the outset but is consumed in the reaction i.e. it will run out. PA has some peroxide there at the beginning but the enzyme continues to generate it over time. Should some difference in numbering be used top convey this? When the product is being ingested? Both answers would appear to be unsatisfactory to the NPA sellers. We were accused of "making numbers up" when we tried to convey peroxide levels. When we put Phenol levels on the product those accusations changed to "you're riding on the coat tails of UMF"

The Codex requires only that a honey meets its monofloral definitions. After that, any label claims are required by consumer protection principles to be true. If a product claims NPA then that must be verifiable. However if a product claims PA and that is verifiable, how is the consumer defrauded? Certainly not by an untrue claim.

**A significant issue here is that the consumer has been subjected to misleading promotional material that has led them to believe that if they ingest a manuka honey with its claims of special NPA derived from MGO, they will derive a benefit of, broadly speaking, something to do with the alimentary canal. And this promotional activity is still happening.**

In the long term, MGO as a substance is at serious marketing risk for New Zealand. There are far more pieces of credible research highlighting MGO as a risk in heart disease, cancer, diabetes, vascular and age related diseases than showing a benefit. It is not a nice substance. There are other bioactive substances in New Zealand honeys that may have benefit in the future and these should not be put at risk by one faction of the industry that is selling a particular type of antibacterial activity and by circumstance has happened to brand it "Manuka". PA activity is one of those and if it can be shown that is effective in clinical trials for mouth, throat or topical applications, then making a claim about it on a product is simply making a statement of fact. Legislating against that statement of fact is legislating in favour of a faction with no proven significant benefit to create a monopoly that has some serious downside risk. Additionally the spiraling sales of manuka honey have occurred in an environment where many claims are being made in the market and to date this array of choices in front of consumers has not prevented this success from occurring and can be argued persuasively that this very diversity is key to having honed the claims that have caught the consumers' imagination. The best outcome will be for claims that are true to capture the consumers' attention. Legislating the status quo for one faction will not provide that best outcome.

**Summary**

**There are two real solvable issues at stake.**

1. Is the product actually manuka using internationally accepted definitions.
2. Are the on pack claims true or false or misleading.

Applying the Codex will fix the first one.
Applying measurement of the claims and guidance of the legality of those claims (are they a health or content claims etc) in a changing legislative framework will solve the second. We suggest that the implementation and application of legislation restricting health type claims is a moving target both in New Zealand and internationally and this last aspect needs further thought and discussion.

**5. Questions for Submitters**

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? No, this system is too subjective

Can they be improved? No

Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this? Not that I am aware of.

**Option 1**

Q3: What are the likely impacts of Option 1 for businesses? For our company almost 100% of our Manuka honey will not comply with this option. There will be a total loss for our company on sales of Manuka honey, we have several years of pollen testing that show our honey does not comply. Please find the results attached

Q4: What are the likely impacts of Option 1 for consumers? For our customers no honey available for sale which will impact on our exports considerably, we export 95% of what we produce to about 10 countries around the world

Q5: What practical steps are required to effectively implement Option 1? I don't know of any

Q6: If a definition based on pollen count is adopted:

- What is the appropriate percentage of pollen to indicate a monofloral honey? I am not familiar enough to comment on the science, however our test results would show it would need to be low
- What, if any, additional parameters should be included? None

**Option 2**

Q7: What are the likely impacts of Option 2 for businesses? This option is one that we are familiar with and can work with; we must have the ability to put our own trademark on inside of stating the actual MG level on the label. We will have a test result here to prove "true to label"

Q8: What are the likely impacts of Option 2 for consumers?
Not a great deal as it is a system many are familiar with

Q9: What practical steps are required to effectively implement Option 2?
Labels and product being checked to be correct and accurate to label and testing

Q10: If a definition based on methylglyoxal activity is adopted:

• What are the appropriate levels of methylglyoxal to include? (Please provide any available data or scientific evidence to support your submission).

There are different correlations out there, please use one that is back by repeatable science. is about the same as MGO 83 not MGO 100 as suggested in many arenas.

• What, if any, additional parameters should be included? E.g. DHA. is doing some research right now, Manuka identification using multiple chemical markers. The first stage of this research is very good, it must be repeated, and the plan is for this to be done first quarter 2014.

**Option 3**

Q11: What are the likely impacts of Option 3 for businesses? As this option requires pollen analysis my answer to Option 1 stands, total loss of sales of our Manuka honey for export

Q12: What are the likely impacts of Option 3 for consumers? As per option 1, reduced honey volume for sale

Q13: What practical steps are required to effectively implement Option 3? If this needs to be considered as an option then there should be an either or option so we can use an option that will allow us to sell our honey for export

**Content claims**

Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which

No they are not; they are confusing in the market place and often pass off as if they are selling NPA honey or honey. They are not the same, and yet are being sold as the same in many market places. In the UK, our market sales are severely being impacted upon by the Active sales, driving prices down and creating huge confusion. There is often a big difference between total activity and the NPA activity (see example attached)

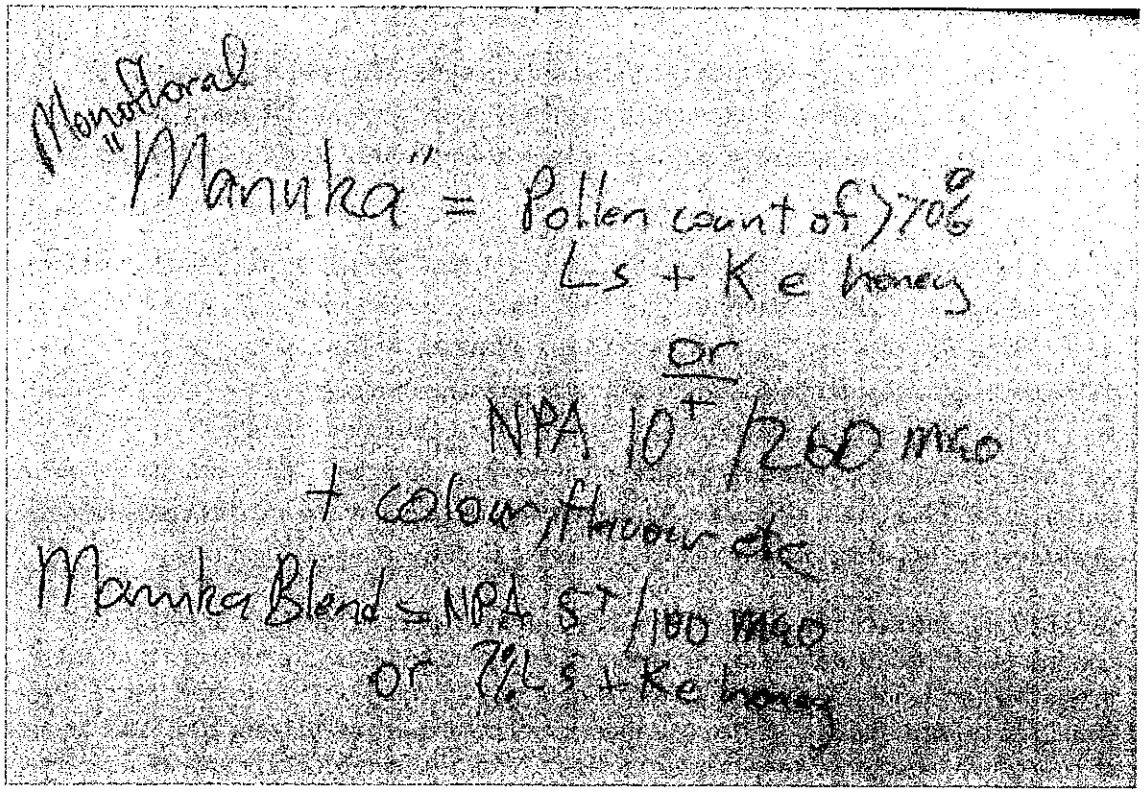
One of the highest Active honey results we got here in recent times was 33, for a Rewarewa honey, yet this could have been sold as Active honey.

-ends-

**Submission to the Ministry of Primary Industries on the Options for setting interim parameters and measurements that Define Monofloral Manuka Honey.**

, it has supplied the domestic market with honey since its conception and to this day our companies focus is for honey on toast for the ordinary New Zealander, people buy our honey for its taste and favour experience. We have hives covering much of the lower North Island, and other areas.

We found the discussion document leading and confusing, something which MPI will also recognise by now. Many beekeepers have told us they want to respond but the way it is presented is too hard to deal with. It is particularly leading and it does not address the 4th choice: Table Manuka at 70% pollen and /or Manuka at 70% that also makes a special claim such as MGO. I believe this shows an extreme bias! and is contrary to the Codex.
Not only that but it also completely misses out the compromise option presented to the BPSC as per this photograph.




In any event we will attempt to address the questions but feel this document leaves a lot to be desired.

Option one

Currently as you will no doubt know from the due diligence you will have completed when you brought the "AC Neilson report " . sold domestically. This honey is sold without further claims other than it is "Manuka Honey" people buy it for their toast because they like the taste, we do not imply any other benefits NPA MGO or anything. We sell our honey based on the international Codex Alimentarius using melissopalynology levels of 70% as part of the criteria. The impact for our domestic consumers for toast honey if option one is used in the first instance for quantifying Manuka monofloral is – no change (Answer to Question4)

Likely impacts to some Packers and Producer businesses is that at a beekeeper level they may have to use better skills to sort their honey rather than including all their earlier produced bush or pasture honey into their Manuka lines. Sorting is what beekeepers used to do before the potential to effectively print money got in the way of truth and integrity. When extracting if a beekeeper finds the honey pours out of the frames and overflows the Honey Loosener tray or he needs to install the lossener over a vat, that's not Manuka he is extracting. For packers it means they may not be so predisposed to " creating " more Manuka Honey by adding Bush Honeys such as Rewarewa or Honey dew if they are could be caught. Effectively it means they actually have to put Manuka Honey in the jar too (Answer Q3)

We support the BPSC guidelines but this possibly needs to improve the organoleptic parameters, these could be interpreted internationally. The guidelines for pollen count need to be clearly understood in that during some processes of extraction the total pollens may be increased but so long as there are approx. 350000 Manuka grains then it qualifies. (Answer Q1)

We do understand that while some other companies classify their product based on methylglyoxal, we all know for many this is not what they are selling on the label and also that the MGO product can be added. We all also know not all Manuka bushes in NZ produce high MGO readings or necessarily any reading. At the coal face we can tell you various areas that have MGO reasonably consistently are under immense pressure with some beekeepers now offering in excess of $100 per hive for sites or even $30000 a farm that can stand 150 hives. Literally hundreds of hives are being placed in very small areas. We also know a particular cultivar has been identified as producing higher DHA which verifies the fact that there are areas of Manuka in NZ that do not have activity. We can also provide photographs of land that is all Leptospermum Scoparium that has little to low MGO.(.Answer question 2)

To attempt separate Manuka from Kanuka is red herring presented by a group of people who have an agenda to protect their brand name. In fact more than one of the larger companies involved buys and produces what will be a mixture to some extent of Manuka and Kanuka all the time so for them to suggest otherwise is simply not true. We do not believe LS and KE should be separated on the packs for either side of the argument. In many cases this idea is a notion to preclude pollen counting by using the "Kanuka doesn't have NPA's card "when in fact much of the LS in NZ does not have NPA's either.

The companies that supposedly sell on NPA or call it UMF and actually test for MGO should perhaps change their wording as surely this is illegal at many levels and needs sorting regardless they should also have 70% Manuka by pollen. Then MPI could perhaps put their hand on their heart and certify to this, as without the criteria's in the codex under pinning it, certification would be a travesty. Perhaps though the next problem is that too much MGO is not good for you!

We feel somewhat uncomfortable regarding NZTE's large investments in the Manuka industry and their level of input into these decisions which may have an expectation of return on investment.

Regarding a comment made on filtration being used to" remove larger pollen grains" therefore making honey more Manuka this statement appears to be wistful thinking on MPI's part .We had discussions with the Honey Industries main verifiers they say that most packing plants use some form of straining usually down to about 200 microns which would not capture pollen grains. Assure said of the 220 premises they inspect no-one is using diatomaceous earth (DE) filtration that filters down to the level of capturing pollen grains. Also it is illegal to do so under the EU Omar, which these premises are most likely registered for. Does MPI have evidence of this and is this product still honey if the properties of it have been removed??? And why has the Companies RMP's not been removed??

Option 2 We are opposed to this option

Question 7 It is already acknowledged that there are areas of Manuka in NZ that do not have or have only low activity, NPA or MGO's so how can this be equitable??. We can take you to or provide photographs of area's that are all Leptospermum Scoparium which has no or low MGO, yet produces pollen readings of greater than 70% . Our company for many years brought honey from another beekeeper- a line of Penny Royal/ pasture blend honey, this honey is no longer available for us to purchase because it was found to have a NPA reading. So all NPA/MGO honeys do not equal Manuka either.

Question 8 Having to provide testing and hold test level on the shelf will put the price beyond the NZ consumer's budget for Manuka honey for toast .All the Manuka honey will then be destined for export. In contrast being able to test for total pollens and 70% Manuka requires little cost and is currently undertaken by several companies.

Question 9 how can you be practical with this when unscrupulous people can take a drum of Rewarewa add a small amount of Manuka and dash of MGO liquid and voila – it is now Manuka

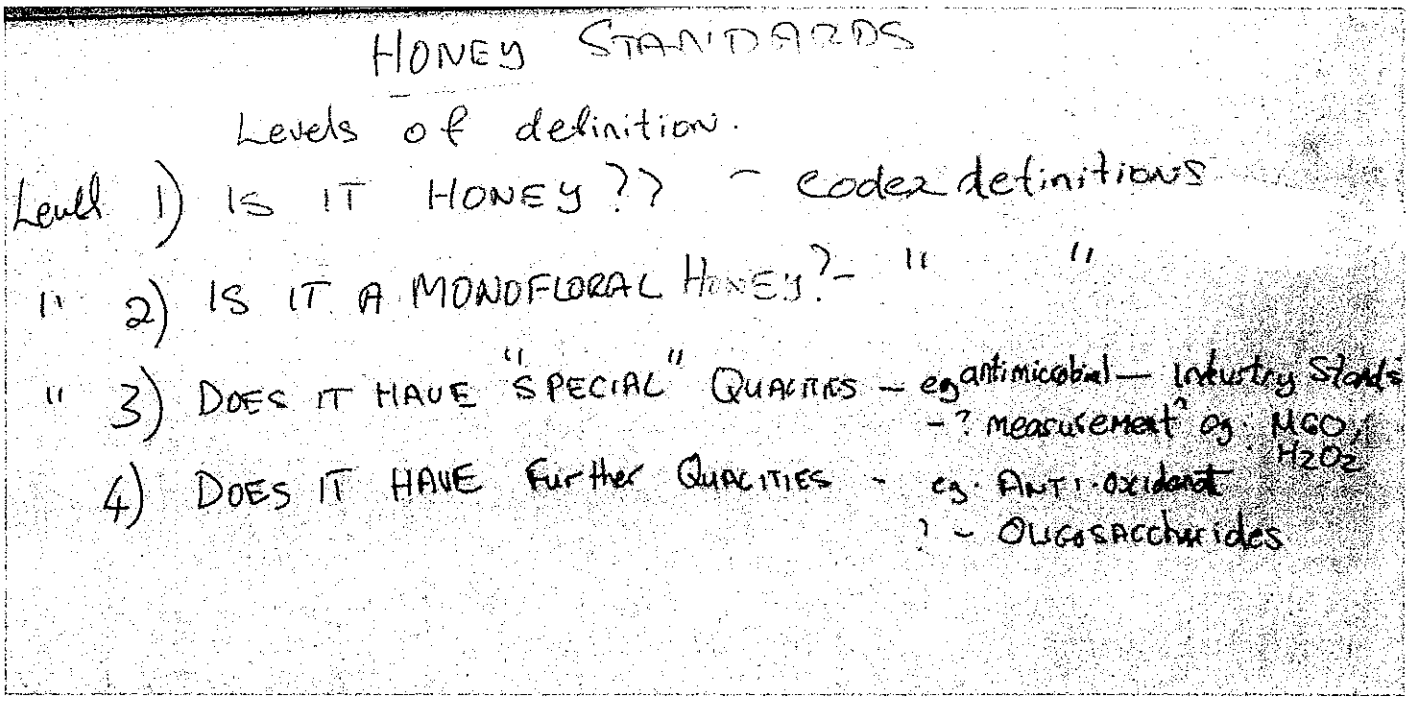
Question 10 the tests appear straight forward, it is just the problem of people cheating that needs addressing. We believe this should only be used a secondary criteria after following the Codex so the level should be at least above 260 combined with Pollen at 70% subject to standard deviation.

Option 3 We are opposed to this option in this form if you amended the words along the lines of Definition based on Codex ( i.e. includes melissopalynology) and **if secondary** claims are made such as MGO then we would be supportive of this.)

As it stands this option removes all the Manuka from the domestic market that does not make a secondary claim, and also removes all the Manuka at 70% that does not have MGO. This is contrary to the requirements of Codex and unacceptable to many businesses packing for the domestic market and exporting internationally under the Codex regulations. Question11

This is grossly unaccecpable to consumers who will not be able to buy the taste sensation they currently enjoy for a fair price. Question 12

The Monofloral honey definitions are just as per the Hong Kong report , reading it from left across to the right- special qualities fall in behind the codex definitions. As a parting comment I attach the information presented at the BPSC meeting some months ago you cannot ignore this.




We sincerely trust that Truth and Integrity will prevail.

-ends-

# SUBMISSION TO MINISTRY OF PRIMARY INDUSTRIES ON THE OPTIONS FOR SETTING INTERIUM PARAMETERS AND MEASUREMENTS THAT DEFINE MONOFLORAL MANUKA HONEY

## 1. INTRODUCTION

**1.1** welcomes the opportunity to comment on the ***Options for setting interim parameters and measurement that DEFINE MONOFLORAL MANUKA HONEY.***

**1.2** The following submission has been developed in consultation with members of the export bee industry sector and my knowledge as an exporter of bee products which spans approximately forty years.

## 2 GENERAL COMMENTS

2.1 supports the establishment of Descriptive Standards for all New Zealand Monofloral Honey. firmly believes that Standards are required. This is very important not only to provide truth in labelling for those who consume honey but to protect New Zealand's reputation as a safe and trusted exporter of high quality food products to world market

*2.2* To provide background to this submission, some history of Manuka honey needs to be acknowledged. It is recorded as far back as in New Zealand author, I Hopkins 1916 book "Forty-Two Years of Beekeeping" - *(Manuka) " thick" honey, as it is usually called, that is, honey that cannot be thrown from the combs by the ordinary process of extraction.* It goes on to say this - *was first experienced in 1879.* Further to this - *unfortunately for my prospects of raising much extracted honey, my apiary was too near the bush which covered the hills adjacent... Nearly all the honey from mixed bush is too dense to extract from the combs in the ordinary way... I therefore turned my attention to the raising of the comb honey in one- pound section boxes....in fact the demand exceeded the supply.*

2.3 More recent history shows during the very early 80's Dudley Ward at Kintail Honey started commercially importing Norwegian Honey Looseners. These were sold to other Beekeepers. The machines made the commercial processing of Thixotropic honeys possible. Initially Dudley was using the machine for Ling heather honey. Written records show that by 1985 after the demise of the Honey Marketing Authority, Kintail was exporting Manuka Honey as a Monofloral Honey to Finland (copies of this are available in the company's archives). Kintail Honey and Arataki Honey along with many other New Zealand Beekeepers and Packers have been retailing Manuka Honey in New Zealand since the early 1980's.

During the period from 1993 to 1998, the National Beekeepers Association established a Marketing Committee which was charged with the task of promoting NZ honey varieties. Three of the current BPSC members served on that Committee at the time, including in the role of Chairman at various times. The Committee employed a Marketing Consultant and marketing work was funded by way of levies collected from all beekeepers in NZ through an Apiary Levy under the Commodity Levies Act. One of the key activities for that Committee was the promotion of

monofloral honey varieties and twelve were recognized as being commercially significant to the industry, including Manuka.

As a result of the discovery and publication by Dr Peter Molan at Waikato University of the non-peroxide, antibacterial characteristics of some manuka honey, it was decided as part of the marketing strategy that this variety would become the "flagship" product for the industry, upon which other varieties would be promoted also, to provide added value for NZ honey across the board. The Marketing Committee worked in close proximity with Waikato University in this regard, and the concept of a "Unique Manuka Factor" was established under the auspices of that connection.

In the late 1990's an independent organisation first known as the Active Manuka Honey Industry Group (AMHIG) was established to focus the marketing efforts of producers and packers who began to produce Manuka Honey packs with recognised " non-peroxide activity" ratings. AMHIG became the Active Manuka Honey Association (AMHA) and of recent times renamed itself as the Unique Manuka Factor Honey Association (UMFHA). Since that time a number of new packing and marketing companies have been established focussing upon the "Activity" rating of Manuka Honey and the export value of the product has risen sharply and consistently over subsequent years.

There has been a steady increase in domestic sales for manuka honey also, with a number of companies continuing to trade in "table" manuka honey, which as a consequence of export demand created by "active manuka" brands, has risen in value and cost to packers and consumers alike.

2.4 Monofloral determination – the process used by many exporting and domestic companies (2.3) for defining a Monofloral Manuka Honey, including is currently based on the internationally recognised Codex Alimentarious Standard for Honey. The three prime criteria are: Organoleptic, Physiochemical and Microscopic properties, as a package. Attempting to break the Codex criteria apart as portrayed in the discussion paper is unacceptable, as it muddies the water and takes away the true picture and process which is used by importing countries who do comply with Codex guidelines for monofloral determination.

## 3 SPECIFIC COMMENTS as per request.

**Q1** The parameters detailed in the BPSC drafted Standards are appropriate but the must be read in their entirety with direct reference to the CODEX Standard for honey. It is misleading to separate the three main properties – Organoleptic, Physiochemical and Microscopic – as it is a combination of all three which provides a determination package.

Improvement – without question, as new science becomes available it will be appropriate to incorporate this in to an updated standard, however such science must first be peer reviewed and acceptance given by the international honey community. New Zealand cannot act in advance of such approval being given, as this could potentially create more smoke and confusion in an already overloaded market place.

**Q2** Alternative options for Monofloral Manuka definition – CODEX principles are currently the only proven method of monofloral definition. The CODEX standard for honey is used both domestically and international by the world honey community, with great success.

No science has been tabled to support an alternative option, therefore none can be considered.

Key point note - there is considerable history going back many years that clearly shows our international markets operate a monofloral analysis programme, all export contracts carry key requirements which our New Zealand Honey must meet for our product to meet their import standard requirements.

Two copies of such contract specifications are attached which supports these comments, in this instance there is an Organic specification (A) and a Conventional (none organic) specification (B) which commonly applied to Honey from New Zealand. The name of the importers has been removed for commercial reasons.

**Q3** Pollen analysis is a primary tool in the identification of honey type and monofloral status, it is used extensively in New Zealand and our International markets. This is a key factor which must not be ignored and must be appreciated. It is a founding principle of our analysis programme for all export honey.

Pollen analysis should not be considered the only tool for monofloral definition, the MPI document has separated the microscopic criteria however this is confusing and misleading. CODEX principles must be applied using the range of criteria detailed to achieve a reliable determination.

No attempt to separate Manuka from Kanuka is contemplated, under the microscope it is not possible to distinguish between the two pollens, however more importantly our markets both domestically and internationally accept that Manuka marketed under the common name principle, is one product.

No impact is expected on our business, we operate strict CODEX principles as do our longstanding clients.

**Q4** No impact is expected on the consumer of our products, maintaining strict CODEX principles means what we say is what they get – truth in labelling.

**Q5** The only steps required to formalise pollen analysis as a key principle in a monofloral standard would be to increase the number of certified testing facilities and to ensure regular "ring testing" is conducted.

**Q6** , maintains, that the current domestic and international standard for determination of monofloral status of Manuka is set at 70% pollen count, however we note that this statistic should not be read in isolation, but as part of the CODEX determination principles (refer to draft proposal document attached).

**Q7/8/9/10** The use of Methylglyoxal content as the sole principle for the determination of a monofloral manuka honey is **totally unacceptable**, no further comment is deemed necessary. It is a very weak option which can be manipulated and would expose the bee industry to fraudulent practise.

Depending on region of production, MG and NPA tested levels can be high or in some cases almost undetectable, in the case of a low outcome, this does not mean the honey is not a monofloral manuka.

**Q11/12** MG and Pollen Analysis as the primary identification tool – the potential for fraud still remains under this scenario, it is almost impossible to add manuka/kanuka pollen to honey, however the same is not said for DHA.

Adding an MG rating to monofloral manuka honey that has been tested at 70% pollen count presents little risk to our business as we market on CODEX principles of analysis. We would not use the MG factor in our business as we have established procedures, as do our international clients.

**Q13** At this time there has been little correlation work undertaken to establish if there is a direct relationship between manuka or manuka/kanuka pollen count and methylglyoxal levels.

On this basis how could such a standard, be implemented. For this to proceed there would need to be considerable **totally independent testing** undertaken to obtain a solid database of information. Quite feasible, however this would take time and we would need the results reflected through a ring testing programme.

**Q14** Non Peroxide Activity rating, Total Peroxide rating, and Methylglyoxal rating.

Provided truth in labelling applies, then we have no option but to support the use of all three descriptors, there should be no health claim attached to the "number", nor is there likely to be evidence of false or exaggerated commentary on the label.

Key to this issue will be the stability of the honey's activity, over the shelf life of the product. Depending on processing, handling and storage the potential for some activity to rise and some to fall is very real, therefore a stipulation that the "activity" statement must go the distance will I suspect weed out the less stable option.

It is important to understand that market perception was fuelled by **early** over exaggerated commentary . Comments such as 'Cancer" and "Ulcer" were used, but these were totally unsubstantiated. It is now widely known that honey is at its best as a topical application and in some instances supports throat and mouth health that is all.

So is the consumer mislead, probably, it is hard to take back what was promoted in the early years of the NAP Manuka story.

Are they being misled today, probably, as the issue around strict labelling guidelines is very weak and there is no control on what the label is allowed to say.

On that note I would formally suggest that MPI takes a serious look at labelling criteria on Manuka Honey which carries an "Activity" or "MG" statement. If you control the label content and ensure what is on the label equals what's in the jar then we would have achieved a very positive outcome.

have prepared a "Principles" based monofloral definition process for Manuka Honey, we would ask that you study this and understand the process, it is internationally accepted.

**ATTACHED:**

European Contract Specification (A) – 4 pages

European Contract Specification (B) – 4 pages

BPSC Draft Monofloral Standards – 1 page

NZ Manuka Monofloral Honey Standard – H& A Ltd – 5 pages.

# New Zealand Honey Profiles Monofloral Varieties
# Bee Products Standards Council (Drafted 2008)

| Key Characteristics | Appearance | | Pollen | | Organoleptic | | Other |
|---|---|---|---|---|---|---|---|
| Variety | Colour | PFND | Frequency of monofloral pollen | Total Pollen Count Range Determination | Aroma | Flavour | Additional criteria and notes |
| Clover | Light pale gold | 0 –60mm | 45% | 100 000 stdev 90 000 | Herbal dry grass. | Clean mild, sweet, delicate | |
| Honeydew (Beech) | Medium dark amber | 87.2 mm std 10.5 | | | Musky | Complex, treacly, | Average 12.6 mS/cm Std 2.5 Micro-sooty moulds |
| Kamahi | Light to pale yellow | 42 average std 11.5 | 45% | 185 000 Ave 66 834 Stdev | Intense, musky, Quite complex .Dominate aroma | Very clean rich and sweet distinctive aftertaste, Buttery texture | Dominant aroma |
| Manuka/ Kanuka | Dark cream to dark brown | 84 mm 11.8mm std | 70% | 517 000 ave 280 000 stdev | Damp earth, heather, aromatic | Mineral, slightly bitter, | Thixotropic in liquid state |
| Nodding Thistle | Colourless to pale lemon | | | Low pollen count | Perfumed floral blossom, intense. | Intense floral flavour, | Dominance of fructose, Slow natural granulation. |
| Pohutakawa | Off- white | Pure 0 –5 Blends 5 – 30 | 10 –15% | | Musky, damp leaves, salty (almost seaweed) but pleasant) | Clean earthy sweet butterscotch | Very rapid granulation, days in comb, hours in tank |
| Rata | Colourless to Pale cream | 16.4mm 8.6 | 45% | 123 000 35 937 stdev | Heady aromatic | Sweet, distinctive, mildly salty | |
| Rewarewa | Amber to red | 92.9mm std 9.2mm | Bird pollinated plant | 112 800 ave 101 867 stdev | Light aroma mild mixed fruit | Clean sweet smoky malty | |
| Tawari | Light | 23 mm std 8.8 | | Low pollen count | Rich perfumed musk/incense/sandal wood orange peel/liquorice | Clean musty roselip syrup, very sweet golden syrup | High in moisture Doesn't fully Granulate |
| Thyme | Amber | 105 mm | More than 20% | 3000 –8000 per 10g Total thyme pollen grains | Pervasive very aromatic, | Resinous aromatic herbal, very strong | Very unique, dominant aroma |
| Vipers Bugloss (Blue Borage) | Light Pinkish Brown | 21.7 mm st 9 | 45% | 72 155 ave 38 699 stdev | Initial floral, bouquet when fresh | Clean tasting mildly herbal | Texture oily texture |

# NEW ZEALAND MANUKA MONOFLORAL HONEY STANDARD

A process for determining a Monofloral Manuka Honey.

**Principle 1.** **The standards must be CODEX based.**

Key Points
New Zealand is a CODEX signatory.
CODEX principles/standards are the foundation of all world trade in honey.
CODEX requirements are clear and specific.
CODEX defines what monofloral means and how it is determined.

**Principle 2.** **CODEX Compliance Properties.**

| | | | Test Method |
|---|---|---|---|
| **Organoleptic** | Aroma | | Sensory |
| | Flavour | | Sensory |
| | Colour | | Visual |
| **Physicochemical** | PFUND Scale | Colour grade | Pfund Grader |
| | Moisture | | AOAC 969.38B |
| | Sugars | Fructose & Glucose / Sucrose | Sum/Content |
| | Water Insoluble Solids | | MAFF V22 |
| | Contaminants | Heavy metals | Max levels set |
| | | Pesticides | Max levels set |
| | | Veterinary Medicines | Max levels set |
| | | Miticide residues | Max levels set |
| | Electrical Conductivity | | Levels set |
| | Added Sugars | Authenticity | AOAC 977.20 |
| | | SCIRA | AOAC 991.41 |
| | Free Acidity | | MAFF V19 |
| | Diastase Activity | | AOAC 958.09 |
| | Hydroxymethylfural Content (HMF) | | AOAC 980.23 |

| | | | |
|---|---|---|---|
| **Microscopic** | Total pollen count | | Microscope |
| | Floral type specific pollen counts | | Microscope |
| | Monofloral pollen qualification if applicable | | BPSC Vol. Standard |

Key Point **Please refer to the BPSC Draft Standards for actual specifications - see attached.**

Pollen counts - the BPSC in its guidelines has a minimum manuka pollen count of 70%, however it accepts that honey with a lower manuka pollen percentage could still be classified as manuka where the total pollen count is at a high enough level to indicate a high total manuka pollen count.

**Principle 3.** **Name of the Food (Honey)**

CODEX is quite specific in its determination with only honey conforming to the above criteria meeting the designation of Honey.

Honey may be designated by name under CODEX, by geographical or topographical region, if it is exclusively within a designated area.

Honey may be designated by floral or plant source under CODEX, if it comes wholly or mainly from a particular source and meets the above criteria Principle 2.

Where honey is designated according to floral or plant source, CODEX states that the "common" name or the "botanical" name of the floral source can be used.

The common name "MANUKA" must be applied to both Manuka and Kanuka as history indicates that this is standard practise, and that markets both in New Zealand and overseas do not differentiate.

No attempt to split Manuka & Kanuka is attempted under this CODEX determination process.

International markets are not seeking to split Manuka & Kanuka as they recognise that their current interpretation based on CODEX is acceptable.

**Principle 4.** **Monofloral verses Multifocal**

For a honey to be labelled a Monofloral Blend, it must be able to demonstrate that the monofloral content exceeds 50% of the determination that qualifies the honey as a monofloral type .

Example - by pollen analysis, Kamahi would have to demonstrate a monofloral pollen count of greater than 23% but less than 45% to be called a Kamahi Blend, if we use the current BPSC voluntary standard for honey of this type - see attached.

Honey that cannot meet this criteria, must be labelled a floral or bush blend only.

**Principle 5.** **Shelf Life (Best Before date)**

A maximum four (4) years from pack date should be permitted

Key Points If an activity, chemical maker or rating is nominated on the label then the product must meet that activity, chemical marker or rating level throughout its shelf life.

**Principle 6.** **Chemical Analysis - Monofloral determination.**

There is currently no proven data available to qualify if NPA Activity or MG Rating can be used to determine if a honey can be classified as monofloral. However we can note that Peter Molan observed that at minimum an activity rating of NPA 13+, more likely 15+ would be needed before a monofloral manuka could be classified.

This Mollen statement has not been verified, though it is understood this was a published comment.

To align NPA Activity or MG Rating to equal a Monofloral honey definition without the supporting CODEX test programme would be unethical, however it is recognised that a lead-in time for any new standard will be imperative and this determination will require a common-sense approach.

As peer reviewed science becomes available in this area, this new knowledge can be used to strengthen the New Zealand Monofloral Honey Standards

**Principle 7.** **Health Benefit Qualification determination.** **How**

| | |
|---|---|
| Total Peroxide Activity | Registered Lab |
| Non Peroxide Activity | Registered Lab |
| Methylglyoxal Rating | Registered Lab |
| Antioxidant Rating | Registered Lab |

Any honey if proven can have health benefit claims, to qualify as a monofloral source honey with a health benefit statement, the honey must first meet and comply with the CODEX monofloral definition as determined above.

Only once monofloral determination is achieved, can a health benefit qualification be applied.

**Principle 8.** Qualifying statements, markers or ratings on labels relating to proven health benefit attributes are permitted.

Key Points Permitted descriptors:
- Methylglyoxal (MG)
- Non Peroxide Activity (NPA)
- Total Peroxide Activity (TPA)
- Antioxidant (AXT)
- Other ? ( )

All activity, chemical markers or attribute ratings which are printed on the retail label must be true to label and supported by a certified test from a registered and approved laboratory should it be requested.

Registered Brands
- UMF (for NPA activity)
- MGO (for MG rating)
- AAH ( ? )
- Other ?( )

All brand registration must detail the relationship between the Brand and the activity, chemical marker or rating and the process for determination.

**Principle 9.** New Zealand will operate in an open market environment where competitor companies have the right to test product from the retail shelf. Product tested and proven to be not true to label will be subject to formal notification and a requirement for immediate withdrawal from the retailer.

Key Points Compliance will cover Monofloral description and qualifying statements, markers or ratings

Product recall will cover the full batch.
All cost will be for the account of the packer and or marketer.
Withdrawal notifications must be filed with MPI.
Repeat offending will result in financial penalties levied by MPI
Penalties will reflect the potential damage to Brand NZ domestically or internationally.
Product relabeling will be permitted.

**Principle 10.** Consumer & Retailer Education

The greatest success will come from consumer education. Accepting this principle, a common marketing information poster (like the fish species) will be developed which clearly spells out to the consumer the range of monofloral honey types available in New Zealand and the definitions/explanations relating to Health Benefit Statements covering Activity, Markers or Ratings. ***It should be mandatory for Retailers to display this poster.***

**Prepared by:**

30 September 2013

1. **Option 1 Pollen**
   - Pollen is not an option to determine a monofloral claim because it's not practical to differentiate Manuka and Kanuka in a commercial setting
   - Because it's not possible to differentiate the pollen, Kanuka without the antibacterial properties can be passed off as Manuka
   - Extraction methods can vary the pollen count considerably
   - Analytical methods of pollen counting are not standardised around the world leading to variability in results
   - Pollen can be easily adulterated
   - The pollen counting option would necessarily lead to the product being a blend or duo floral claim as the Commerce Commission supported; so it is not a monofloral identifier
   - We are not aware of published research that confirms pollen is a reliable indicator of NPA/ MG activity; our evidence is to the contrary
   - Pollen is not reliable enough as a monofloral indicator for any regulator to defend it in court ;
   - There is expert evidence to suggest that bees have a bias against Manuka pollen because there is not much of it, and it's hard for them to extract and they can get it more easily from other species
   - We do not accept the argument that combining Manuka and Kanuka has been common industry practice for years and therefore should continue. It is of the essence of new science that it often disproves previously held beliefs; simply because a belief (such as Manuka and Kanuka being of the same genus) has been held to be true in the past does not justify sustaining that belief after it has been disproven.

2. **Option 2 MG**
   - Non-peroxide activity (NPA) is significantly attributable to the naturally occurring compound methylglyoxal (MG). This is what provides the antibacterial properties on which the Manuka brand value has been built.
   - MG is unique to Manuka and is not present in any other New Zealand honies
   - Although MG levels can be adulterated, it is possible to detect this adulteration; it is illegal and covered under existing legislation. There is a limited number of places to purchase synthetic MG which means this can be readily audited.
   - MG can be measured reliably in laboratories around the world
   - This option is fast and inexpensive and reproducible
   - The method is accepted internationally in our major markets eg China and UK
   - Over 80% of labelled Manuka honey exported from New Zealand is MG tested

- supports two methods of measuring non-peroxide activity - NPA and MG. recognises honey with an NPA value in excess of 5 or an MG in excess of 100 as being Manuka honey. We do not use the name Manuka Honey associated with any product unless it meets these threshold criteria. These criteria are interim and subject to change through emerging science. Minimum levels will move to 10 / 260 by March 1 2014, unless the science enables us to move to an expanded set of markers unique to Manuka. There may need to be a stock in trade provision to enable transition.

3. **Option 3 Combination [and]**
   - this option is negated by the arguments in Option 1
   - we support the view of the Commerce Commission that pollen cannot lead to a monofloral claim ; it would be duo floral
   - high NPA levels which are the basis for the activity claims that underpin the Manuka brand can be associated with low pollen counts < 50%
   - We are not aware of reliable evidence of significant/ useful correlation between pollen and MG; our evidence is to the contrary

4. **Antibacterial claims – peroxide claims**

*From MPI discussion paper:*

*Often expressed as 'bioactive' or 'activity' either together with or without numerical values. This peroxide activity is said to be somewhat less stable in honey than MG and it is found in most honey.*

*Because of the similarity of these claims to MG or NPA claims, and because peroxide activity is a generic feature of most honey, peroxide activity claims may be considered misleading to consumers.*

*Are claims related to peroxide activity appropriate for Manuka honey? If so, which ones?*

   - We agree with the reasoning above.
   - Claims related to peroxide activity are not appropriate for Manuka honey because:
     - MG / NPA is the distinguishing feature for Manuka
     - Catalase in the body destroys peroxide activity; it does not destroy MG
     - The instability of peroxide activity is such that it is extremely difficult to guarantee label claims over a reasonable shelf life, and this brings risk to the Manuka brand
     - All honies have peroxide activity, so allowing a peroxide claim for Manuka removes the differentiating value proposition for Manuka and increases the risk of consumer confusion
     - All honies have peroxide activity so peroxide claims increase the risk of false Manuka monofloral claims

5. **Alternative options:**

A. pollen or MG = an alternative transition strategy to option 2

- This is a transition solution only, until published science provides greater certainty
- But there must not be any peroxide claims associated with the pollen option

B. Combination of MG and DHA

- DHA only occurs naturally in Manuka honey
- DHA converts to MG
- Two markers make it harder to counterfeit
- There is a known dynamic of conversion of DHA to MG over set storage conditions; this relationship can be used to characterise Manuka honey over its shelf life
- DHA by itself will not be a satisfactory identifier of Manuka
- We think this is worth exploring. But it is not for immediate use because more science is needed to refine the understanding of the relationship, and there isn't sufficient practical experience of using these measures in combination at scale.

**6. Regulate VS guidelines**

A. We recommend the implementation of regulation based on our recommendations. We note deliver more than 80% of Manuka honey exports, and are therefore in closest contact with factors that will impact on New Zealand's ability to sell into export markets.

B. Whilst we acknowledge does not represent the entire industry and it is in export markets that the Manuka brand and brand New Zealand is at risk.

C. The risk is that if New Zealand does not regulate, regulatory authorities in key markets may react in ways that we can't control. The fact that we don't have regulation is negatively affecting the credibility of brand New Zealand

**Appendix:**

1/ data set attached alongside this submission on MG / pollen relationship

2/ provide data to support the above points in their individual submission.

1/ ***data set***

There are 2 sets of data summarised in the attached spreadsheet.

1. Relationship between MGO and DHA.

On worksheet 1 'MGO vs DHA', the barrels of honey were tested at different time points as signified by the storage time column. Each line represents one barrel and its change over time.

Worksheet 2 'High DHA' is a similar set of data summarising the change in DHA/ MGO in 2 barrels which started with exceptionally high DHA levels. The relationship and timeframe between DHA and MGO is similar for the 2 barrels.

2. Pollen versus MGO

Internally we only have limited pollen count data. This presentation includes our in-house data and also data summarised from 2 publications which are noted. These data confirm that there is no relationship between MGO level and pollen counts (worksheet 3 ' MGO vs pollen') when expressed either as total pollen count or % pollen count.

References quoted are:


- Oelschlaegel, S., Gruner, M., Wang, P.-N., Boettcher, A., Koelling-Speer, I., & Speer, K. (2012). Classification and characterization of Manuka honeys based on phenolic compounds and methylglyoxal. Journal of Agricultural and Food Chemistry, 60(29), 7229-7237.

- Stephens, J. M. & Molan, P. C. (2008). Pollen analysis of manuka (*Leptospermum scoparium*) honeys. New Zealand Beekeeper, September, 8-12


-ends-

**Submission to the Ministry for Primary Industries**
**on the options for defining monofloral manuka honey**

Main point submitted: urgent focus should be on misrepresentation of active, not monofloral, manuka honey

The main point which I wish to submit is that the attention is on the wrong issue. My opinion is that the reason why there is so much consumer demand for manuka honey, and thus why it commands such a high price compared with other honeys, is because consumers are buying it for the unique antibacterial activity (i.e. NPA) that they expect it to have. Those consumers who are buying it only because they like the flavour of manuka honey will be undeterred by it being labelled 'Manuka Blend' or 'Manuka Table Honey'. As long as it tastes right for these consumers it will not matter if it is a blend of manuka and kanuka honeys, or even 100% kanuka honey, if the flavour of kanuka honey is sufficiently similar to the flavour of manuka honey to satisfy the consumer.

My opinion is that honey should not be sold as manuka honey if it does not meet or exceed minimum standards for content of MG, unless it is clearly labelled as 'Manuka Blend' (with the same font size for both words) or 'Manuka Table Honey' (with the same font size for all three words). My preference is for the term 'Manuka Blend' because it more correctly describes what the product is, and because the term is clearer for consumers. (The term 'Table Honey' has meaning to honey producers but probably not to consumers.)

The misleading of consumers into believing that honey sold as manuka honey will provide the unique type of antibacterial activity when it does not have it is dangerous. Such misleading could even lead to death where consumers are expecting, quite reasonably, that infection with antibiotic-resistant bacteria will be cleared up by the honey they have purchased when they believe that the honey has the unique type of activity for which it is famous.

When arguments about including kanuka honey has ceased, then a standard for monofloral manuka honey can be introduced. In the meanwhile a standard for 'Active Manuka Honey' can easily and immediately be introduced, based simply on it containing a minimum of about 250 mg/kg of MG (*i.e.* a level of MG that corresponds to a rating of 10 for NPA – which precise level of MG that is depends on which laboratory assays the MG.)

My submission is in three sections, one relating to 'Active Manuka Honey', one relating to manuka honey sold as not being active, and one applying to both types of manuka honey.

## SECTION 1: 'ACTIVE MANUKA HONEY'

### (a) Honey with activity that is due to hydrogen peroxide must not be sold with manuka in its name

There is much confusion of consumers when honey described as manuka honey is said to be active, especially when it has activity rating numbers on it. They think the honey has the unique type of antibacterial activity for which manuka honey is famous. Even where the small print on the jar or website says that the activity is due to hydrogen peroxide there is confusion because many consumers are not aware of the distinction between the two

types of activity – they expect the honey to give the same results treating infections as they have read about being achieved.

The term "total activity" that is used is a confusing term. Hydrogen peroxide activity and NPA do not work additively in the standard test for antibacterial activity – the test measures whichever of the two types of activity is greatest and thus diffuses out furthest. (The lesser activity, diffusing out a smaller distance, is in a zone where the bacteria are dead anyway, so its effect is not seen.)

Honey with a level of MG that shows it to be true "Active Manuka Honey' does not show activity due to hydrogen peroxide. Within the margin of error in measuring antibacterial activity the "total activity" (*i.e.* activity without the enzyme catalase added to destroy hydrogen peroxide) is no larger than the NPA seen when catalase is added.

It appears that the MG in manuka honey inactivates the enzymes in the honey, thus the enzyme that produces hydrogen peroxide in other types of honey is not active in manuka honey. Exporters to countries which require honey to pass a test for other enzymes (*e.g.* diastase) being active in honey find that manuka honey with a level of MG that shows it clearly to be true 'Active Manuka Honey' fails this test.

Where the activity is due to hydrogen peroxide, not NPA, the honey is of no more value than other types of honey which are not manuka honey which have the same level activity due to hydrogen peroxide. It is in my opinion unethical to sell them as 'Active Manuka Honey' at a higher price than the other types of honey command.

**(b) Kanuka honey requires a standard to stop activity ratings on that honey being used to mislead consumers**

The similarity in the names 'manuka' and 'kanuka', especially for consumers in export markets where they are not familiar with Maori words, is likely to confuse consumers into thinking that they are similar honeys. There is also the possibility that marketers will use this confusion to profit from consumers being misled. Already there has been publicity in the news media from a marketer of kanuka honey claiming that its antibacterial activity is due to MG. The antibacterial activity of kanuka honey is not due to NPA/MG (Allen *et al.* 1991; Allen *et al.* 1991). If misleading so-called "active manuka honey" is displaced from the market by standards being introduced then I expect the gap in the market to be filled by misleading "active kanuka honey".

Although it is quite legitimate for honeys to be marketed with a high level of activity due to hydrogen peroxide, there are other types of honey (*e.g.* rewarewa) which could be marketed instead which would not cause confusion.

This is a topic which requires some debate. Some suggestions I put forward are: that it is required that the botanical name 'Kunzea' is used instead of kanuka; that the honey be described as multifloral rather than kanuka if it is claimed to be active; that any rating of activity on labels be required to look distinctively different from how the activity of manuka honey is shown; that the words 'hydrogen peroxide activity' should be in a font size at least as large as the word 'active' or the number for the level of activity (whichever is the larger of the two).

**(c) There must be no implication of activity in honey sold as manuka that is below the standard for activity**

To avoid misleading of consumers there must be no implication that honey on sale with manuka in its name has activity when it does not have the minimum level of MG required in the standard for 'Active Manuka Honey'. It must not be allowed for there to be implications of activity on the label, in associated point-of-sale promotion, in advertising material, on a website, or in information given to the news media. Implications of activity would be the use of the words "active" or "activity", the use of numbers which could be taken by consumers to be ratings of activity, or the use of trademarks which have been used in the past to show activity ratings. (This will not preclude these trademarks continuing to be used on honey which does meet the standard for 'Active Manuka Honey'.)

**(d) The minimum level of MG in 'Active Manuka Honey' should be 250 mg/kg**

Honey having a level of MG at 250 mg/kg has NPA at a rating of about 10. For many years the lowest level of NPA that was allowed to have a 'UMF rating' on it was 10 (*i.e.* a non-peroxide antibacterial activity equivalent to that of 10% phenol when tested by a standard method). That was because the majority of the membership of the Active Manuka Honey Association (AMHA) which controlled the use of the 'UMF' trademark voted to recommendation of this. based on there being an absence of clinical evidence that honey with a lower level of NPA was effective in clearing infection, and much anecdotal evidence that honey with NPA rated below 10 was less effective than that with activity rated above 10. There was pressure from for marketing reasons, to be allowed to sell honey with a rating of UMF 5, and they started doing that very shortly ceased contact with AMHA despite the majority decision of the membership of AMHA.

The lower the level of activity there is in honey, the less the honey can be diluted and still have sufficient activity to prevent the growth of bacteria. Most research testing of sensitivity of bacteria to NPA in manuka honey has been done with honey with the median level of activity (NPA 16). Some species of bacteria do not have their growth prevented by such honey if it is diluted more than ten-fold (Molan 2009). If the level of activity in the honey were NPA 5 then it would not prevent growth of these bacteria if diluted just three-fold. A teaspoonful of honey held in the mouth to treat a mouth or throat infection would soon get diluted more than three-fold by salivary secretion, and a teaspoonful of honey swallowed would get diluted by gastric fluid much more than that going into the stomach even if the stomach were empty. On a wound there would be dilution by serum oozing out as a result of the osmotic action of honey, and in the eyes honey would be diluted a lot by lachrymatory secretion.

in the past agreed with the selling of honey with a rating of UMF 5 (*i.e.* a level of activity that is NPA 5), <u>but this has been with the strict proviso that the label bears a warning in the same font size as the activity rating that says that the honey is not suitable for treating infections.</u>

Another reason for not allowing honey to be sold with a rating of NPA 5 is that the published method (Allen, Molan et al. 1991) for measuring NPA has a minimum level of detection of NPA 8, with many samples of honey with activity ratings lower than 11 giving only partial inhibition of bacteria on the agar plate and thus not allowing their activity to be measured. (The published method specifies complete inhibition.) Measurement of NPA at a level below 8, or measurement of NPA where there is partial inhibition using the published method, requires a different testing method which has not been published and which gives a result that is an approximate and cannot be directly related to the NPA values above 8. Note that it is important that a standard testing method is used: see Section 1 (f) below.

Another consideration is that honey sold with an activity rating of NPA 5 is not likely to be monofloral manuka honey. A study of a large number of samples from many different areas found that, after adjusting to exclude dilution of NPA by non-manuka nectar sources, there was no manuka honey with NPA below 8 (Stephens 2006). The samples of honey in this research work were freshly collected and kept refrigerated until tested. It is well known that freshly collected manuka honey increases in its level of NPA quite quickly at ambient temperature, so for commercially handled honey these results would mean that there is no pure (*i.e.* 100% manuka source) manuka honey with activity below 10 or even higher than 10. Therefore a honey with NPA as low as 5 must have less than 50% manuka source. (Although it is claimed by some that there does exist pure, *i.e.* 100% manuka source, manuka honey with no detectable NPA, there has been no scientific evidence of this presented. Section 2 (a) of this submission discusses how measurement of thixotropy can be used to determine if honey rated NPA 5 does in fact contain more than 50% manuka honey. However, such honey will be uncommon, so honey sold rated NPA 5 is most likely to not be monofloral manuka honey. With regards to anyone maintaining that it is monofloral honey they are selling, the onus is on them to prove this scientifically. In the absence of such proof it would be a false claim.

Although preventing the sale of honey as 'Active Manuka Honey' is likely to have an impact on the business of any companies that have been selling substantial amounts of honey with NPA rated as 5, it is my opinion that this business has been based on taking advantage of the lack of knowledge of consumers about the points made above in this section (1(d)), and thus is business which I consider that they should not have had anyway. The ethics of what they have been doing should be questioned. Why would anyone be pushing to be allowed to call low-activity honey 'Active Manuka Honey' if they are not aiming to profit from riding on the reputation that has been built up for manuka honey that has an effective level of NPA?

**(e) The level of activity should be shown on the label as MG or NPA**

The level of activity in honey meeting the standard for 'Active Manuka Honey' should be shown on the label as either 'NPA' or 'MG'. This should be in an easily read font size, in a position on the label where it is easily noticed. Any other system for labelling the level of activity is potentially misleading for consumers.

Any brand names for these levels of activity should be additional to the claimed level of MG or NPA (not instead of these) so as to avoid any misleading of consumers.

To enable comparison of products by consumers there should be an official correlation graph or a table of corresponding values authorised, and its existence (and where a copy can be viewed) widely publicised. Anyone informing consumers that the corresponding values are different from the official version will then be guilty of unfair trading.

Ideally there should be a correlation graph obtained by independent testing directed by scientists with expertise in the subject (not by brand managers), using experienced commercial testing laboratories working with a validated assay for MG and with the published NPA assay (using the modifications which have been made to improve the reproducibility of the assay but which do not affect the value of the results).

Until that is done the correlation graph used by the UMF Honey Association could be used after the values of MG in the graph are adjusted if necessary to be in line with any difference in the values which Hill Laboratories now give. (It is said by others who assay MGO that after changing their method of assay Hill Laboratories seem to now

be giving a lower value for the results than they did at the time the correlation graph was produced.) Although the data may be withheld by the Association because it is claimed to be proprietary it has been published through the "calculator" which the Association has had on its website, so the data so published could be used.

Also, the graph of the Association's data should be plotted with only the results for NPA from 10 upwards, and a straight line fitted to this graph which gives a better fit to the data points than the power curve which has been forced onto the data to include the NPA values below 10 which have been obtained with a different testing method from the published one used to obtain the data for NPA values above 10.

The correlation between MG and NPA is somewhat rough, therefore the claim on the label should be for whichever of MG or NPA is actually measured, otherwise the claim my prove to be a false claim. This is especially the case with the commonly used practice of measuring the level of MG then estimating from this the level of NPA and putting the level of NPA on the label.

A major problem with the practice of estimating NPA rather than measuring it is that a large proportion of samples of honey with an activity rating of 10 or 11 give only partial inhibition of growth of bacterial in the published assay method, as mentioned in Section 1 (d) above. Saying that these have a rating of NPA 10 would be a false claim, because the published method specifies complete inhibition of bacterial growth.

**(f) NPA should be measured by the published method which has become the *de facto* industry standard**

The results for level of activity will vary if there are differences in the methodology used. In the same way that the octane ratings for the same petrol would be different in the USA and New Zealand because the regulations in the two countries specify different testing methods, if different testing methods are used to measure NPA then different numbers will result. What has become the industry standard, internationally, for measuring NPA is a published agar well diffusion assay with *Staphylococcus aureus* (Allen, Molan et al. 1991). Any deviation from this method is likely to give different results because the reference standard in this assay is phenol, and the relative sensitivity of the bacteria to phenol and the NPA of honey varies with different conditions. If a different strain of bacteria were used the difference is likely to be even greater.

Claiming that the activity of a jar of honey is due to a stated concentration of phenol could be found to not be a true claim if the method used to audit it were different from the method used to rate the activity of the batch of honey during its processing for sale. Having a standard which specifies the testing method (as is done with the octane rating of petrol) ensures that any auditing is done using the same method as is used in quality control during processing and packing of the honey for sale.

Modifications have been made to the published method to improve the reproducibility of results (*i.e.* to decrease the variability in results between repeated tests) and thus increase the reliability of the results obtained from single tests. (The details of these modifications are freely available.) These do not affect the value of the NPA rating obtained by this test. (*I. e.* the value for NPA obtained, as the average of repeated tests, will be the same if testing is done by the original published method and by the modified method.) In reality the improvements are just more tightly specifying the protocol in the commonly used testing method, to ensure that what is described in the published method is actually done.

**(g) A major education campaign is needed about honey with MG below 250 mg/kg described as manuka honey**

Consumers purchasing a product described as manuka honey are likely to be misled into thinking that it has the unique type of antibacterial properties for which manuka honey has become famous. It will take a major education campaign to get consumers to become aware of the distinction between 'Active Manuka Honey' and products on sale described as manuka honey.

As discussed in Section 1 (d) above, there are many reasons why honey should not be sold as 'Active Manuka Honey' if it has a level of activity below NPA 10 (approximately equivalent to MG at 250 mg/kg). There will be honey on sale with activity nearly as high as NPA 10 (MG 250 mg/kg) which will have less than 50% manuka source (see Section 1(d) above).

Honey with activity below NPA 10 (MG 250 mg/kg) that has more than 50% manuka source could under the Codex standard be called monofloral manuka honey. Ideally, however, to remove the possibility of consumers being misled if the education campaign has not been effective, honey with MG below 250 mg/kg should have to be labelled as a manuka blend. The percentage of manuka in the blend could be stated (*e.g.* "a blend of 80% manuka honey with 20% multifloral honey"), the percentage of manuka source being determined by measuring thixotropy or by the use of advanced 'fingerprinting" techniques being developed.

With regards to anyone maintaining that it is monofloral honey they are selling which has a level of MG below 250 mg/kg, the onus is on them to prove this scientifically. In the absence of such proof it would be a false claim. There is also the question to be asked, why would anyone be wanting to be allowed to call low-activity honey monofloral if they are not aiming to profit from misleading consumers and riding on the reputation that has been built up for manuka honey that has an effective level of NPA?

## SECTION 2: MANUKA HONEY SOLD AS NOT BEING ACTIVE

### (a) Manuka honey can be distinguished from other honeys by its containing MG and its being thixotropic

Thixotropy is a feature which is almost unique to manuka honey. Manuka honey is highly thixotropic. Although ling heather honey is thixotropic it is only moderately so and can be easily distinguished from manuka honey by its flavour. Measurement of thixotropy of blends of different proportions of manuka and non-manuka honey allowed the proportion of manuka honey to be determined quite precisely (Stephens 2006). (A distinction should be made here between viscosity, which varies between different honeys, and thixotropy which is the increase in viscosity that occurs when manuka honey is left undisturbed and has chance to gel.

As discussed in Section 1 (d) above, commercially handled honey which is 100% manuka source will have a level of NPA higher than 10 (which is equivalent to about 250 mg/kg MG). This means that down to very low percentages of manuka source present there will be MG present at levels above that found in honeys from other sources.

### (b) The percentage of manuka source present should be specified for a honey to be called a manuka blend

If there is no specified minimum content of manuka source in a honey described as a manuka blend, then honey could be sold in which there is only a nominal amount of manuka source present, such as 1%. This would be misleading consumers and harming New Zealand's export market if the blending is done with honeys from other

countries. The minimum content of manuka source in a standard for honey sold as 'Manuka Blend' needs to be agreed and specified.

A much better standard would be for it to be required that the percentage of manuka honey in the blend be specified on the label (*e.g.* "A blend of honey containing 25% manuka honey").

**(c) In honey sold as Manuka Blend it should be stated what it is blended with**

Although the term 'blend' has meaning to honey producers and packers it may not have meaning for consumers. To make it completely clear to consumers that the product is only partially manuka honey it should be stated that the product is manuka honey blended with a named other honey (*e.g.* "Manuka honey blended with clover honey", or '"Manuka honey blended with multifloral honey").

**(d) Colour should not come into any standard – it depends on the history of the honey**

The colour of freshly produced high-quality high-activity manuka honey is a golden brown. The colour of much of the genuine Active Manuka Honey on sale is dark brown. This because all honey darkens with age as phenolic components get oxidised. Heating the honey to hasten the ageing process to maximise the production of MG accentuates this darkening. Manuka honey has a very high level of phenolic compounds in it (Wilkins *et al.* 1993) so darkens very much on ageing/heating. Thus a small proportion of aged/heated manuka honey present will give a quite dark colour to a blend containing little manuka honey. Another honey with a high content of phenolics is rewarewa honey. This darkens in colour on ageing and is often passed off as manuka because of the dark colour it develops. Therefore a standard for manuka honey based on colour is useless because a fresh monofloral manuka honey with more than 50% manuka source could have a very light colour whereas a dark brown honey could have a small amount of manuka honey present if this honey has been aged or heated, or it could be 100% rewarewa honey.

**(e) Pollen content is a very unsatisfactory way of determining the floral source of honeys**

The reasons why pollen counts are a very poor indicator of the floral source of a honey are discussed in a published peer-reviewed paper which is a review of the methods that are available for determining the floral source of honeys (Molan 1998). In brief, the pollen in honey comes primarily from contamination of the nectar in the hive by pollen collected by a set of worker bees which collect only pollen. Thus the pollen in honey reflects mostly which sort of pollen was being collected by the pollen-collecting bees at the time that the honey was being produced by honey-collecting bees.

It appears that honey from a pure or near-pure manuka source contains very little manuka/kanuka pollen (manuka pollen being indistinguishable from kanuka pollen). in the past been called upon to help out companies exporting manuka honey to the UK who have been threatened with prosecution for their honey described as manuka failing to have sufficient manuka pollen to meet the UK standard for a monofloral manuka honey. to point out to the authorities that a honey with a high level of NPA could have come only from a manuka source. (This was in the days before it was discovered that the active component was MG and that the level of this could be increased by adulteration.) A small research project, the results of which

were published in the *NZ Beekeeper* journal (Stephens and Molan 2008) demonstrated that there is relatively little manuka pollen in true manuka honey.

Thus having a standard for pollen content in manuka honey could exclude true manuka honey, which would have a major impact on sales of genuine Active Manuka Honey. This genuine honey would have to be sold as a blend. At the same time it would allow kanuka honey to be sold as manuka honey because kanuka and manuka pollens are indistinguishable. In blends of manuka with kanuka honey there would be plenty of kanuka pollen, but blends of genuine manuka honey with sources obtained where there was no kanuka growing would fail to meet a standard for manuka honey blend if the standard included pollen content.

The actual quantity of pollen in honey is so small that fraud by manipulation of pollen content is easy.

**(f) "Fingerprinting", if multivariate analysis is done, is good but needs more samples to be tested**

There are various methods that have been published which show that the floral sources of honey can be determined by analysis of components of honey which vary from type to type (Molan 1998). New methods of analysing the array of trace components in honey to obtain "fingerprints" have been developed. These make the procedure quicker, simpler and therefore less expensive. *Oritain* are developing a completely different method based on mineral elements present.

Individual "markers" are not reliable for identification because the levels of these can vary from sample to sample of authentic manuka honey, and because these compounds also occur in some other honeys. By statistical treatment of data for the level of multiple "markers" (*i.e.* multivariate analysis), these variations and the presence of single markers in other honeys are eliminated and a much more reliable identification of floral source is possible. A PhD thesis (Senanayake 2006) describes research which demonstrated that such a method, using data from GC-MS analysis of honey samples, can distinguish active manuka honey from inactive manuka honey.

In order for any of these methods to be brought into use it will require a large number of authenticated samples of pure (*i.e.* 100% manuka source) manuka honey to be analysed to establish the degree of natural variation. Such work needs to be directed by scientists with expertise in the subject, not by brand managers.

**SECTION 3: ALL MANUKA HONEY**

**(a) Product described as manuka honey should be from New Zealand**

Although *Leptospermum scoparium* grows in other countries, the name 'manuka' is the name of the tree that grows in New Zealand, so for the claim on a label that the honey is manuka honey the jar must contain honey from the New Zealand trees. In Australia where *Leptospermum* honey is produced the honey comes from nectar from other species besides *Leptospermum scoparium*, so it definitely cannot be correctly called manuka honey as is done on http://www.comvita.com.au/healthcare/medihoney-range/medihoney-active-10plus.html.

Where honey is sold as a 'Manuka Blend' or 'Manuka Table Honey' it should be stated that it is a blend of manuka honey with honey not from New Zealand where such blending has been done.

The country of origin of a honey can be ascertained by the type of pollen present. This is the one thing for which pollen analysis of honey is universally recognised as being good.

**(b) A quality mark is required to show that honey on sale overseas complies with the NZ standards**

Until such time as other countries adopt standards for Active Manuka Honey and blends of manuka honey there will be a need for a universally used quality mark to show that honey being sold meets the New Zealand standard. This because honey packed overseas may still be misleading consumers. There will need to be a major campaign of educating consumers about the distinction between genuine Active Manuka Honey and the misleading products. Allowing companies packing overseas to use the quality mark if they meet the New Zealand standards will help squeeze the misleading products out of the market.

A quality mark for manuka honey without activity is needed also, to overcome the problem of honeys that are not manuka honey being sold as manuka honey.

**(c) Auditing will be needed to ensure that products are true to claim**

In order to ensure that there is no misuse of the quality mark there will need to be "spot check" auditing carried out. The assistance of consumer protection authorities overseas in doing this should be sought. It would be in the interests of New Zealand companies exporting manuka honey to run 'spot checks" themselves on the products of competitors, and lodging complaints to authorities where there is misuse of the quality mark.

**(d) Concerns about falsification by adulteration should not influence standards**

There is already a Codex standard that specifies that honey should not be adulterated, so whether or not the level of MG can be increased by adding DHA or MG is a distraction from setting a standard for 'Active Manuka Honey'. Such adulteration is outright fraud, and there are existing laws to deal with it. Detection of fraud is a forensic issue.

Addition of DHA or MG can be detected because the level of MG will be out of line with the thixotropy that would be in genuine manuka honey that naturally had a high level of MG. Manipulation of pollen content will give abnormal proportions of pollen and will be seen to be suspicious if absolute counts are done instead of the traditional percentage scores. When sophisticated techniques come into use to establish the floral source of honey then fraudulent addition of DHA/MG and manipulation of pollen will be easily detectable as there will be high levels of DHA/MG and manuka pollen in honey with a low level of manuka characteristics.

Research should be undertaken to investigate if impurities in synthetic MG and DHA can be detected as foreign substances when these chemicals are added to honey at levels likely to be used in adulteration. (Most synthetic chemicals contain other substances as impurities.)

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September 30, 2013

I am writing to provide my feedback on the discussion paper "Options for Defining Monofloral Manuka Honey". My company is in the business of producing Manuka Honey in the region. I also have a company that is exporting our honey and selling it in the U.S. market under my own label. My submission is organized around your questions as provided in the discussion paper.

Q1 – BPSC parameters – I don't think that I would agree with the Flavour definition. Our manuka does not have the characteristic bitter taste that many associate with Manuka honey. I use words like, bold, sweet, and buttery on my label. We get a lot of feedback from New Zealanders that our Manuka is some of the best they have ever tasted. I think the BPSC parameters are not very appetizing and may sell our product short in the marketplace. I would advocate for some balance that allows more room for great tasting Manuka honey.

Q2 – No, I think these are the right basic options.

Q3 – Impact of defining Manuka by pollen count would benefit some businesses that are currently selling on pollen count. Due to the difficulty in differentiating between Kanuka & Manuka pollen, I think this would be a terrible means of defining Manuka honey. It would open the market to a lot of Kanuka honey that would not be true to label if we call it Manuka. Further, due to the issue of bees working Manuka for nectar and other floral sources for pollen, it would not be a great measure of Manuka content if taken on its own.

Q4 – Option 1 impact on consumers would likely be a loss of confidence in the honey labeled as Manuka.

Q5 – Option 1, to effectively implement would require more consistent means of measuring pollen count.

Q6 – If pollen count is used, I would recommend going with the broadest definition possible, which I think would be > 50% Manuka pollen by count to count as monofloral.

Additional Comments – I have some data that I can provide to you under separate communication that includes MG, DHA, and pollen count.

Q7 – Option 2 impact on businesses. I think option two would be preferable to option 1 as I think the MG level is a more reliable indicator of the Manuka content than pollen count. The MG level correlates with the non-peroxide activity so it provides assurance to the market as to the content of the honey in terms of the health benefits that the market perceives exist. Producers that are currently selling on pollen count alone, would be negatively impacted if their honey did not contain a sufficient level of MG. This would likely flush out of the market Kanuka honey that is currently being sold as Manuka.

Q8 – Option 2 impact on consumers. This option is not likely to have much of an impact on consumers. Most Manuka is currently sold either by MGO, or NPA, which is correlated to the MG level.

Q9 – practical steps to implement. The main thing to implement this approach is to make the correlation between NPA and MG publicly available. Doing so would provide better transparency to the consumer about the activity level of the honey. The standards for testing for MG should be defined and adopted by the laboratories providing testing services, and also by the companies doing their own testing in house.

Q10 – MG level to qualify as Manuka. I would support an MG level of 100 ppm as the cut-off for calling honey Manuka, vs. Manuka blend. In terms of other criteria; including DHA of at least 700 would strengthen the measure.

Q11 – Option 3 impact on business. This option is by far the more robust and I think the impact on business would be very positive. I would serve to remove the Kanuka product from the market, and bring better certainty to the industry regarding what can be labeled as Manuka. It would be helpful to have the major labs that currently perform the MG testing, to add the pollen count analysis so the same sample can undergo both tests. Currently, I get one service to test my pollen count, and another to test for MG / DHA. It would also be useful for the labs to blind report to MPI data results on all of the testing. This would provide a robust dataset to analyze the correlation between pollen count and MG; which could be used to refine the standard over time.

Q12 – Option 3 impact on consumers – Consumers would have increased confidence in the Manuka product coming out of New Zealand.

Q13 – Establish a good cutoff for MG & Pollen count. My recommendation would be 100ppm MG, and 50% or greater pollen count.

Q14 – No, I don't think peroxide activity claims are appropriate for Manuka honey. Most Manuka is sold based on it's NPA level (or MG level). Be allowing peroxide activity claims, the consumer is being misled, or will just be confused, which is not good for the market.

-ends-

30 September 2013

The task of defining manuka honey seems as if we are attempting the impossible - to put a label on nature itself. Honey is not made in a factory; there will always be infinite variety and exceptions to every rule. However, due to the high price demanded by manuka honey, it is essential that we make an official start to this process of definition. This submission will be rather simplistic, a broad view approach, rather than answering the specific questions posed, which detail all the complexities involved.

In my opinion Option 1 offers the best protection, in terms of minimizing potential for fraud, and misleading statements, and in terms of practicality, cost and sustainable benefit. A pollen count analysis will ensure that it is New Zealand honey, lessening the chance of international fraud. It is of course, fraught with problems in that some areas produce high grade manuka honey with very low manuka pollen counts, so the level of standard would need to take this into account. Likewise the honey would need to fufil the organoleptic properties that are characteristic of manuka eg. aroma, flavour, colour.

It is important that this pollen count includes both kanuka and manuka honeys. These honeys are in practice indistinguishable in their harvesting (beekeepers note that the timing of the flowering of these trees usually overlaps, making it impossible to separate) and impracticable to differentiate in the actual counting of pollen. Furthermore there has been a long tradition in the selling of manuka honey with the understanding that it would include the honeys of both manuka and kanuka origin. This common name has been accepted and unchallenged by consumers. ( I note that the MPI is continuing to look for examples of internationally traded honey that includes multiple genera marketed under a common name and I commend this search.)

The pollen count option seems to be a more appropriate measure for manuka honey as a food, whilst Option 2, based on a methyglyoxal content is certainly appropriate for honey that is being sold and used for its medical values. However, to sell manuka honey on the MG content alone to consumers who are seeking "to buy" good health could be seen to be somewhat misleading. Peter Molan's research showed the benefits of using manuka honey as a topical dressing and I do not think that there has yet been research that proves conclusively that the consumption of active manuka honey brings about a cure for such ailments as stomach ulcers etc. Maybe our industry should be promoting the separation in the market place of manuka honey sold on the basis of its medical use (eg. as a wound dressing), from that of table manuka honey.

For this reason, I think that Option 3, combining the pollen count and MG content would create excessive costs in testing. This would reflected in a considerable price rise, taking manuka honey out of the range of most New Zealand consumers. In effect, it would be the end of manuka honey as a table honey.

Such a regime of testing would mean that only the large packers would be able to accommodate the cost and this would disadvantage smaller beekeeping operations in the marketing of their manuka honey. It is important to remember that smaller operations of younger, innovative beekeepers can provide our 'nursery', an important factor in the future growth of our industry.

In conclusion, I consider that our initial standard definition of manuka honey needs to be as inclusive as possible, to gain the maximum acceptance by all interested parties. Subsequently, as new research advances and robust results become available, (eg chemical footprinting for manuka honey ) we can strengthen the definition accordingly. As part of the research it is essential to build as quickly as possible a large data base demonstrating the correlation between the pollen counts and

the MG contents in manuka honey from across a broad spectrum of New Zealand apiary sites. In order to gain this sort of information from beekeepers all over New Zealand, it will be important to retain their good will and achieve their acceptance of the official manuka honey standard that will ultimately result from this discussion paper.

-ends-

SUBMISSION TO MINISTRY OF PRIMARY INDUSTRIES ON THE OPTIONS FOR SETTING INTERIUM PARAMETERS AND MEASUREMENTS THAT DEFINE MONOFLORAL MANUKA HONEY

## 1 GENERAL COMMENTS

2.1 supports the establishment of Descriptive Standards for all New Zealand Monofloral Honey. firmly believes that Standards are required. This is very important not only to provide truth in labelling for those who consume honey but to protect New Zealand's reputation as a safe and trusted exporter of high quality food products to world market

*2.2* To provide background to this submission, some history of Manuka honey needs to be acknowledged. It is recorded as far back as in New Zealand author, I Hopkins 1916 book "Forty-Two Years of Beekeeping" - *(Manuka) " thick" honey, as it is usually called, that is, honey that cannot be thrown from the combs by the ordinary process of extraction.* It goes on to say this - *was first experienced in 1879.* Further to this - *unfortunately for my prospects of raising much extracted honey, my apiary was too near the bush which covered the hills adjacent... Nearly all the honey from mixed bush is too dense to extract from the combs in the ordinary way... I therefore turned my attention to the raising of the comb honey in one- pound section boxes....in fact the demand exceeded the supply.*

NZ Journal of science and Technology of July 1936 published work by R H K Thomson of Cawthron on chemical composition of New Zealand Honey including Manuka Honey.

2.3 There is concern that newer people in the industry consider that Manuka Honey was only "discovered' when Dr Molan's research on NPA activity was carried out. The combined history of the individual companies represented on the members clearly shows this is not true.

Examples:

For the record, Comb Honey was not subject to control by the old Honey Marketing Authority; Honeydew was released from a single desk seller in the mid 1970's.

Under the Honey Marketing Authority (HMA), bulk Manuka honey was shipped to the UK for packing, probably as a blend many years before the discovery of Non-Peroxide Activity. The HMA was disbanded around 1982, and export controls on honey were removed.

A number of honey packing companies began to explore export markets with a variety of honey types, including manuka and well before the "discovery" of NPA activity in NZ Manuka Honey

2.4

In 1987, the National Beekeepers Association established a Marketing Committee which was charged with the task of "formulating a common marketing policy". Three of the current served on that Committee at various times, including two in the role of Chairman.
The Committee employed a marketing consultancy, Floyd Marketing Ltd., and **the marketing work was funded by way of annual levies collected from all beekeepers in NZ through an Apiary Levy under the Commodity Levies Act.**

**One of the key activities for that Committee was the promotion of monofloral honey varieties and twelve were recognized as being commercially significant to the industry, including Manuka.**

As a result of the discovery and publication by Dr Peter Molan at Waikato University of the non-peroxide, antibacterial characteristics of some manuka honey, it was decided as part of the marketing strategy that this variety would become the "flagship" product for the industry, upon which other varieties would be promoted also, to provide added value for NZ honey across the board. The Marketing Committee worked in close proximity with Waikato University in this regard, and the concept of honey standards, and an industry "Quality Mark" was examined at the time.

2.5 In the late 1990's, the NBA disbanded its Marketing Committee, but an independent organisation first known as the Active Manuka Honey industry Group (AMHIG) was established in 1997 to focus the marketing efforts of producers and packers who began to produce manuka honey packs with recognised "non-peroxide activity" ratings. AMHIG established a trademarked device, UMF (Unique Manuka Factor) and later formed an incorporated society called the Active Manuka Honey Association (AMHA), which has subsequently become the Unique Manuka Factor Honey Association (UMFHA). (Reference: http://www.umf.org.nz/history)

2.6 Since that time a number of new packing and marketing companies have been established focussing upon the "Activity" rating of Manuka Honey and the export value of the product has risen sharply and consistently over subsequent years. The subsequent discovery of the "active" ingredient in manuka honey, methylglyoxal, came about through research by a laboratory in Germany in collaboration with the NZ company, This has in turn led to development of a controversial "correlation" conversion graph, whereby non-peroxide activity (NPA) formerly measured by an agar-well diffusion assay technique, is now extrapolated from measurement of methylglyoxal levels in manuka honey.

This is now the preferred method employed by most testing laboratories when asked to provide either MG or NPA ratings for honey samples, reflecting the higher reliability of methylglyoxal testing compared to the well-recognised variability of agar-well diffusion assays.

There has been a steady increase in domestic sales for manuka honey also, with a significant number of companies continuing to trade in "table" manuka honey, which as a consequence

of export demand created by "active manuka" brands, has risen in value and cost to packers and consumers alike.

2.7 Monofloral determination –

The process used by many exporting and domestic companies (2.3) for defining a Monofloral Manuka Honey is currently based on the internationally recognised Codex Alimentarious Standard for Honey. The three prime criteria are: Organoleptic, Physiochemical and Microscopic properties, as a package. **Attempting to break the Codex criteria apart as portrayed in the discussion paper is unacceptable, particularly to importing countries that do require compliance with Codex specifications.**

2.8 International concerns (United Kingdom)

The notes with concern that it would appear that they were misled by the content of a UK Honey Report, as it is now understood that this may only have consisted of some old publicity by a company promoting and protecting their brand, which was resurrected by a UK reporter.

2.9 International concerns (Hong Kong ) –

The acknowledges this report and wishes to highlight an important fact that in simple terms the chart on page 15 of the Hong Kong Report is constructed in a manner that follows and reflects the Codex process of determination with "added claims" being the last consideration. This is a key factor when we look to our international counterparts for direction and guidance, when New Zealand moves to established interim criteria for Manuka Monofloral definitions.

## 3 SPECIFIC COMMENTS TO MONOFLORAL MANUKA DEFINITIONS:-

3.1 It is the consensus of the that definition of monofloral manuka honey as a food product should be based on accepted international standards – namely Codex – and that there is no good reason or current data to deviate from this. Options 1-3 of the MPI discussion paper do not fully cover the definitions required as a whole, which is a flawed approach.

3.2 The believe that accepted international guidelines require that monofloral manuka honey should be defined as follows:

- **As honey under the Codex Standards**
- **As a Monofloral Manuka honey using Codex Standards which include "wholly or mainly from", common name principles and "Manuka" pollen from Leptospermum scoparium and Kunzea ericoides, no separation would apply.**
- **That only if the criteria above are met, should any "extra" claims not defined in Codex be considered - such as Non peroxide activity, Methylglyoxal, Total peroxide activity, Dihydroxyacetone (DHA)**

3.3 The published BPSC guidelines for monofloral manuka are determined under Codex principles, **being organoleptic, physicochemical and microscopic properties.** which are:

- **Botanical names: Leptospermum scoparium and Kunzea ericoides**
- **Pollen minimum % of common name species : 70%**

- **Pollen total (mean+/- 1 standard deviation): Mean 517,000 s.d. 66,800**
- **Colour (Pfund mm): 84 mm, s.d.11.8**
- **Organoleptic: Aroma - Damp earth, heather aromatic**
- **Flavour – Mineral, slightly bitter ,tangy**

In addition other factors which may be assessed include:

- Conductivity
- HMF Levels
- Thixotropic nature - prior to packing or blending
- Region of production – Oritain verification.

3.4 Minimum Pollen Analysis - in its guidelines has a **minimum manuka pollen count of 70%,** however it accepts that honey with a lower manuka pollen percentage could still be classified as manuka where the

**The inclusion of both total pollen count and % pollen content are considered essential in the use of pollen analysis as a determining factor for monofloral manuka honey.**

believe that these definitions are an acceptable base for a monofloral definition that can be validated by international regulators, international markets and domestic markets, as reflected by example in the 2013 Hong Kong CC Report.

Note: the reference data for pollen counts was obtained from Airborne Honey's comprehensive database of honey analysis spanning many years.

3.6 In addition to this accepts that NPA activity or MG content in Manuka honey can be used as further indication of the presence of Manuka honey but rejects completely that it can be used as a primary indication of monofloral Manuka honey.

3.7 has not included the Thixotropic nature of Manuka honey in the standard. It confirms that this is an additional tool when grading bulk manuka honey but is difficult to identify in retail packs that are most often granulated (creamed) honey.

3.8 accepts that the current organoleptic descriptors may not fully comply with international standards as interpretation may vary from country to country. It is recommended that an international body be used to confirm the descriptors used.

3.9 confirms that monofloral Manuka honey may include pollen from both Leptospermum scoparium and Kunzea ericoides and is concerned at the use of "erroneously" in the MPI document as a misleading statement.

believes that the "common name" of Manuka can be used for honey from Leptospermum scoparium and Kunzea ericoides and does not accept that front labelling on table manuka should be required to show Manuka and Kanuka or Leptospermum scoparium and Kunzea ericoides.

It further submits that internationally there is no requirement to deviate from the long standing and well-understood practise of marketing under the "common name" Manuka, honey from Manuka, Kanuka or Manuka/Kanuka (naturally blended) plants.

believe that to put the double wording (Manuka/Kanuka) on the front labelling would be the same as saying "blend" when in fact the honey by "common name" definition, is Manuka. The separation of Manuka and Kanuka is extremely difficult and at this time there is no reputable test that can demonstrate this can be undertaken on a cost effective, commercial basis.

3.10 **The does not accept that NPA rating or MG rating can be used solely to define the Manuka or Kanuka content of a honey for the purpose of separating monofloral type.**

The believes that there is data available to clearly show that DHA can be easily added to honey at process, or hive by feeding, and that this adulteration is indistinguishable from "natural" occurrence, depending on the source of the DHA. Further that this artificially increases the resultant MG rating and "adds value" in a fraudulent manner which is extremely difficult to detect.

believe that current data clearly shows that while pollen in honey retains its integrity and counts remain constant over a considerable time period (decades) that colour, DHA, MG and NPA readings will change significantly over a relatively short time period (3-5 years). These changes are also known to be accelerated by heating and sub-standard storage conditions of honey.

3.11 is concerned at the misleading information in the media around both the UKFSA and the testing of product in the Hong Kong market. They believe that correct interpretation of the Hong Kong results supports the use of Codex criteria as the primary determination process as promoted by the BPSC through their website.

3.12 is concerned that information given to regulatory bodies should be correct. We believe that the UKFSA was given biased and unproven information that was misrepresented as being supported by MPI and the New Zealand Honey Industry.

3.13 are concerned that NZTE is also using biased and unproven information from a limited number of companies that are not a true reflection of the industry as a whole, thereby supporting or promoting strategies that could be harmful to the New Zealand Honey Industry.

3.14 accepts that there may be fraudulent honeys in the market place and that the first target should be overseas honeys fraudulently sold as New Zealand Manuka Honey. The standards set should do as much as possible to eliminate these products, particularly if the industry educates both consumer and retailer.

3.15 accepts that the high dollar value of manuka honey in the export market is based on marketing as "New Zealand", and as "Manuka" and some type of activity number indicating perceived health benefits. They believe that all claims should be verifiable and that all "numbers" quoted should be able to be proven. The consensus of the council is that unqualified "Activity" claims mislead the consumer to believing they are buying honey with a Non Peroxide Activity when this may not be the case.
Once again education at retail level is a key requirement and we should look to the Fish Industry for guidance, as they faced the same challenges in the past and have successfully overcome the misrepresentation issue.

3.16 The verification of activity is difficult and was not able to reach consensus on the testing methods required to support NPA activity. Some members support methylglyoxal (MG) testing to give an NPA result while others do not, the main concern being the perceived correlation between MG and NPA. It is evident that even within the MG users there is a considerable variance to the correlation which clearly is manipulated for serious commercial gain.

3.17 believes the standard must be fair. While it accepts that some New Zealand companies are misleading consumers with low end Manuka blends and dubious activity numbers that cannot be verified, they also believe that the bulk of New Zealand Manuka honey sold is not fraudulent and that standards should not be set at limits that would exclude the majority of New Zealand Manuka (Manuka/Kanuka) from the market.

3.18 believes there will be no issue within the New Zealand Commerce Commission with recommended standard. They believe that if the Commerce Commission is given the correct and whole information, including product history, it will be clear that consumers will not be defrauded. It is hoped that New Zealand Manuka (Manuka/Kanuka) honey will always be available to New Zealand consumers as a food product.

3.19 is open to future suggestions for changes to standards should new peer reviewed research data becomes available which would clearly indicate a change would be beneficial to industry. They do not believe that current "fingerprinting" information being promoted is yet sufficiently robust to be considered as part of a standard , and will require considerable supporting evidence in the future to overcome doubts as to its veracity as a technique.

**4.0 Summary Statement:**

, and its representative members have been deeply involved in the process of attempting to establish monofloral standards for New Zealand honey varieties for many years. The sense of history, and appreciation of the complexities of this task is nowhere better represented than within that group.

adopted a set of definitions for twelve NZ Honey varietals, based upon a matrix compiled and agreed to by an industry meeting held in 2002. This was adopted by all the recognised industry representative groups at that time, and has subsequently become the basis for significant domestic and export trading in NZ honey varietals. This set of definitions was formulated in accordance with the recommendations set down by the Codex Alimentarious to which NZ is a signatory.

The ratification of these monofloral recommendations into industry standards has been severely hampered by on-going attempts from vested commercial interests to "capture" the use of the term "Manuka Honey" for marketing and promotional purposes. is concerned that there is a marked confusion amongst these vested interests as to the interpretation of a monofloral honey definition, and a floral varietal functionality. This has led to their denial of the accepted international standards for monofloral definition under Codex, and an attempt to introduce a definition based upon a functional aspect of a minor portion of the total production of manuka honey, to take naming precedence over all the rest.

This proposal is unacceptable , and is rejected accordingly. sees no reason at this stage to attempt to establish any different criteria from those it has advocated up until now, based upon Codex principles, and fairly representative of the majority of product currently being traded both domestically and internationally to present and potential markets.

Options for Defining Monofloral Manuka Honey

Question 1: Are the BPSC parameters for organoleptic and physicochemical properties of Manuka honey appropriate? Can they be improved?

The . agrees that these parameters are appropriate and we don't believe that they can be improved.

Question 2: Are there alternative options for defining Manuka honey (i.e. not based on MG content or pollen count), and what scientific evidence supports this?

We don't have any alternative options.

**Option 1: Definition based on pollen count**

Question 3: What are the likely impacts of Option 1 for businesses?

This option would have no effect on our company as we already define our Manuka honey based on the Codex Standard for Honey.

Question 4: What are the likely impacts of Option 1 for consumers?

Consumers are receiving a product that meets Codex Rule and is true to label. Consumers can also be confident that the product they are buying will be consistent in taste, colour and thixotropy.

Question 5: What practical steps are required to efficiently implement Option 1?

We would like a standardised lab certification system to be established for pollen, colour, conductivity and thixotropy analysis.

Question 6: If a definition based on pollen count is adopted:

- What is an appropriate percentage of pollen to indicate monofloral honey? In excess of 50%.

- What, if any, addition parameters should be included? Total pollen count, colour, thixotropy, taste, and conductivity.

**For examples of datasets where both pollen, and MG and DHA levels have been measured for the same honey samples, please refer to Appendix One.**

**Option 2: Definition based on methylglyoxal content**

Question 7: What are the likely impacts of Option 2 for businesses?

This would have a substantial impact on our business. Our standard Manuka market would be drastically affected in a negative way. This would have a larger effect on South Island companies.

Question 8: What are the likely impacts of Option 2 for consumers?

Consumer confidence would be lost because there would be little consistency (taste, thixotropy and colour) in the product.

Question 9: What practical steps are required to efficiently implement Option 2?

We don't see any method that would result in consumer confidence in the product and truth in labelling. This option won't supply New Zealand with a true and level sales platform.

Question 10: If a definition based on methylglyoxal is adopted:

- What are the appropriate levels of methylglyoxal to include? (Please provide any available data or scientific evidence to support your submission).

N/A

- What, if any, additional parameters should be included? E.g. DHA. N/A

**Option 3: Definition based on methylglyoxal content and pollen count**

Question 11: What are the likely impacts of Option 3 for businesses?

We would agree with this option so long as it doesn't see the exclusion of standard Manuka which has a high Manuka pollen count but undetectable MG activity. There should be room to allow for honey with a pollen analysis of over 70% Manuka to still be sold as standard Manuka.

Question 12: What are the likely impacts of Option 3 for consumers?

There would be a huge reduction in standard Manuka availability. This could lead to substantial price rises.

Question 13: What practical steps are required to efficiently implement Option 3?

Research will need to be conducted around combined pollen and MG testing; there will need to be laboratories set up within New Zealand that will provide both tests at the same time. **For examples of datasets where honey samples have shown a high Manuka pollen count but an undetectable level of MG activity,** i

**Content Claims**

Question 14: Are claims related to peroxide activity appropriate for Manuka honey? If so, which ones?
As a company we do not support total activity claims, we only support MG and NPA claims.

**Subject:** Manuka Honey Submission

As a person who both produces and sells Manuka honey I find that the problem is not with how to define Manuka honey but with the Public's understanding of why they purchase Manuka honey and the perceived benefits

1) MGO/UMF level does not define Manuka it defines the level of MGO/UMF in a honey and therefore the perceived extra healing benefits

2) Pollen does not define Manuka it just gives a reading of how much pollen is in the honey

I believe an education program explaining that all honey works externally to aid healing and why honey with MGO/UMF levels have extra benefits will reduce the confusion of the public.

Until the industry/government produces easily understandable education material the public will continue to be confused. Confusion allows the not so honest to profit from the situation

Honey promoted with health benefits containing MGO/UMF should be regulated as a health food product.

It is well known that different regions and years produce different variations of the same honey type due to many reasons such as soli types adjacent plants etc. To define Manuka or any honey based soley on principles of it contains MGO/UMF will be detrimental to producers of honey who market honey as a natural product ie straight from the hive to pot.

I would like to see Honey sold for health benefits put into a health food category, the honey defined by MGO/ UMF not as manuka or by pollen.

-ends-

1- They need to improve the pollen assay. If pollen is not assayed the test will not distinguish clover honey to which DHA has been artificially added because such a honey could pass assay of MGO, DHA, and NPA in the right proportions it would also pass a NPA test. Testing for the above does not prove it is manuka and certainly not NZ manuka although it would prove whether it was bioactive or not.

2 There may be certain chemicals that could be used as markers for manuka. More work needs to be done. UMFHA say they are doing this but yet to see results.

3 We are selling Manuka based on NPA, this would mean doing 2 tests which would be expensive, Currently I pollen test manuka now if it does not reach a NPA of 5 to determine that it is manuka.

4 Customers would not know the NPA level which determines health benefits.

5See Q1

6 I understand currently it must reach 60 or 70% not quite sure to be a monofloral

7 I would prefer this as we sell on NPA

8 A lot of consumers have been educated to understand the different NPA Activity with their benefits.

9 Compulsary testing at an accredited Lab stating the NPA result beginning at a 5+ and printed on a label.

10 All methods have weaknesses and if multiple tests are involved it will become expensive. If one or a combination of these methods is selected then research needs to be directed to produce a robust methology for identification of floral source as a possible future alternative.

11 This would make honey testing very expensive

12 Rather confusing unless if honey did not reach an NPA of 5 then it must be pollen tested to determine manuka.

13 See 12

14 Definitely not

-ends-

**Submission to the Ministry for Primary Industries**

**on the Options for Defining Monofloral Manuka Honey**

**Aim**

The stated aim of the discussion paper is – "to achieve a clear, scientifically robust definition of Manuka honey"

- The only peer reviewed scientific publication that distinguishes Manuka honey (and its anti-bacterial activity) from other honeys and the common type of anti-bacterial activity - that I am aware of – is by Dr Peter Molan
  Allen, K. L., et al. (1991). "A survey of the antibacterial activity of some New Zealand honeys." Journal of Pharmacy and Pharmacology 43(12): 817-822.
- This unique activity is known as ***Non Peroxide Activity*** NPA to distinguish it from the common activity found in other honeys called ***Peroxide Activity*** and sold as Total Activity TA.
- The NPA is based on several markers found in Manuka honey ( bio-activity being synergistic) of which by far the greatest contribution being Methylglyoxal (MGO)
- There exists well documented testing methodology for the correlation of NPA and MGO. While different commercial companies may use different correlation graphs and different laboratories there is a consensus that the data is robust.
- There is still need for a published (peer reviewed) correlation that works with a validated MGO assay and the published NPA assay. Current practice is the various companies select who they use for this testing and only informal discussions occur between laboratories.

***There are no other markers currently available that have "good clear science" and that remained unique to Manuka honey and it's NPA. The recommendation of this company is that ONLY a genuine NPA or MGO rating system be employed in the definition of Manuka honey.***

**Answers to the Discussion paper questions**

1. Are the parameters for organoleptic and physiochemical properties of Manuka honey appropriate? Can they be improved?

   Colour, Aroma and Flavour can all be manipulated by blending with other honeys.

   Thixotropy is a feature which is characteristic of Manuka BUT also found in Kanuka. As Kanuka honey is the main offender in misleading the consumer this property does not help.

   Pollen is also a significant problem in that Manuka and Kanuka pollen are for analytical purposes indistinguishable. Hence the high "Manuka pollen" counts that relate to TA honey are in fact Kanuka. There is also the problem that "honey dew" can be used to dilute the honey and yet not alter the pollen count.

2. Are there alternative options for defining Manuka honey ( ie not based on MG content or pollen count) and what scientific evidence supports this?

   As expressed above Pollen count is a poor option and will lead (and has been the main reason) for fraudulent Manuka honey in the market.
   MGO correlation with NPA is the only sound option
   There are a number of other markers in Manuka that this company is aware of and has filed patent application for – including assay's. These are not yet available for commercial use. Other companies have made statements about "mother molecules" etc. however I am not aware of any published science available other than MGO/NPA correlation.

   We are also in favour of a minimum level of MGO ( 250mg/kg) for a product to be called Manuka.

   I am aware that any further discussion will require scientific data and possibly more research as the data base is not robust in many areas. For example the pollen count request is difficult when companies have relied on NPA/MGO for the sale of product and not pollen. It is interesting though that the companies selling on pollen count have only TA activity in their honey and no NPA/MGO. This should tell a story.

   Appreciate the opportunity to make a brief submission

   -ends-

**SUBMISSION ON OPTIONS FOR DEFINING MONOFLORAL MANUKA HONEY**

* PROCEDURES FOR DEFINING MANUKA HONEY:

Accurately keeping records of where the boxes of honey come from and the date they are taken off the hives. Honey from areas of, for example, where a lot of Rewarewa/Manuka nectar sources are growing and honey comes off early, it is likely to have frames of Rewarewa and frames of Manuka in the same box, which have to be sorted out at time of extraction, but some years Rewarewa does not flower at all so in that particular year it will highly likely be Manuka which is much easier to sort. Rewarewa and Manuka honeys are not quite so easy to sort by colour but very easy to sort by taste, smell and viscosity.

Sorting honey prior to extraction, using:
aroma,
taste,
colour,
viscosity

Manuka Honey, when you place an object into the comb, gives a jelly like appearance and will not extract in a honey extractor without going through a Honey Loosener, (a special machine that loosens each cell of honey to allow extraction by centrifugal force in a honey extractor).

Sorting of Manuka and Clover mixed is a lot easier because Clover is a very light coloured honey compared with Manuka honey.

But one must keep in mind at all times that Manuka varies tremendously in colour, region by region. Some regions some years Manuka is very light in colour but it is still very viscous and smells and tastes like Manuka.
After extracting honey we then centrifuge, filter and store in IBC's. Later on before packing the honey, you liquefy the honey by using low grade heat over a period of time. If, for example, some Rewarewa got mixed in with the Manuka, or some Clover got mixed in with the Manuka, or some Kamahi got mixed in with the Manuka, after examination when the honey is liquid, from the outside of the IBC a very clear line will be visible with a clear Kamahi/Clover/Rewarewa honey below the line and Manuka above the line. This is then easy to separate out the genuine Manuka honey.
Manuka will always look opaque and normally contains some air in it, hence it always rises to the top. This is a very useful check to confirm the procedures you have used during extraction have been done correctly.
After filtering and pumping into tanks and stirring, it is then reassessed to confirm once again by smell, taste, colour and viscosity. Normally at this point we will check Pollen counts which is of limited use.

**The above procedure set out is the only way that is effective for determining Manuka honey.**

To make sure Manuka Honey is true to label, the only way at present, is to use a skilled honest honey grader, using colour, smell, taste and viscosity.
The use of Pollen counts or Methylglyoxal activity (MG) content, will give highly unreliable results and will cause honey to be called Manuka honey when it is not and Manuka that will not be able to be called Manuka honey because it will not pass either of these methods or a combination of methods.

Some basic reasons why as examples:
Manuka honey produced in Tongariro National {Park where many other good pollen sources are available for the bees to work in January, will produce good Manuka honey, but with Manuka pollen being only 20% or less of the total pollen.
The other extreme is that at Gore we can produce honey which has 80-90% Manuka/Kanuka pollen in it, but only have 20% Manuka honey and the rest will be Clover or Kamahi.
Your other recommendation is using MG, which is not acceptable to us, as a lot of Manuka honey never produce MG activity.

We understand that . is working on testing all honeys to define what the nectar source is and in one year's time it is hoped that research will give a good indication of all types of honey, including Manuka. But it may take two years to get scientifically proved results.
One of the problems I see is that you may be able to tell there is a Rewarewa source, a Manuka nectar source and a Clover nectar source in a particular line, but it may be more difficult to ascertain what percentage of each honey type is in the packed line.

While the above gives you the answers to the problem, they are not always as you request in your Discussion Paper 2013/3. I will endeavour to do so now. I am actually concerned that you have tried to lead the Beekeeping Industry by a scientific approach which is currently unsatisfactory for all honest parties concerned. If the current scientific approach is accepted and enforced on the Industry by law, it is highly likely to give bad results in all directions and even possibly lead to court cases against MPI. So I would strongly recommend for people who do not know the characteristics of Manuka honey, their Manuka honey packs should be subject to verification by a Honey Grader.

Q1. The only reliable parameters of telling what is Manuka honey are as listed above under PROCEDURES FOR DETERMINING MANUKA HONEY.

Q2. No. There are only alternative options to define Manuka honey - see above. MG content or Pollen count are not options.

50 years of practical experience and the scientific evidence of honey which is Active will have all the above properties as listed by us. But Manuka honey without Active properties or high

Pollen count will also have the above properties.

Q3. What Are The Likely Impacts of Option 1 on Businesses?

If you use Pollen counts and Activity to determine Manuka honey, you will create adverse financial hardship on businesses because they will not be able to sell what is truly Manuka honey, as

Manuka honey. But at the same time you will be able to sell honey which is not Manuka honey, as Manuka honey, which will leave avenues for corrupt beekeepers or packers to thrive in.

Q4. What Are the Likely Impacts of Option 1 For Consumers?

A lot of the genuine Manuka honey not being able to be sold to them as Manuka honey and honeys which are not Manuka honey being able to be sold to consumers by unscrupulous beekeepers

or honey packers.

Q5. Follow my recommendations Only.

Q6. Pollen count is absolutely unreliable. Huge discrepancy between areas and in particular between the north and south island. The South Island Manuka Pollen being generally over representative, north island Manuka Pollen generally under representative, particularly in late flowering Manuka areas. If you insist on using Manuka pollen as a guideline of whether Manuka is Manuka, the minimum Manuka pollen should be set at 10% Manuka pollen.

Q6. Second bullet point: See recommendations above on how to determine Manuka Honey.

Q7. What Are the Likely Impacts of Using MG Content of Honey?

This will exclude much genuine Manuka honey which has low MG Content, but will still allow beekeepers or honey packers to increase the MG content fraudulently.

Q8. The Effect on Consumers will be the lessening of genuine Manuka honey available to them as Manuka honey, but still allowing fraudulently adulterated honey to increase MG Content to be sold

as Manuka honey.

Q9. There are no practical steps to implement Option 2. They will not assist only genuine Manuka honey getting to the market place.

Q10 Because of the answers above - Not Applicable.

Q11 What Are the Likely Impacts of Option 3 For Businesses?

Very detrimental for those businesses that are honest and who do not manipulate MG Counts or Pollen Counts.

But very beneficial for those corrupt businesses who are capable of adjusting either or both the above.

Q12 Once again, lessening the amount of product available which is genuine Manaka honey being sold under the Manuka name and increasing the amount of honey which has been manipulated

by unscrupulous beekeepers or honey packers. This is definitely against my wishes.

Q13 There are no practical steps to implement No 3, so disregard this Option.

Q14 Are Claims Related to Peroxide Activity Appropriate For Manuka Honey? If So Which Ones?

Not inappropriate, but certainly not appropriate to be used in determining whether the honey is genuine Manuka honey or not.

-ends-

30 September 2013

The most immediate problem facing the Manuka Honey Industry is the passing off of Peroxide Activity honey as having NPA/MGO content.

Our in market experience confirms the average retailer and consumer does not understand the difference between Total Activity and Non Peroxide Activity/MGO. So long as the label has the word manuka printed on it in association with numbers or symbols then retailers and consumers believe the honey has the properties made famous through Dr Peter Molan's research.

**Submission to MPI discussion paper**

1. **Option 1 Pollen**
   - Pollen is not an option to determine a monofloral claim because its not practical to differentiate Manuka and Kanuka in a commercial setting
   - Because its not possible to differentiate the pollen, Kanuka without the antibacterial properties can be passed off as Manuka
   - Extraction methods can vary the pollen count considerably
   - Analytical methods of pollen counting are not standardised around the world leading to variability in results
   - Pollen can be easily adulterated
   - The pollen counting option would necessarily lead to the product being a blend or duo floral claim as the Commerce Commission supported; so it is not a monofloral identifier
   - We are not aware of published research that confirms pollen is a reliable indicator of NPA/ MG activity; our evidence is to the contrary
   - Pollen is not reliable enough as a monofloral indicator for any regulator to defend it in court [UK experience of members confirms this]
   - There is expert evidence to suggest that bees have a bias against Manuka pollen because there is not much of it, and its hard for them to extract and they can get it more easily from other species
   - We do not accept the argument that combining Manuka and Kanuka has been common industry practice for years and therefore should continue. It is of the essence of new science that it often disproves previously held beliefs; simply because a belief (such as Manuka and Kanuka being of the same genus) has been held to be true in the past does not justify sustaining that belief after it has been disproven.

2. **Option 2 MG**

- Non-peroxide activity (NPA) is significantly attributable to the naturally occurring compound methylglyoxal (MG). This is what provides the antibacterial properties on which the Manuka brand value has been built.
- MG is unique to Manuka and is not present in any other New Zealand honies
- Although MG levels can be adulterated, it is possible to detect this adulteration; its is illegal and covered under existing legislation. There is a limited number of places to purchase synthetic MG which means this can be readily audited.
- MG can be measured reliably in laboratories around the world
- This option is fast and inexpensive and reproducible
- The method is accepted internationally in our major markets eg China and UK
- Over 80% of labelled Manuka honey exported from New Zealand is MG tested
- . supports two methods of measuring non-peroxide activity - NPA and MG. recognises honey with an NPA value in excess of 5 or an MG in excess of 100 as being Manuka honey. We do not use the name Manuka Honey associated with any product unless it meets these threshold criteria. These criteria are interim and subject to change through emerging science. Minimum levels will move to 10 / 260 by March 1 2014, unless the science enables us to move to an expanded set of markers unique to Manuka. There may need to be a stock in trade provision to enable transition.

3. **Option 3 Combination [and]**

- this option is negated by the arguments in Option 1
- we support the view of the Commerce Commission that pollen cannot lead to a monofloral claim ; it would be duo floral
- high NPA levels which are the basis for the activity claims that underpin the Manuka brand can be associated with low pollen counts < 50%
- We are not aware of reliable evidence of significant/ useful correlation between pollen and MG; our evidence is to the contrary

4. **Antibacterial claims – peroxide claims**

*From MPI discussion paper:*
*often expressed as 'bioactive' or 'activity' either together with or without numerical values. This peroxide activity is said to be somewhat less stable in honey than MG and it is found in most honey.*
*Because of the similarity of these claims to MG or NPA claims, and because peroxide activity is a generic feature of most honey, peroxide activity claims may be considered misleading to consumers.*
*Are claims related to peroxide activity appropriate for Manuka honey? If so, which ones?*

- We agree with the reasoning above.
- Claims related to peroxide activity are not appropriate for Manuka honey because:
    - MG / NPA is the distinguishing feature for Manuka

- Catalase in the body destroys peroxide activity; it does not destroy MG
- The instability of peroxide activity is such that it is extremely difficult to guarantee label claims over a reasonable shelf life, and this brings risk to the Manuka brand
- All honies have peroxide activity, so allowing a peroxide claim for Manuka removes the differentiating value proposition for Manuka and increases the risk of consumer confusion
- All honies have peroxide activity so peroxide claims increase the risk of false Manuka monofloral claims

**5. Alternative options:**

A. pollen or MG = an alternative transition strategy to option 2

- This is a transition solution only, until published science provides greater certainty
- But there must not be any peroxide claims associated with the pollen option

B. Combination of MG and DHA

- DHA only occurs naturally in Manuka honey
- DHA converts to MG
- Two markers make it harder to counterfeit
- There is a known dynamic of conversion of DHA to MG over set storeage conditions; this relationship can be used to characterise Manuka honey over its shelf life
- DHA by itself will not be a satisfactory identifier of Manuka
- We think this is worth exploring. But it is not for immediate use because more science is needed to refine the understanding of the relationship, and there isn't sufficient practical experience of using these measures in combination at scale.

**6. Regulate VS guidelines**

B. We recommend the implementation of regulation based on our recommendations. We note that ,deliver more than 80% of Manuka honey exports, and are therefore in closest contact with factors that will impact on New Zealand's ability to sell into export markets.

C. Whilst we acknowledge that does not represent the entire industry the very large majority of exports; and its in export markets that the Manuka brand and brand New Zealand is at risk.

D. The risk is that if New Zealand does not regulate, regulatory authorities in key markets may react in ways that we can't control. The fact that we don't have regulation is negatively affecting the credibility of brand New Zealand

-ends-

**Options for Defining Monofloral Manuka Honey**

**2. Introduction:**

The supports the Ministry of Primary Industry's aim to achieve a clear, scientifically robust definition of manuka honey that consumers should have confidence in the integrity of the manuka honey products sold. The also agrees that guidelines should be developed for defining and labeling of manuka honey, to ensure that all New Zealand honey is true to label and that consumers are not misled.

**3. Standards for Honey:**

**CODEX ALIMENTARIUS**

The agrees with the BPSC organoleptic and physicochemical properties of manuka honey.

**Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? YES.**
**Q2: Can they be improved? YES by including as a key characteristic the thixotropic nature of manuka honey. This distinguishes manuka honey from other honey.**

**4. Assessment Criteria:**

The agrees in principle with the criteria to ensure authentic manuka labeling. It is the contention that all the parties involved in the (manuka) honey industry need to work together to protect this valuable resource. The landowners within the and our broader landowner networks, can enable access to the manuka resource to ensure ongoing research. This will hopefully assist in a more robust, accurate and evidenced-based science.

**5. Option 1 – Definition based on Pollen Count:**

The is of the opinion that as the technology improves it may be possible to distinguish manuka based on its pollen count. At present this is not possible with bees collecting both manuka and kanuka nectar/pollen, as these species co-occur in New Zealand. If the technology can't be developed, **the** **would not be supportive** of using the existing pollen count testing due to the fact manuka and kanuka cannot be differentiated. It is our belief that manuka honey sold at present is blended with other honey, including kanuka.

**It is recommended** that a better understanding of the manuka resource is required. This will be achieved by a closer relationship between landowners, beekeepers, honey companies and science researchers. There will a natural dilution of the purity of manuka honey unless all the parties involved in its production work together to determine best practice based on robust science.

Q3: What are the likely impacts of Option 1 for businesses?
**The impact to business is likely to be significant as a lot of the existing manuka honey may be manuka blend. This will have an impact on the wholesale and retail price of manuka honey and a relative impact on landowner returns.**
Q4: What are the likely impacts of Option 1 for consumers?

**Consumers will have some assurance of the integrity of the product, as long as the technology and science can differentiate and isolate manuka pollen from other floral varieties.**

Q5: What practical steps are required to effectively implement Option 1?

**Undertake a literature review of all the known research on pollen counts for manuka honey. MPI to facilitate a meeting with Crown Research Institutes and University's to collate the information. Work with the industry is setting standards that are agreed. There may be the need to have some impartiality as some of the industry players will have a vested interest in the outcomes. This will mainly be driven by commercial imperatives and not what's right for the industry. Maori landowners are passive players in the industry and could provide the independence required as well as being major owners of the manuka resource, which maori view as a taonga.**

Q6: If a definition based on pollen count is adopted:

- What is the appropriate percentage of pollen to indicate a mono-floral honey? **There should be a minimum percentage established, which should be informed by the best science and technology.**
- What, if any, additional parameters should be included? **No comment.**

**6. Option 2 – Definition based on Methylglyoxal Content:**

The agrees that MGO is the main contributor to the non-peroxide activity in manuka honey. It is also acknowledged that MGO levels increase significantly after fresh honey is harvested, with DHA decreasing over time to reach a relatively stable equilibrium. It is also acknowledged that DHA levels can be manipulated by adding DHA to fresh honey.

<u>It is recommended</u> that an agreed industry standard and a new testing regime should be developed to confirm that DHA is not being added either intentionally to fresh honey or by feeding it to the bees.

Q7: What are the likely impacts of Option 2 for businesses?

**The impact to business is likely to be significant as a lot of the existing manuka honey may in actual fact be manuka blend. This will have an impact of the wholesale and retail price of manuka honey and a relative impact on landowner returns.**

Q8: What are the likely impacts of Option 2 for consumers?

**MGO and its relevant activity is what set's manuka honey apart from any other honey in the world. This should be clearly defined and understood by the consumers. The industry needs to agree as to which standard is the accepted mark of quality (eg: MGO/NPA and the trade marked UMF).**

Q9: What practical steps are required to effectively implement Option 2?

**The industry in conjunction with the research and science institutes need to work more closely together.**

Q10: If a definition based on methylglyoxal activity is adopted:

- What are the appropriate levels of methylglyoxal to include? **The science should determine the appropriate level of MGO.**
- What, if any, additional parameters should be included? e.g. DHA. **Test HMF as well. MGO activity will increase after the honey harvested, the DHA is likely to decrease. If the honey is stored for long periods of time and exposed to heat, either stored above room temperature then the HMF will increase. This will likely make the honey un-saleable. This is important to note as either bulk honey sold or**

**honey packed in jars, if not stored correctly will decrease in MGO and increase in HMF.**

## 7. Option 3 – Definition based on Methylglyoxal Content and Pollen Count:

The re-affirms that:

1. If the technology is not developed to differentiate manuka pollen from pollen from other floral varieties, then the **is not supportive** of using the existing pollen count regime. This is too inaccurate and will support the status quo, which may result in manuka blend being sold as manuka honey.
2. MGO is the benchmark for determining the Non Peroxide Activity of manuka honey. The is supportive of this testing regime. However, the adding of DHA to manuka honey needs to be discouraged by the industry. The technology needs to be developed to test whether DHA has been added. A common practice is to hold onto the honey to increase the MGO activity. If not stored correctly this will result in an increase in HMF, as described above.

30 September 2013

**OPTIONS FOR DEFINING MONOFLORAL MANUKA HONEY**

In regard to the questions raised in MPI's consultation document "OPTIONS FOR DEFINING MONOFLORAL MANUKA HONEY" we note that there is not yet a consensus within the New Zealand manuka honey industry in regard to pollen analysis. to the wider honey industry, we do not wish to present a preference for any of the options.

However should the industry and/or regulator conclude that pollen analysis may be a valuable tool for defining manuka honey (either alone or combined with organoleptic and analytical methods) we do wish to draw attention to :

To date, the analysis of pollen in honey (or 'melissopalynology') has been a slow and meticulous activity requiring access to highly trained resources.

It has been demonstrated that the concentrations of many potential chemical markers change, whereas a honey's pollen content/fingerprint is stable with respect to time and under differing storage conditions. This attribute may significantly aid in providing assurance about honey's authenticity independent of these variables. Pollen content/fingerprint is particularly useful to confirm geographical origin, and may be an increasingly important tool for the industry to detect and protect against adulteration and other types of fraud that might occur throughout the supply chain.

We do wish to note that a wider set of profiling parameters for commonly co-sourced pollen taxa might assist in defining manuka honey. Pollen and fungal spores unique to New Zealand taxa are often present in Manuka honey and these may assist in defining the type and providing proof of wholly New Zealand origin. There are some suggestions in the

[1] K. Holt, G. Allen, R. Hodgson, S. Marsland, J. Flenley (2011). *Progress towards an automated trainable pollen location and classifier system for use in the palynology laboratory.* Review of Palaeobotany and Palynology 167 (2011) 175–183

literature that a combined profiling (i.e. pollen spectrum, organoleptic and physiochemical) produces the best practical differentiation of a monofloral status[2].

We would also note that to define a monofloral manuka honey using pollen analysis will require a New Zealand industry consensus on the absolute pollen count (APC) parameters and relative corrected percentages for Manuka. A well supported testing programme on a wide and statistically significant number New Zealand manuka honeys would be useful to validate the distribution of absolute pollen count values and to determine the 'r' values used to correct percentages based on the relative frequency of pollen from nectar secreting plants as well as some agreement on to how to treat pollen from non secreting plants that contribute to the pollen spectrum found in manuka honey. Detailed chemical profiling/analysis and pollen spectrum for New Zealand manuka honeys could be completed simultaneously to ascertain the extent of useful correlations that may aid a unique definition, or definitions.

-ends-

[2] Kaspar Ruoff, Werner Luginbühl, Verena Kilchenmann, Jacques Olivier Bosset, Katharina von der Ohe, Werner von der Ohe, Renato Amadò. (2007). Authentication of the botanical origin of honey using profiles of classical measurands and discriminant analysis. Apidologie 38 (5) 438-452. DOI:10.1051/apido:2007027

**"Options for Defining Monofloral Manuka Honey"**

*MPI discussion Paper No: 2013/38*

**Introduction:**

Manuka honey is highly sought-after and commands a premium price because of its perceived health-giving benefits. These benefits are due to the presence of a unique non-peroxide antibacterial activity not found in kanuka honey or any other honey.

The non-peroxide antibacterial activity might be in all true manuka honey or it might not be.

1. There is already a standard identifying manuka honey that has this non-peroxide antibacterial activity (NPA) – this is the phenol standard.
2. There needs to be a standard identifying manuka honey.

The three proposed options are inadequate in that:

1. Pollen counts do not single out manuka honey that has non-peroxide activity
2. Methylglyoxal is a marker of honey that has non-peroxide activity. DHA is the precursor to methylglyoxal in manuka honey. However both DHA and methylglyoxal and can be artificially added to honey and thereby give the impression that the honey has non-peroxide activity. A methylgyoxal standard would need to be accompanied by an adulteration detection programme.
3. Recent research using chemical fingerprinting distinguishes between manuka honey and kanuka honey. It would be potentially damaging to the NZ Inc to develop a standard that confuses manuka honey and kanuka honey.
4. Chemical fingerprinting can identify adulteration of honey where existing methods fail to do so.

Preliminary research (2013) carried by Analytica Laboratories is showing that each floral type of honey has its own unique chemical fingerprint. This research used honey from the Oritain Honey Vault (2010) collection plus honeys produced more recently. This preliminary research has shown that the manuka honey chemical fingerprint is different to the chemical fingerprint of kanuka honey. This preliminary research verified the findings of the Oritain Honey Vault Project and has led to the development of the Manuka ID Project being driven by the UMF Honey Association. The first step of the Manuka ID Project is the collection of forensically robust honey samples this coming summer.

**Question 1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?**

- The existing BPSC parameters are broad, subjective and open to an individuals personal interpretation, any number of New Zealand Honeys (monofloral or not) will fit within these parameters. These are not widely used to market NZ Manuka honey.
- The Bee Products Standards Council does not hold any sort of mandate to regulate or influence the New Zealand Bee Keeping or Honey marketing industry.

**Question 2: Are there alternative options for defining Manuka honey (i.e. not based on MGO content or pollen count), and what scientific evidence supports this?**

- Manuka Honey is highly sought after and commands a premium price because of its perceived health giving benefits. These benefits are due to the presence of a unique non-peroxide antibacterial activity (NPA) not found in Kanuka honey or any other honey, Customers know there is something different about NZ Manuka honey and that "something different" is the NPA. If we abuse the trust they have in us our markets will tell us.

- The non peroxide activity might be in all true Manuka honey or it might not be. There is already a standard identifying manuka honey that has this non-peroxide antibacterial activity (NPA) – this is the phenol standard.

- Initial findings have been released with regards to the work begun by the UMFHA called the "Manuka ID" project; these findings have shown the ability to prove monoflorality of any honey using liquid chromatography-mass spectrometry, essentially chemically "Fingerprinting" the honey.

  The initial results have easily differentiated between Kanuka and Manuka Honeys and do not require a Methylglyoxal content test or a Pollen Counting analysis. This first stage research used samples from the Oritain Honey Vault Project (2009 – 2010) plus honey produced more recently.

  This summer an audited and forensically monitored honey collection is taking place; these samples will enable further testing and analysis to provide a definitive chemical fingerprint for each New Zealand mono floral honey.

  The collection and first round of analysis has already begun and will be completed by March 2014, only 6 months away.

- If there must be an interim standard we believe it is appropriate to continue with current labelling requirements until the Manuka ID project is able to provide further answers. The current labelling throughout the industry can be narrowed to three categories:
  1. Honey that contains an NPA rating of 10 or higher; or,
  2. Honey that contains an MG content of 263 or higher; or,*

3. Honey that contains a Manuka Pollen count of 70% or higher.

Honey testing below these limits might be considered to be a Manuka blend.

* The correlation between NPA and MG content has been widely misused and an accurate and verified correlation is published on the UMFHA website http://www.umf.org.nz/umf-trademark/methylglyoxal-npa-honey-conversion-calculator this provides the correct correlation between NPA and MG, for example NPA 5 = MG 83. It is imperative that the correct correlation is used for the sake of accuracy and to prevent commercial advantage.

**Question 3: What are the likely impacts of Option 1 for businesses?**

- A monofloral standard based on Pollen counts will hurt all businesses trading in, or exporting New Zealand Manuka Honey or Manuka products. Explaining to a customer that the honey they are buying might be Manuka or it might be Kanuka because the testing process is not advanced enough to establish a difference, is not going to do our world renowned reputation any good. New Zealanders are seen as being innovators and as being able to solve any problem. How will we explain that we have to lump two different floral species together because we can't tell them apart in the laboratory? The purchasing public will possibly see this for what it is "pulling the wool over their eyes".
- Our honey certainly will not meet a pollen based standard even though it has a high non peroxide activity NPA 16+. Samples of our honey were included in the Oritain Honey Vault research project and were found to be between 20% and 40% Manuka/Kanuka pollen well below the required 70%. A pollen count standard will seriously disadvantage our business, by preventing any of our UMF 16+ Manuka honey from being labelled as Manuka Honey.
- Honey collected from our Kanuka area provided a higher pollen count (between 58% to 79%)
- The results of testing of our honey during the Oritain Honey Vault project (Of which we were silver sponsors) is shown in the table below and also the full results in the attached Appendix.
- Bee keepers certainly comment about the lack of Pollen collected and stored in hives placed in areas where Manuka is the predominant floral type. Often noting that bees will collect Pollen from other sources like Clover or Lotus early in the morning and then move onto visiting Manuka plants from the mid morning when the plants begin to yield nectar.

**Question 4: What are the likely impacts of Option 1 for consumers?**

- Pollen counting enables Kanuka Honey to be called Manuka, it is unable to identify Manuka Honey that has the Non peroxide Activity which gives Manuka its special qualities and makes it sought after.
- International research scientists could expose this blurring of the Kanuka / Manuka lines as deception and bring the integrity of New Zealand into question.
- Consumers will not appreciate being deceived and resistance in the market place will be likely if you can not convince your customer that they are buying genuine Manuka honey that offers them tangible benefits.

**Question 5: What practical steps are required to effectively implement Option 1?**

- In our opinion this standard cannot be implemented therefore no practicable steps exist.

**Question 6: If a definition based on pollen count is adopted:**

**What is the appropriate percentage of pollen to indicate a monofloral honey?**

- Our results show that none of the Manuka Honey we produce with a MG content contains a Manuka pollen count higher that about 40.2% and most are significantly lower.

**What, if any, additional parameters should be included?** N/A

**Question 7: What are the likely impacts of Option 2 for businesses?**

- The use of the testing process to establish MG content simply realises the existence of the chemical methylglyoxal within the honey being tested, it does not measure the honeys actual ability to effect and limit the growth of bacteria.
- The established NPA bio assay testing process (Phenol standard / Well diffusion assay) has been proven accurate and is monitored continuously by ring trials and the use of an international interlab programme.
- Testing using a bio assay measures the antibacterial activity of the honey and usually gives a clear and determinable result, on occasion the result can be provided as a "Partial inhibition", there has been no research into causes for this "partial inhibition" result. It could be because of contamination within the honey being tested. Partial inhibition has been a problem to many in the industry, methylglyoxal content testing does not detect honey that has a "partial inhibition" result effectively hiding this fact. Eurofins / NZlabs defines "Partial Inhibition" as: "appears to demonstrate some antibacterial activity.....the zone of inhibition could not be measured precisely"

**Question 8: What are the likely impacts of Option 2 for consumers?**

- The consumer buys Manuka honey or Manuka products based on the perceived health benefits, MG content provides some guarantee that the health benefits exist but NPA Bio assay testing allows for a more honest testing regime.

**Question 9: What practical steps are required to effectively implement Option 2?**

- None, this is a widely used testing regime recognised worldwide.

**Question 10: If a definition is based on methylglyoxal activity is adopted: What are the appropriate levels of methylglyoxal to include?**

- Initial research into Manuka honey and its Non peroxide activity considered any activity level below NPA 10 to be non-beneficial, this being the case we consider MG 260 or above, or NPA 10 or above is appropriate.

**Question 11: What are the likely impacts of Option 3 for businesses?**

- It will be impossible to satisfy this standard, examining the data set provided within the Appendix it shows that our honey will not meet any standard relating to Pollen.

**Question 12: What are the likely impacts of Option 3 for consumers?**

- A consumer in the market for Manuka honey or Manuka products will miss out on the all important NPA that is found only in Manuka Honey if packers and honey producers are struggling to satisfy a pollen/mg standard and are unable to label good quality honey as being Manuka.

**Question 13: What practical steps are required to effectively implement Option 3?**

- N/A

**Question 14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?**

- No. Claims relating to Peroxide activity, bio activity or other such undefined descriptors are not appropriate as these are common to all honeys and most definitely fall within the misleading / passing off category. These types of labelling claims damage the reputation of the New Zealand Manuka Honey industry and cause confusion of the consumer.

-ends-

**Submission on Options for Defining Monofloral Honey**

The standards as outlined in the "Options for defining Monofloral honey" as outlined in MPI Discussion Paper NO.2013/38 would be detrimental to my beekeeping business.

My beekeeping business is based in the . I produce manuka honey as well as clover.

The manuka crop from my hives can be a blend with clover and other native species but in many years can be quite pure based on its flavour and taste. Many lines I have produced have graded pure manuka by two major honey packers.

Although much of the manuka I have had tested has shown high Manuka pollen counts and has all the thixotropic and taste properties of this plant, it has never shown an UMF level above 5. There is no kanuka in the areas where I produce manuka honey.

A definition based on pollen counts would not disadvantage my business but **a definition based on the anti-bacterial properties (MGO) most definitely would disadvantage my business.** In my opinion defining manuka honey in this way would be totally incorrect and not be in line with Codex standard or that of the Bee Products standards Council monofloral definition.

I consider taste and flavour to be the best factors on which to base a manuka standard and that a definition based on anti-bacterial properties is a purely commercial definition and not true to the floral.

I also consider that there should be auditing of all UMF claims in manuka honey in order to tidy up the current 'fraudulent' use of that description in exported honey.

-ends-

## Submission on Options for Defining Monofloral Honey

### Options for defining Manuka Honey

Contrary to your suggestion, under defining Manuka Honey *"methods for defining manuka honey in New Zealand: by pollen and MG content"*, Manuka honey in NZ has never been defined by MG content. Mg has only been used to define its antibacterial effect and that is comparatively recently. Over a much long period this activity was defined by its UMF value which is still more generally accepted than MG or more correctly MGO.

### Option1. Based on Pollen count

I agree with most of the claims made in this option except for paragraph 4 which is complete conjecture and I have seen no reported science to support it. This paragraph should be removed from any consideration as it has just been dreamed up to support why some honeys with high Kanuka pollen levels are also active. A more likely explanation is that they have a high level of very active Manuka in them.

I agree with the analysis except many samples handled by ' ' show high levels of pollen but little Organoleptic or thixotropic properties of either Manuka or Kanuka.

If Kanuka cannot be separated on this basis some other method will also have to be used.

Q3/Q4 mixed Manuka/Kanuka blends would be accepted as Manuka. Consumers would in time possibility differentiate pure Manuka on colour and taste.

Q5 easy to measure and implement.

Q6 +60%

### Option2. MGO content

In my opinion there is no scientific evidence to suggest a mono floral honey could be defined on this basis. It is not supported by the "Codex Alimentarius". MGO is a recently discovered constituent of Manuka honey and is responsible for its anti-microbial activity. Peter Molan's research presented at NBA Conferences has indicated there are wide variations in MGO/UMF levels between regions of NZ and he has postulated that these could be due to "subspecies of Manuka". Four have been suggested with three in the NI and one in the South. The South Island Manuka shows low levels of activity. Generally less than UMF 5.

Q7 this measure would be a disaster for many beekeepers producing high quality monofloral Manuka honey such as myself. MGO is a marker for Manuka honey but not a measure of its purity see Attached analysis High levels of MGO in some honeys have led the industry to dilute these honeys down with many other floral types. I have tasted many high branded Manuka 5-10+ UMF honey with little manuka organoleptic properties.

Q8 consumers will end up not buying a monofloral manuka honey

Q9 option 2 should not be implemented

Q10 No level is appropriate; in general it would not relate to purity **FULL STOP.**

MGO/DHA is a measure of the non peroxide anti-bacterial ability of manuka honey. It is not a measure of its purity and can be easily manipulated in various ways.

**Option 3 MGO and Pollen**

See notes on option two above. No standard based on MGO/DHA is scientifically acceptable. I would be confident in predicting no NZ law court would accept there is evidence to support a claim that manuka honey purity is related to MGO levels.

MPI may have some data to suggest a correlation e.g. 70%/300mg MGO. But this must be extremely limited and may hold in particular area of NZ. It does not hold in the South Island and in particularly in the SW of it.

Q11,Q12, Q13. See for option 2.

**Content claims**

MGO/UMF is a content claim. It has no relevance to the mono floral purity. MPI and Food Standards are taking a major risk with their reputations by in any way supporting any term except "non peroxide activity". A search of the literature will indicate there is no evidence to support any health advantage from ingesting MGO but it is more likely to be potentially detrimental to health. (CJ Adams et al 2009)

Q14 UMF should be encouraged by MPI as per notes above, until more is known about the effects on health from ingesting MGO it would be safer for MPI to not to promote it as a substance in human food.

UMF is essentially a marketing tool that evolved out of the non-peroxide anti-bacterial properties of manuka honey. Other measures ( MGO, Molan Gold Standard) came into use as "UMF" could only be used by registered entities

**Questions for Submitters**.

This document discussing options leaves out a discussion of the most important codex standard for defining Mono floral honey, its **organoleptic properties. This is the primary basis on which a mono floral honey should be determined.**

Also missing from this document is a discussion on the use of the thixotropic properties in defining manuka honey. Many beekeepers and buyers invert a honey pot of freshly extracted manuka honey

to see if it will "run". This is a very good rough test of manuka purity.
have some subjective data using this factor.

From Codex Standard for Honey (CODEX STAN 12-1981).

Description of Honey 2.2,

**"The flavour and aroma vary but are derived from the plant of origin".**

This is the base from which the description of a monofloral honey should be set. It is a subjective human assessment of flavour and aroma that the codex describes for distinguishing honey from different plant origins. The codex does not allow for the definition of a monofloral honey on the basis of either pollen analysis or some other chemical marker.

During the era of the Honey Marketing Authority (HMA) all export honey was graded by an Authority grader. This ceased when the Authority was disbanded in 1982.

It is my suggestion that the MPI introduce an official (certified) honey grader back into the NZ Honey industry. That is MPI would authorise an official grader (or Board), who would then **register** major industry players and buyers after some training and setting of appropriate standards. Any disputes would be adjudicated by the Official Grader (possibly in consultation with one or two other suitably experienced persons). It could be incorporated into the RMP system

All **export** Manuka Honey would have to be graded by a certified grader as being to an acceptable Monofloral standard. That is the dominant flavour and aroma of the honey are those of pure Manuka Honey and it meets the other physical parameters of colour etc. as set out in the Codex.

Domestic honey could be sold as meeting the export standard.

Honey sold as Manuka could be referred to the grader as being mislabelled in a dispute.

The cost to MPI could be neutral if the service had an appropriate fee. The MPI could also contribute to the cost in recognition of the monetary benefit the Manuka industry has had to NZ exports and economy. In reality a quick taste test should be no more expensive and possibly cheaper than an objective chemical test. Industry players requiring many tests would set up their own certified tester. Smaller player could have their honey referred to a certified contract provider.

Although it lacks the repeatability of an objective test, it is far more accurate than the test outlined in the MPI discussion document. Those tests have far too many flaws to be the basis of a monofloral definition of Manuka Honey. At the best in their current form, they only indicate that there is Manuka honey present in the sample.

This proposal could be expanded to cover all mono floral Honey of commercial significance.

Honey samples:

I have sent away for pollen analysis some sample of my honey that relate to information I have on their colour, DHA and MGO contents. All these honeys had phund colour 75 to 85. They showed strong Manuka taste and aroma characteristics. Where this honey is gathered no Kanuka is present. I will forward the analyses when they come available.

Reference: Christopher J. Adams, Merilyn Manly-Harris and Peter C. Molan. *Carbohydrate Res. (2009)doi:10.1016*

-ends-

Please note that for the purpose of ease of writing reply's to these questions the term UMF® has been used as a representation for the activity in Manuka Honey known as either UMF® , NPA or MGO.

OPTIONS FOR DEFINING MONOFLORAL MANUKA HONEY

***Q1 : Are the BPSC parameters for organoleptic and physicochemical properties of Manuka honey appropriate? Can they be improved?***

- Colour (pfund mm) 84mm s.d.11.8
  Our experiences that the colour of UMF® Manuka honey ranges between 40 – 60mm. If we had honey with a reading of 84mm there would be great concern as such a high reading could indicate that the honey may be burnt, so we would need to complete additional tests eg (peroxide activity) to give us confidence that this honey should be purchased .

  Aroma and Flavour are very subjective and we have found that with Manuka honey they vary from region to region . Every person also has a different experience therefore perspective of aroma and taste vary greatly.
  As we are purchasing the Manuka honey for its UMF® activities, then these factors are less critical. This is more relevant perhaps for standard Manuka honey as this being sold to consumers as an eating honey.

  Manuka honey is by nature thixotropic but this is generally something we observe but do not measure .

  When purchasing we have our own panel to assess all honey for visual , aroma and flavour , but primarily we then rely on the specific testing carried out by approved laboratories. Our Market is UMF® Manuka honey which has a very high value so the test results are critical.

***Q2 : Are there alternative options for defining manuka honey (ie not based on MGO content or Pollen Count), and what scientific evidence supports this?***

We look at all of the above categories including HMF and C4's levels but the UMF® with an MGO conversion is the most critical currently when purchasing Manuka Honey stock.

***OPTION ONE***

***This option would define manuka honey as having a specified level of manuka pollen. Honey that did not meet the specified level of pollen could be labelled as a manuka blend.***

***Q3 : What are the likely impacts of Option 1 for the businesses?***

This option is of great concern to us , as bees are known to collect very little pollen from Manuka. This option could potentially destroy a number of businesses immediately . Businesses have until now been producing Manuka Honey based on the UMF® activity for distribution into markets worldwide , so many millions of dollars worth of Manuka stocks being held by many different entities could potentially have the values of their stock destroyed overnight . Their stock would still hold the natural UMF® activity but if the bench mark was to suddenly be changed to Pollen then a collapse of the industry would likely occur.

It is well known that the Manuka trees along with the manner in which the bees collect from this source, is of a different nature than many other floral sources.

It is not pure manuka that is the base of this industry , but the highly active UMF® factor . In addition the cost of good accurate pollen testing which would differentiate the difference between Manuka and Kanuka would add $400 per drum at purchases price . The pollen count in the UMF® Manuka market is largely irrelevant as UMF® is the critical factor .

NOTE : Manuka is the carrier honey that happens to contain this unique UMF factor .

Pollen is able to be filtered out to give a false reading, or pollen can be added.

Standard Pollen test - Manuka and Kanuka pollen are identical and the additional cost to analyse and differentiate these is expensive.

This is definitely not a measure that we would support. The cost of accurate testing of $1.30 per kg make the product unmarketable ,if pollen testing was to occur at point of purchase .

Generally all manuka honey processing is to order based on the UMF® activity . Currently some markets already require approx. $2000 worth of testing to be carried out for each batch made – see testing cost schedule attached .

If a pollen test is added to our existing requirements, for the batch then we would have to wait prior to bottling in case we miscalculated the blend . This would create a difficult matrix to blend to, as we have to already allow for UMF® and C4 sugars:

- Adding the pollen to the mix would make blending to market requirement almost impossible

***Q4 : What are the likely impacts of Option 1 for the consumers?***

The market and consumers would also become confused that they are one day purchasing and UMF®15+ Manuka honey then the next time it is a UMF® 15+ Manuka Blend honey. UMF® has always been the product being marketed.

If the pollen count was a determining factor there would need to be a lot more work done by someone to inform the consumers so they were not confused. The confusion would result in the consumer becoming disillusioned with the product, resulting in loss of trust in the integrity of brands in the market that have spent considerable sums to develop the market. So would probably find an alternative option to purchasing UMF® Manuka honey.

***Q5 :What practical steps are required to effectively implement Option 1?***

The bees never collect nectar from purely one source. There may be a number of other species flowering at the same time and generally manuka nectar, not pollen collection is predominant.

There are 3 sub species of Manuka that produce UMF® and these are generally mixed well within the foraging area that the bee harvest from. Until there is a time when only the UMF® producing manuka is cultivated in large plantations you could not use pollen count as an identifying marker.

As it is not Manuka but UMF® that is the active component this option would not be of assistance to the industry

***Q6 : If a definition based on pollen count is adopted :***

- ***What is the appropriate percentage of pollen to indicate a monofloral honey?***

Refer to the comments above . We do not support this manner of identification of UMF® Manuka Honey

- ***What, if any, additional parameters should be included?***

  Ref to the comments above

***OPTION TWO***

***Under this option honey would be defined based on meeting a minimum specified MG level (and possibly also a DHA level). Honey that did not meet the specified MG level could be relabelled as a 'Manuka Blend' The manuka honey must meet the defined MG levels throughout it's shelf life.***

***Q7 : What are the likely impacts of Option 2 for the businesses?***

- This is the method our company currently uses, as our major demand is for UMF® honeys. We test each drum at Hills for the MGO marker converted to an NPA figure, then we blend our batches on that basis to get the NPA rating to meet our order requirements. This is the value that the consumer is paying for. For our business there would be no change . The UMF® mark is internationally recognised, so there has to be recognition that these are aligned .

- There are very pure Manuka honey's from both the north and south island that have no NPA activity at all so adopting this as a marker for all Manuka honey would not technically be correct.

***Q8 : What are the likely impacts of Option 2 for the consumers?***

There needs to be an official independent table that clearly shows the conversion of MGO to NPA or UMF®, so the consumer cannot be mislead deliberately or accidently by retailers or others, that are not concern about the ethic's in their actions.

Monitoring of exports would be required so that claims on labels meet the labelling guidelines and that test results are available to back up the claims

***Q9 : What practical steps are required to effectively implement Option 2?***

MPI would have to implement a testing program that would ensure that label claims were met, with periodic testing of product destined for export especially from unknown operators. This would ensure that what was being exported was the same honey that had been sent for testing.

Adjustments in the e-cert programme would ensure an easier compliance with requirements and monitoring by MPI

This is not a complete option if Standard Manuka is also included, as this honey does not have either an MGO or a DHA reading.

***Q10 : If a definition based on Methylglyoxal activity is adopted***

- ***What are the appropriate levels of methylgloxal to include? ( please provide any available data or scientific evidence to support your submission)***

MGO from 83ppm (5%NPA) would be appropriate as that is now in the market . To change from this would confuse the market, push up prices higher for the higher NPA honey (10+) , and create a shortage which would impact on the market and loose NZ international credibility .(The stable door is already open)

- ***What if any ,additional parameters should be included ? eg DHA***

DHA levels diminish as the NPA level increases so this is not a good indicator as to the purity of the Manuka Honey. DHA levels only represent the ability for the NPA levels to grow if the honey is stored and so is good indicator of the value that the consumer is paying for.

***<u>OPTION THREE</u>***

***This option defines Manuka honey using a combination of pollen count and MG content. The honey would require a pollen count to test whether it is at least manuka and/or kanuka. It would then be tested for MG content to determine whether it contained sufficient MG to make a monofloral claim***

***Q11 : What are the likely impacts of Option 3 for the businesses?***

Pollen counts are not a marker that indicates whether the honey has NPA activity.

MGO is not a marker as to Manuka being the only source of nectar or pollen in the honey but it does indicate what the consumer is looking for generally when they purchase Manuka Honey.

***Q12 : What are the likely impacts of Option 3 for the consumers?***

MGO is an indicator to the NPA or UMF® strength.

Pollen really gives no surety that the consumer is receiving what they intended to purchase.

***Q13 : What practical steps are required to effectively implement Option 3?***

- A great deal of thought needed if this option is implemented.
- There are still many gaps in the science and Manuka is and has never been a straight forward species. Perhaps that is why it produces such a 'unique' activity.

***CONTENT CLAIMS***

***Q14 : Are claims related to peroxide activity appropriate for manuka honey ? If so, which ones?***

Claims on the peroxide levels are not appropriate.

Peroxide is very unstable often being destroyed during handling and processing. If it is preserved during the processing procedure, it does give additional activity to the honey as peroxide works synergistically with the UMF® activity.

If Peroxide activity claims are made on a label the tests need to be taken post processing and not prior to processing. Many processors do not process in a manner that preserves the peroxide in honey . Many supermarket honey's have not preserved this activity.

NOTE: For the purpose of easy writing the writer uses the term UMF® to refer to Manuka honey currently known as either UMF® , MGO or NPA.

## BACKGROUND

### The Origination of UMF® Manuka Honey

Dr Peter Molan's discovery of the 'active' and 'non active' components ( as per the attached documents)within Manuka honey, led to the formation of a new industry within New Zealand's honey industry. Demand nationally and internationally arose for UMF® Manuka honey due to the sometimes life changing results, that were being experience by persons who were treating often very difficult medical conditions.

The UMF® Manuka Honey industry is and has always been based on the now known, but originally unknown, UMF® factor. This discovery of this component was originally made by Professor Peter Molan of the Waikato University .

The name UMF® originated as a description for the UNIQUE MANUKA FACTOR . 'Trade marked' and registered for the protection of the New Zealand industry by the original working group made up of beekeepers and processors to establish a pathway to market that would enable a new product to be launched and be able to hold credibility with all those who were using it.

During this time the Univerity of Waikato led by Dr Peter Molan, had been working with nurses from the Waikato district , trialling Manuka Honey containing the active component , on patients who the medical fraternity had not been able to find a manageable and successful method to treat their conditions . This was the catalyst for looking at a way to get this product directly into the hands of those who needed this activity, to assist in the healing process of their often debilitating condition.

The increased value and market interest was never based on MANUKA HONEY but the highly active component within MANUKA. Manuka honey happened to be the carrier for this highly effective activity.

Dr Peter Molan agreed that although UMF® activity was detectable at 5% , his research had all been done on generally 12% UMF®Manuka Honey so he supported the industry using the Trademark UMF® when the Manuka Honey had a minimum activity of 10%. All Manuka honey that registered as having UMF® Activity between 5% & 9%, was then classified by Dr Peter Molan as being 'ACTIVE Manuka' honey. All other Manuka Honey was known as 'Standard Manuka' or just 'Manuka honey' intended as a nice honey to have on your toast.

The 'Manuka Honey Industry' developed quickly and soon increased purchase prices for those honey's demonstrating that they contained UMF® activity were now being traded at substantially increased reward's for the producers. Some processing and marketing companies along with the University of Waikato , began to invest very large sums of money on research , IP and market development. There was a great deal of work required to be done to ensure consumer safety and this responsibility was clearly understood by the original market leaders.

It was seen that there would need to be market vigilance to ensure those of a less ethical nature would not tke advantage of the consumer. There were many attempts at trying to formally address

the issues involved with those of a less ethical nature, but this was difficult as the beekeeping industry had no unity or ruling body , therefore no official entity to monitor and prosecute anyone who was taking advantage of this loophole. Self monitoring within the industry was only working to a point. It was easy for traders or producers to profit in new markets when they were selling to non educated markets. A few International opportunists also quickly saw this loop hole.

A great deal of research began in the late nineties , early 2000's to understand and try to identify what was actually happening with Manuka honey. It was known that there were great variances between regions and often great seasonal differences . At the time much of New Zealand's Manuka was being cut down to make way for forestry plantations or other more profitable crops or activities, so there was then a lot of energy put into trying to secure hive sites . This could only be done by the sharing in the rewards of the harvest from beekeeper to land owner. Manuka was often growing well on otherwise marginal land and it was clearly identified that if there was to be any chance of this industry developing for New Zealand then there would need to be an halt on the clearing of these lands.

Over the next years there were many changes within the industry as many individuals and businesses scrambled to take part in the phenomenon of this powerful healing product.

Research Institutes worldwide began to look at the originations of the UMF® activity and also a search for other possible highly active honey took place . The medical profession started to use medical devices containing UMF® Manuka Honey. Many beekeepers at this point made their fortunes as the once 'non valued' ,'too difficult' to handle honey took centre stage in the world market.

As with any industry that is showing good returns there are those who climb on board wishing to walk the easy road ,caring little for any consequences their actions may have on others.

After a period of time the term UMF® was adopted for all Manuka honey showing any amount of this activity . So the once 'Active manuka" 5%-9% was reclassified and now the range of UMF® Manuka Honey could range from 5% upwards to as high as 30% UMF® activity.

This now left an opening in the terminology, leading to standard Manuka honey being labelled as Active . Previously there was a lot of work done in the market place to inform the consumer on how to distinguish between Standard , Active 5%-9% and UMF® 10% upwards.

Peroxide levels (not always from test results after processing) have now been used by traders and marketers worldwide, who have jumped on the back of all the research , thereby confusing the consumer about what they are actually purchasing. Often much higher values for this Standard Manuka honey have been paid by the consumer , who finds that they are then not getting the indicated results they thought they were paying for. Many individuals and some companies have gained much by this action. The UMF Association has been the only body policing standards of Manuka Honey sold internationally . Government support is needed to ensure that Manuka honey does not lose credibility with the international consumer.

The market needs a clear guideline to ensure compliance, with an internationally accepted standard which is monitored independently

If this was just another standard (peroxide only active) honey then it finds it's own level of support by consumers willing to pay for the taste. UMF® Manuka honey has some amazing healing properties and has scientifically gained a very credible international reputation and has been scientifically proved to heal people with difficult and in some cases life threatening conditions.

There is now a great deal of awareness worldwide regarding Manuka honey and research institutes within many countries are looking much more closely at the properties within this living product and moving to – pathways that will enable product made from UMF® Manuka to be reclassified from medical devices to medicines.

The industry currently faces many problems with actually identifying what happens within Manuka. The UMF® activity is now able to be produced, made by the adding of a synthetic substance DHA or MGO (luckily still unknown by many) . There is yet to be enough research done to have a test that can identify that these synthetic substance have been added to make the UMF® honey .

Scientists have discovered that they can make UMF activity in clover honey but luckily this and other honey's have already been identified as having only peroxide activity so the policing and prosecution of any entity wishing to try and pass this off to consumers would be easily stopped.

UMF® Manuka honey is a living and active product . The higher UMF® activity held within the honey generally the longer amount of time this has taken to grow. During this period of being held there are many components within the honey that change . The reasons for these changes are far from conclusive and often the test results are now indicating a possibility of potential contamination, but the science is showing that Manuka honey produces these components naturally. Until this science has progressed even further than the current stage there needs to be caution when regulating.

Until there is more scientific conclusive evidence we believe that the only logical option is to legislate. Very strong legal penalties for any person or entity partaking in deliberately and or knowingly adulterating Manuka honey at any point along the production chain,this certainly would be a good deterrent .If New Zealand Authorities became more pro active internationally about protecting & policing UMF® Manuka honey including it's reputation then this would assist in all consumers getting exactly what they paid for.

An immediate law change to restrict and regulate all users of both synthetic DHA and MGO would help give government authorities and industry assurances that the UMF® Manuka honey has derived from natural sources.

New Zealand has been given a wonderful Natural product that benefits humanity. This needs to be given the full protection that it deserves to ensure a bright future for all. Currently the consumer struggles to understand that there are several variations being marketed eg UMF®,NPA , MGO , Active, Bio Active and TA. New Zealand needs to present itself in a much more unified manner for all concerned.

There are many issues to be addresses and the option for additional testing at beekeeper level needs to be carefully consider, as if this was applied to every drum of honey this product would currently be priced out of the market place. Attached is a table to show you the cost structure

involved for finished products in some current markets and we have calculated what this would add to the cost of each drum if required. If an additional pollen test was then added on top the cost, it would be unmanageable by all involved. Currently the cost of testing each drum of honey at time of purchase is $432 .

In summary our observations

- The use of the word ' ACTIVE' in the sale of Manuka honey has been taken advantage, of as you will note that Dr Peter Molan originally endorsed this term to indicate UMF®activity of 5% to 9%.The term active is now a passing off claim to the consumer and is deceptive and misleading and so should lead to prosecution
- The value of the Manuka honey is in the NPA activity, which gives it the unique medical properties . International research supports this uniqueness. Without the NPA manuka is just another floral honey
- As there is so much self interest now in the industry ,and industry has not been able to agree on how to self monitor , the only option is government intervention to ensure that this product does not loose credibility.

  Please do not hesitate to call those in the industry who have been involved in it's development from the onset.

# A Simplified Overview of the Various Activities in Manuka Honey

**Manuka honey**

Manuka honey is derived for the Leptospermum tree that is native to New Zealand and Australia. The indigenous people from both lands have been using Manuka in their traditional medicines for centuries. In recent decades laboratory studies in both countries have identified unique health and healing properties found only in some Leptospermum species in New Zealand and Australia. Today, following extensive clinical testing in New Zealand and other countries, the unique value of Manuka has been recognised worldwide. Manuka Honey is now sought after around the world for use in hospitals, burns units, diabetes clinics and other specialist clinics, family health care, digestive health care, beauty and skin care, veterinary practice and as a health food.

Manuka honey is now marketed throughout the world and the antibacterial strength can be tested for and is often shown as a strength number on the labels i.e NPA 10+ or UMF® 10+. For commercially competitive reasons there have been a number of symbols introduced into the market over recent years that are purported to represent the antibacterial strength of Manuka. Following is an explanation of the more commonly used antibacterial indicators.

***Note - Manuka honey with antibacterial activity derived from the leptospermum trees is found in both New Zealand and Australia***

**Hydrogen Peroxide Activity (HPA)**

When the bees are collecting the nectar from flowers they introduce and enzyme to convert the nectar into honey. This enzyme produces an antibacterial activity in the honey called Hydrogen Peroxide Activity (HPA) and most honeys around the world have this activity when the honey is freshly taken from the hive. Although this Hydrogen Peroxide Activity can be useful to help fight some common bacteria it is very unstable and is easily destroyed by both heat and light so although most world honeys varieties have HPA when fresh from the hive, this activity is easily reduced or destroyed through heating during processing or warm room temperatures over time or by sunlight and artificial light when the jar is sitting on the shelf, therefore most honeys in the jar have very little or no HPA left by the time it gets to the customer.

***Note – Hydrogen Peroxide Activity is susceptible to heat and light***

**Total Activity (TA)**

The Hydrogen Peroxide Activity (HPA) in Manuka honey is often measured as part of the Total Activity (TA) and some companies record the strength of this by labelling their honey as "TA" rated honey i.e. TA 10 or TA 10+. This method of identification can be misleading to the consumer who believe they are buying honey with an NPA or UMF® activity when in fact this test is recording the total activity which can include some or all of the less stable Hydrogen Peroxide Activity and give an artificially high or inflated number when compared to the more stable NPA or UMF® rating.

***Note - Consumers should be careful that they do not confuse TA rating which can include the less effective HPA with the more stable NPA or UMF® activity rating.***

**Non Peroxide Activity (NPA)**

In 1981 Dr Peter Molan (MBE) who is a professor at the University of Waikato in New Zealand was researching the peroxide activity in honeys from around world and he found that when he deliberately destroyed the Hydrogen Peroxide Activity (HPA) in the honey that one honey was still showing strong activity. This activity became known as Non Peroxide Antibacterial Activity (NPA) and Dr Molan went on to research this activity over many years and found that it was very stable in the honey and could withstand both heat and light exposure and still remain highly active and effective.

Further research by Dr Molan and his team revelled that Manuka honey with this NPA activity was very effective against many strains of bacteria including Staphylococcus Aureus and the MRSA super bug. Dr Molans team also found that Manuka honey produced different strengths of NPA so a test was developed to measure the strength of this activity in each batch of honey. The rating for NPA is measured as a one-to-one relationship to the phenol standard e.g. NPA 5 Manuka honey has the same non-peroxide antibacterial activity as a 5% phenol solution. It was also discovered that honey from a similar floral variety in Australia contained NPA and became known as Australian Manuka honey. This honey also carries an NPA rating and antibacterial strength.

***Note – Manuka honey containing Non Peroxide Activity (NPA) is found in both New Zealand and Australia***

**Unique Manuka Factor (UMF®)**

In 1995 a small New Zealand bee industry group met together to discuss and investigate the best way to Trade Mark and protect the unique antibacterial activity (NPA) that Dr Molan had found in some Manuka honeys. In 1998 Dr Molan announced that a new trade mark for the Unique Manuka Factor "UMF®" had been registered for licence holders to use as a quality mark for describing the strength of the NPA activity in New Zealand Manuka honey. Only Manuka Honey from New Zealand that is tested with an Non Peroxide Activity can carry the UMF trade mark and it is based on an equivalent value strength i.e. NPA 10 = UMF® 10. The UMF® mark covers all aspects of the integrity of Manuka honey with the special activities.

***Note - NPA and UMF® are recorded as an equal and equivalent strength in number.***

**Methylglyoxal (MGO)**

Research has shown that one of the components that is attributed to the unique antibacterial activity in Manuka honey is methylglyoxal and this chemical marker is now used as an indicator of the strength of activity in Manuka honey. MGO is measured in ppm and the NPA is measured as a percentage of phenol equivalent. The UMF® Association as establish an official MGO and NPA/UMF® convertor http://www.umf.org.nz/umf-trademark/methylglyoxal-npa-honey-conversion-calculator , typical examples of the correlation between MGO and UMF® are as follows

NPA/UMF® 5+ = MGO 83
NPA/UMF® 10+ = MGO 263
NPA/UMF® 15+ = MGO 514
NPA/UMF® 20+ = MGO 829

***Note – Care should be taken to check the actual correlation between MGO and NPA/UMF® when selecting the strength of your honey the larger number on MGO can be very misleading***

treatment. (A trial of Active Manuka Honey on unresponsive skin ulcers was successfully carried out at Waikato Hospital in New Zealand; the results have been published in the *New Zealand Medical Journal*.)

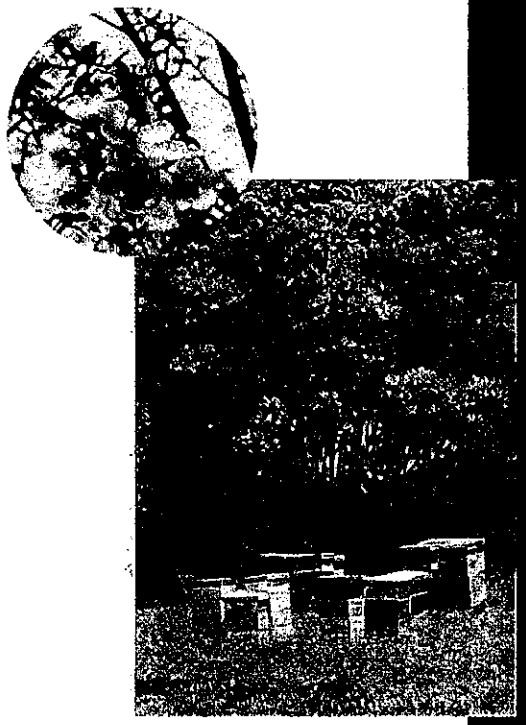
- I have learned the outcome of a trial of UMF Manuka Honey used on a case at a large Brisbane, Australia, hospital where non-UMF honey had previously been used as a wound dressing. The medical professionals there found much more rapid healing with UMF Manuka Honey, in particular on a patient for whom the usual honey was not working.

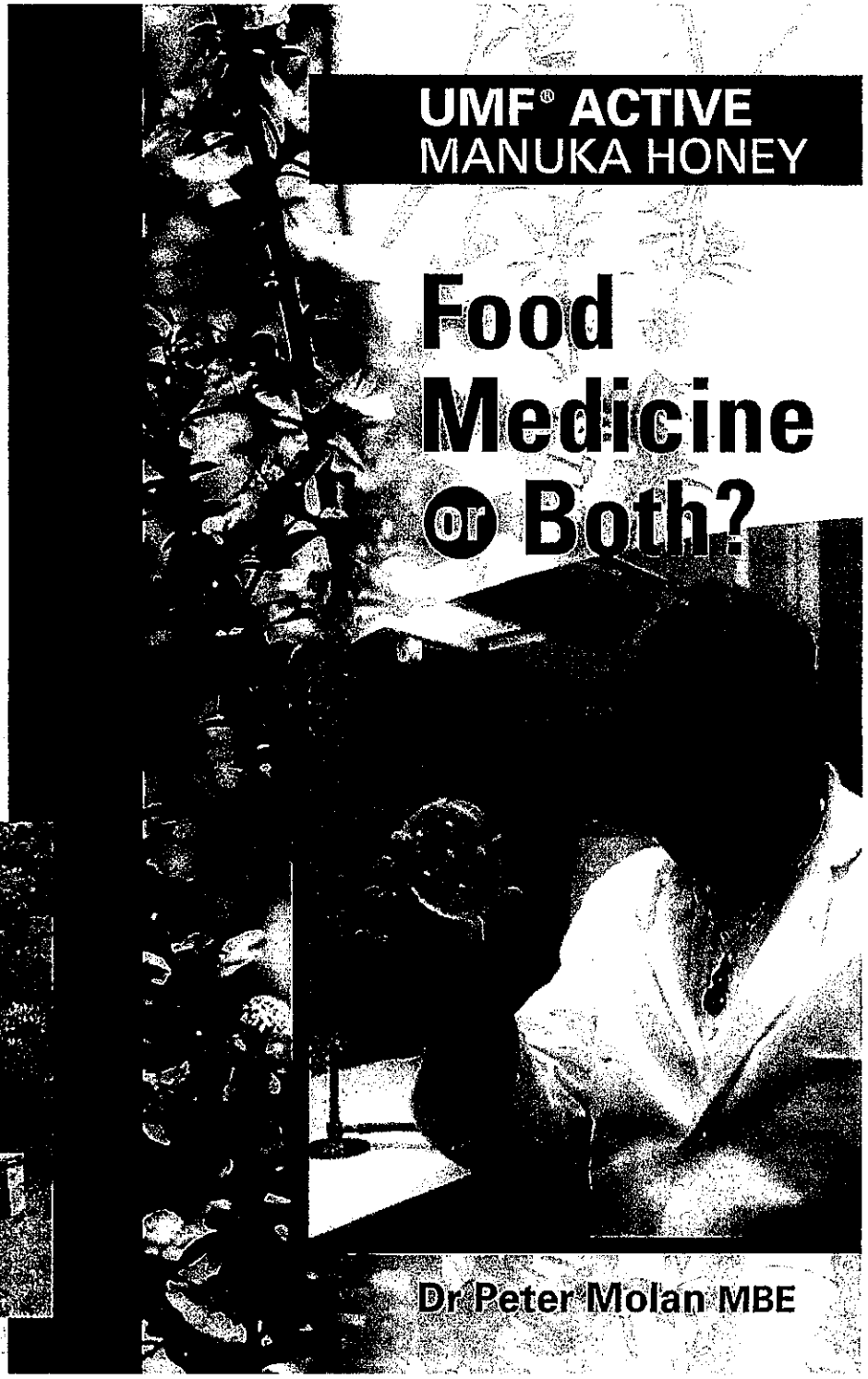
- Although none of the results being obtained can be considered as clinical evidence (a comparative clinical trial will be needed for that to be established), I nevertheless recommend that Active Manuka Honey be used to treat infections. I also recommend that people use a manuka honey with a good level of antibacterial activity. Like all other types of honey, there is a large variation from sample to sample in the level of the antibacterial activity.

- It was for this reason that I devised the testing method and the "UMF number" as a way for honey producers to inform purchasers of the potency of the honey for sale. The UMF number comes from a standard laboratory test for antibacterial activity, with the honey being compared with a standard reference antiseptic (phenol) for potency. So, for example, a honey with a UMF rating of four would be equivalent in antiseptic potency to a four percent solution of phenol (a carbolic disinfectant), and a honey with a UMF rating of 10 would be equivalent in antiseptic potency to a 10 percent solution of phenol.

- The New Zealand honey industry has registered UMF as a trademark to prevent its misuse so that the antibacterial activity of manuka honey cannot be misrepresented.

- I recommend that honey with a rating of UMF 10 or higher be used, which is the level of activity for honey used by medical professionals in New Zealand. Although good results may be obtained with lower levels of activity, there is a chance that the activity may not be high enough to fully clear an infection. Honey with a lower level of activity will not allow as much of the antibacterial elements to diffuse into infected tissues, and this could mean that effective control of infection may not be achieved in deeper tissues.





## Dr Peter Molan MBE

## *Discoverer of the Unique Manuka Factor*

## (UMF®) in Active Manuka Honey

**Dr Molan is the Associate Professor of Biochemistry at the University of Waikato.** Dr Molan has been investigating the antibacterial properties of honey for more than 15 years and has been awarded an MBE for his work. During this time he has made some amazing scientific discoveries and has uncovered some of nature's and the bee's best kept secrets. Since his initial discoveries Dr Molan has gone on to scientifically prove the special health benefits of honey and in particular New Zealand's unique manuka honey. As well as his on-going commitments to further investigative work and his university commitments, Dr Molan now travels the world lecturing to health professionals on the unique health benefits of these special honeys.

"For over 10 years I have scientifically investigated what many local New Zealanders have accepted as common wisdom: our local manuka honey is a superior treatment for wounds and infections. After the results of my work became known through scientific journals, many people have contacted me wanting to know what is so special about Active Manuka Honey. A thorough and scientific response is available in articles listed on my website (http://honey.bio.waikato.ac.nz), but I have compiled the pertinent facts here:

- There are approximately 50 reports in medical journals that honey in general is a very effective dressing for wounds and an effective therapy for eye infections and for diarrhoea.
- It is well established that honey has an antibacterial activity, but this can vary widely in potency; some honeys are no more antibacterial than sugar, whereas others can be diluted more than 100-fold and still completely stop the growth of bacteria. The difference in potency of antibacterial activity found between different honeys is more than 100 fold.
- Manuka honey is gathered exclusively in New Zealand from the manuka bush, *Leptospermum scoparium*, which grows uncultivated throughout our country.
- The honey being sold as "Active Manuka Honey" is the only honey available that is being tested for its antibacterial activity and selected for sale based on its level of activity.
- In the future, other honeys may be tested and selected for their antibacterial activity, but manuka honey contains an additional antibacterial component that is unique to honey produced from *Leptospermum* plants.
- This "Unique Manuka Factor" (UMF) is not affected by the catalase enzyme that is present in the tissues and serum of the body. The catalase enzyme breaks down hydrogen peroxide, the major antibacterial factor in other types of honey. The potency of the antibacterial activity of other types of honey would most probably be reduced when used on an infection because of the action of catalase.

- The hydrogen peroxide in honey is produced by an enzyme in the honey. This enzyme is destroyed by the exposure of honey to heat and light. UMF is very stable, so there is no need to worry about whether the manuka honey you are using has lost its activity in storage.
- Manuka honey has UMF in addition to the usual hydrogen peroxide antibacterial activity, making it doubly potent. There is also evidence that the two antibacterial components together may have a synergistic action, i.e., their combined effect is greater than the sum of its parts.
- UMF honey is more effective than hydrogen peroxide against some types of bacteria. Against *Staphylococcus aureus*, the most common cause of infected wounds, active manuka honey is twice as effective as other honeys. Against *Helicobacter pylori*, the cause of gastric ulcers, manuka honey is more than eight times as effective as other honeys. In research work that we are currently doing, manuka honey is significantly more effective against *Streptococcus pyogenes* which causes sore throats.
- Many medical professionals are choosing to use active manuka honey and are getting very good results with the treatment of wounds which have not been responding to standard

**Submission to OPTIONS FOR DEFINING MONOFLORAL MANUKA HONEY**
**MPI Discussion Paper No: 2013/38**

**Introduction**

Until the 1990's Manuka honey had been an 'unpopular' honey because of its strong flavour. Honey producers had difficulties in selling manuka honey and it was kept as 'bee feed' or sold as a manufacturing honey. The value of the product was low and beekeepers preferred that their bees collected more saleable honey. Research work was conducted on manuka honey to identify any properties of the honey that could be capitalised on to raise the profile of manuka honey and realise a market for manuka honey.

Some Manuka honey was found to have greater 'antibiotic' powers than non manuka honey and a measure of identifying the extent of the 'special' antibiotic powers was developed by the Waikato University. The resulting measure of non peroxide antibacterial activity was called 'Unique Manuka Factor" and trade marked as UMF™. A market has developed where the health benefits of manuka honey are being purchased rather than manuka being purchased as a food.

Some sellers have promoted their manuka for its 'special' qualities and developed measures of that special quality as their own standard, sometimes protected by their own trade mark.

As the value of 'active' manuka honey has risen, so too has the opportunity for increased returns for adulterated or misrepresented product to be offered in the market.

**Product differentiation.**

Manuka honey is being marketed as a health food with special 'health benefits' as well as being offered as 'different flavoured' honey. Therefore a 'standard' for manuka honey need to address two different marketing areas that may not be related. This would necessitate a standard for table (eating) manuka as well as a standard for 'special' or health benefiting manuka honey.

**Standard for health benefits.**

For products that are marketed with health claims it would be assumed that there is some 'evidence' that the marketers would be able to verify their product. Marketers have used UMF ™ , AAH™ , 'Active' , 'BioActive' or used a measurement of MGO (Methylgloxal) content as well as other references to the 'special' health beneficial aspect of the honey.
I submit that it is to the benefit of both consumers and the 'natural antibiotic honey producers/marketers' if this form of honey was subject to its own form of standards or 'controls' that would give confidence that any product claims was able ti be quantified.
I also submit that the consumers of such a 'health food' pay a premium for some 'measurable' content of 'antibiotic' properties in the pot of honey they purchase. It would appear logical to suggest that as the 'active ingredient' is the main consideration for the purchase of the 'health' product then it does not matter the makeup of the honey; for instance if honey is labelled 'active 15+' then as long as there is some way that the producer/marketer can verify the 'active claim' it should not matter that there is 1, 49, 51 or 99% 'manuka content' of the product the purchaser has been guided by the health claim. For

consumption of the product orally it would be assumed that the predominate (manuka) flavour is of secondary concern.

**Standard for Table honey.**

Whilst I accept that pollen count is used as a measure of honey composition total reliance on pollen count as a measure of 'purity' is open to debate. The discussion paper already acknowledges the difficulty in distinguishing the difference between manuka and kanuka pollen. As well the discussion paper acknowledges the difficulties in assessing the relationship between pollen and honey for plant species and the apparent differences particularly between manuka and kanuka. There appear to be differences in 'interpretation' by different laboratories which would question any pollen analysis results. A significant issue with the use of pollen as a sole method of determining 'purity' is that product may have the required pollen type and content but not contain or taste of manuka.

I submit that the term monofloral is confusing the issue where it is expected that the floral source and the predominant 'taste' (and other organoleptic considerations) in manuka/kanuka would be greater than 50% of the product. It is possible for 'blends' of manuka/kanuka and other honey to 'taste' of manuka when the actual manuka/kanuka content is between 10-20% of the total volume. This situation may have contributed to the confusion in the market where the actual manuka/kanuka 'content' may be less than 50% of the volume and consumers claim that they are paying for a product that should comprise greater than 50% of the advertised ingredient.

Taking this argument to the wider food industry there are products such as "Honey Mustard" sauce, "Honey Puffs" and "Honey Nut Museli Bars" where the ingredients list sugar of corn syrup at considerably greater quantities than honey. In some cases the amount of honey in a product compared to the other sweetener is only enough to validate the word 'honey' on the label.

**Honey and Misrepresentation or Fraud.**

Honey is a natural product of a bee colony. The production of honey is time consuming for bees and the beekeepers who farm bees. Because of the extensive resources utilised in the production of honey it tends to be a "high priced sugar product". On the other hand other forms of sugar are produced with 'economies of scale' as agricultural crops (sometimes 'sugar' is a by-product of protein extraction from grains) and are produced cheaply.

It is to be expected that there will be some who see advantage in 'manipulating' other forms of sugar and selling as a higher priced 'honey'.
Attached is a label from a product "Honey Maple Syrup" which does not contain honey or maple syrup. If this product had manuka/ kanuka pollen added could this then meet the criteria to be called Manuka honey, now suppose DHA was added could this be called "Active Manuka Honey"?

**World Honey Markets.**

It is interesting that our NZ MPI can set standards for countries throughout the world for manuka honey. It is acknowledged that Manuka/ Kanuka are native plants and MPI is able to give some official assurance that –the honey produced in NZ is of NZ origin, as well the honey conforms to a 'standard' consistent with manuka/kanuka honey (standard yet to be defined but should contain multiple criteria). For honey

processed outside NZ then I do not believe MPI have any jurisdiction on the market claims in other countries.

**For the completion of this submission I will comment on the questions as presented in the paper:**

Q1. As everybody has a different concept of aromas and flavours it will be difficult to base a 'standard' on a concept ie damp earth in Ashburton is likely to smell different to damp earth in Auckland. Improvement?- very hard. The MAF has had "official Honey Graders" in the past – if there was an official taster and his word was final then it may be possible to have some form of 'imposed' standard based on the 'taste' of an individual.

Q2.I feel the question is not the difference between manuka/kanuka honey and other honey, it appears the issue is the ratio of manuka to the other honey in the pot that is causing concern in the market place.

Q3 As per above text, pollen is only 1 indicator. it does give an advantage for those with equipment and knowledge to manipulate the pollen of honey to obtain the necessary criteria for the standard. It could enhance the ability for fraudulent products BUT at the same time give some "Official Assurance" that a product (including fraudulent manipulated honey) conforms to a 'standard'.

Q4 Consumers could be swayed that the product is conforming to standards when in fact it may be 'manufactured' to conform to the standards. It could create a greater market for fraudulent product but reduce the market for natural products that do not quite meet the standard.

Q5 The easiest way of implementing would be to have 1 lab doing chemical analysis and creating a dictatorship where others cannot question the results (the lab analysis is subject to human identification and counting pollen grains and variations occur between technicians).

Q6 Pollen alone cannot determine honey. Taste is certainly a large consideration in determining manuka as well as the beekeepers ability to know what is flowering and what the bees are collecting.

Q7 this test should only be used to verify claims of MG in honey as a health giving property. IT has little relevance to manuka honey that is promoted solely as a 'different flavour honey'

Q8 those who wish to purchase a 'chemical component' in their honey will be assured that it contains the chemical, however there can be no assurance that MG is a natural occurrence in the honey or it has been tipped into the honey from a jar.

Q9 Give (or sell to) all beekeepers producing manuka honey a never ending supply of DHA and educate on the use of the product. If the product is extensively used then 'Official Assurance" is not a problem – every one complies

Q10 The appropriate level of MGO would be expressed as say 1 bucketful per tank of honey, however as a beekeeper who only produces limited quantities of manuka/kanuka we do not claim any health benefits for the honey our bees produce. I would be upset to be required to add DHA to our honey to conform with any standards imposed.

Q11 Our business does not rely on the manuka market, we do not wish to be placed in a situation where our (small) manuka/kanuka trade is subject to us adding pollen and DHA in order that our product passes

some sort of standard. Our repeat sales are as a result that our customers 'like' the product we offer, at the price we offer.

Q12. The only guarantee for the customer is that they get a product that has been manipulated to meet a standard, and that the product has been manipulated to meet the 'official assurance' required by MPI.

Q13 Make available trapped pollen and DHA to beekeepers and give education on methods to incorporate into product. Ensure that product contains the necessary chemical composition for eligibility for export.

Thank you
-ends-

# MONOFLORAL MANUKA STANDARD – SUBMISSION – OCT 2013/

**MPI PAPER: OPTIONS FOR DEFINING MONOFLORAL MANUKA HONEY – OCTOBER 2013**

**SUBMISSION AND RESPONSE FROM**

HISTORICALLY

The was a late entry into Manuka honey processing as Shareholders (Beekeepers) supplied a predominantly Clover/Pasture derived honey.
The consistency of supply over a large supplier base enabled development of a strong database of product consistency from suppliers despite regional variation. Organoleptic or sensory (Odour, Taste, Colour) and Thixotrophy (texture), honey profiling was the basis for honey grading.
As Manuka demand has increased, honey is purchased from a growing number of new suppliers and regions. The variation in Manuka honey has resulted in a revision of traditional grading methology and inclusion of technology where possible.

From Codex Standard for Honey (CODEX STAN 12-1981). Description of Honey 2.2,
**"The flavour and aroma vary but are derived from the plant of origin".**

This is the base from which the description of a monofloral honey should be set. It is a subjective human assessment of flavour and aroma, Codex describes for distinguishing honey from different plant origins.

(Codex does not allow for the definition of a monofloral honey on the basis of either pollen analysis or some other chemical marker).

**HONEY SAMPLING**

The key to successful batch grading is the validity of the honey sample. Most Manuka Suppliers are situated in prospective Tutin growing areas. Honey extraction and blending by batch is Standard Practice and this allows a composite representative sample to be taken prior to drumming off. At this same time samples for each batch should be set aside for a test sequence relative to the Manuka honey.

**HONEY TESTING**

The batch samples should be set aside and sent to an Accredited laboratory, designated by the Standard Committee for the tests

APC – Product hygiene
DHA – Shelf-life assessment
MGO = UMF – Evidence of Activity rating
HMF - Evidence of excess heating /aging
COLOUR (mm Pfund) – 60-100
THIXOTROPHY – via Viscometer
C4 SUGARS – Evidence of Sugar supplements

The Beekeeper would be invoiced for the tests. This would allow the Beekeeper to assess the market value and enable grades to be traceable to plant origin. This procedure would verify the hygiene rating of the extraction system. The measurement of these parameters is essential for allowing access for Manuka honey to our export markets.

# MONOFLORAL MANUKA STANDARD – SUBMISSION – OCT 2013/

**TEST INDICATORS**

OPTION 1 – POLLEN COUNTS

Manuka and Kanuka honey pollen is indistinguishable. Because of issues with the Pollen counting techniques and interpretation, and the lack of a pollen standard method, this would not stand alone as a validation method for Manuka.

Q3 – Good from view point of Manuka/Kanuka being labelled as the same.

Q4 – Consistency in product outturn, but only if pollen counts were a scientific method of verification.

Q5 – Practically this would not work as pollen not proportionally represented in honey and methodology not scientifically assessed.

Q6 – Definition should not be based on pollen count.

OPTION 2 – METHYGLOXAL

A purists dream this one. A simple Chemical test with LOD's, Standard methods. The numerical game does work. Unfortunately adulteration will probably negate this methods exclusivity.

Q7 – We already do this and find it matches other parameters such as thixotrophy, taste and region.

Q8 – Product and labelling consistency. E.g. 5+ - Manuka Blend, 10 + - Healthy honey, 15 + - Medi honey.

Q9 – Measuring MGO content close to time of sale for label verification.

Q10 – Not enough science around DHA but levels of 100, 300 and 550 mg/Kg MGO are feasible.

OPTION 3 – METHYLGLOXAL / POLLEN COUNT

Much work has been done to match the pollen counts of Manuka Honey batches with the (mg/kg) MGO rating of the honey. Unfortunately the reliability of the pollen counting method does not produce a consistent correlation. However, pollen counts do verify the presence of Manuka/Kanuka and may be useful to validate the plant species present. This would be in the form of a GO/NOGO test rather than using quantitative (%'s) of Manuka Pollen.

Q11 – Good to see Manuka/Kanuka debate categorised into one honey type and major players are already using these techniques alongside organoleptic testing to grade Manuka honey.

Q12 – More product consistency

Q13 – Many producers are already using these techniques, so implementation is not an issue.

# MONOFLORAL MANUKA STANDARD – SUBMISSION – OCT 2013/

DATA AND OTHER IMPACTS

1. We are aware the experimental error for the MGO test allows +- 0.7 mg/Kg UMF + range.
2. Total Activity of Manuka should not be promoted or product labelled as such.
3. DHA levels need to be sufficient (> 1,000 mg/kg) at packing to enable a shelf-life claim of at least one year.
4. Adoption of Option 3, like this season (2013) would encourage Suppliers to store the honey for long periods to maximise revenue and possibly risk deterioration of the honey (HMF, fermentation).
5. UMF Manuka packed and sold into the warmer Asian market tends to increase in levels of UMF over time.
6. We have data sets from in-house experiments supporting some of the evidence based claims.
7. Label claims need to be verified to enable the price point to directly reflect the "value" of the product.
8. The honey Standard should be written as Manuka/Kanuka so we maintain consistency between the North and South Island Supply.
9. Restricting Bulk supply of Manuka would help control compliance within NZ and to allow it's 'unique" tag to apply to NZ territorially.
10. Thixotrophy is a key element in categorising Manuka/Kanuka honey.

**SUBMISSION REGARDING OPTIONS FOR DEFINING MONOFLORAL MANUKA HONEY**

**MPI DISCUSSION PAPER NO: 2013/38**

Q1: Are the BPSC parameters for organoleptic & physiochemical properties of Manuka honey appropriate?

We cannot comment on these apart from saying that I have no proof or documentation regarding the Pfund colour measurement scale for 'Manuka' and therefore do not have any basis by which I can say this measurement truly represents NZ Manuka honey.

Also, from experience in packing Manuka honey for the colour of this honey can vary from year to year and area to area.

Can they be improved? Yes, there needs to be a range of colours to incorporate the natural seasonal and geographical regions of NZ.

Regarding flavour: these are a good description of Manuka

Regarding aroma: these are ok, but each person will have their own take on it and not necessarily use such poetic descriptions. These need some modification, as there also could be geographical differences and slight seasonal differences, plus human perspectives will vary, so great clarity if this is going to be a key player in determining Manuka.

Q2: Are there alternative options for defining Manuka honey (i.e. not based on MG content or pollen count, and what scientific evidence supports this?

DHA – dihydroxyacetone, may need to be used to support other evidences of honey being Manuka

**OPTION 1:**

Defines Manuka honey based on pollen count only

Q3: What are the likely impacts of Option 1 for businesses?

Until now, there has been considerable controversy regarding an acceptable pollen account for Manuka honey. We understand the current percentage is more typical of the South Island variety.

Pollen count is variable based on geographical region and varieties, hence an acceptable range pollen count needs to be determined and used to encompass all regions.

If a reasonable range is not used to encompass all regions in the North and South Islands and varieties and variations of each region, then many honeys could be disqualified that have been proven by laboratory tests to be NPA/MG/UMF honeys.

If this occurred, there would very serious consequences on businesses that sell NPA/MG Manuka honey most of which is produced in the North Island .

This could also have a detrimental impact export sales as this is the honey that the world is demanding.

Q4: What are the likely impacts of Option 1 for consumers?

Considerably less good quality NPA/UMF/DHA Manuka honey available for consumers, especially in the export market

Higher prices

Not necessarily assurance that what they are getting is Manuka Honey

Q5: What practical steps are required to effectively implement option 1?

Pollen counts on their own are not suitable as a marker for Manuka honey.

More reliable pollen count research is required and a range adopted that encompasses all varieties and geographical regions.

Q6: If a definition based on pollen count is adopted:

(i) What is the appropriate percentage of pollen to indicate a monofloral honey?

This needs to be determined by unbiased research

(ii) What, if any additional parameters should be included?

May never be able to be used as a stand-alone standard, hence will most likely need to combine other 'Manuka honey finger prints' that have been investigated, researched and proven

**OPTION 2:**

Defines Manuka honey based on methylglyoxal (MG) Activity only.

Q7: What are the likely impacts of Option 2 for businesses?

Using MG as a marker would advantage the one company that uses MGO as a 'trademark' for its NPA active honey and unfairly disadvantage all other companies that do not. Also using this marker for Manuka honey also disadvantages the UMFHA members commercially because of the 'higher' numbers used to measure MG in honey versus the lower numbers used for UMF/NPA.

Secondly, this option will most likely disqualify Kanuka honey which is produced mostly in the South Island and areas of the North Island. If Kanuka is disqualified, then export and business revenues will drop dramatically as a large percentage of 'standard manuka' which is not necessarily active Manuka honey is possibly kanuka or a mix of kanuka and Manuka honey.

Q8: What are the likely impacts of Option 2 for consumers?

Less Manuka honey available

Higher prices

Q9: What practical steps are required to effectively implement option 2?

We don't agree with using MG on its own to validate if a honey is Manuka or not.

Q10: If a definition based on methylglyoxal activity is adopted:

(iii) What are the appropriate levels of methylglyoxal to include? (provide any available data or scientific evidence to support submission)?

UMFHA recommends (please see MGO/UMF conversion table on page 11 of HKCC test results July 2013 English version): MGO 30 = UMF3, MGO100 = UMF6; MGO250=UMF10; MGO400= UMF13; MGO550 = UMF16

(iv) What, if any additional parameters should be included?

DHA results to validate the MG

TA and NPA results to validate both MG & DHA and vice versa

**OPTION 3:**

Defines Manuka honey based on Pollen count and MG activity

Q11: What are the likely impacts of Option 3 for businesses?

Pollen parameters need to be fairly representative of all Manuka honey produced from both the North and South Islands.

Using MG could possibly and unfairly disadvantage those companies that do not use MGO as a marker for their honey. This could (unfairly) advantage the company that does.

NPA has been used as a marker for Manuka honey for many years, although the industry needs proof that only honey with NPA/MG/DHA is Manuka when compared to pollen counts.

Q12: What are the likely impacts of Option 3 for consumers?

From the MPI document regarding the defining of monofloral Manuka honey, it would appear there could be more assurance that the honey consumers are buying is Manuka.

This would very likely disqualify many honeys on the market already and therefore drive the price up because there would be less Manuka honey in the market place.

Q13: What practical steps are required to effectively implement option 3?

There needs to be more research done on pollen parameters to ensure fairness to all Manuka honeys

Mitigate any possible commercial advantage and disadvantage to any companies by not using MG as a marker

We do not agree that MG is used as the accepted definition for Manuka honey, therefore, adopt after further consultation with industry and further research an acceptable combination of markers that are not associated to any one company.

We recommend DHA and NPA combined should be used as validation tests for Manuka Honey and also some organoleptic qualities including its thixotropic properties and flavour.

Q14: Are claims related to peroxide activity appropriate for Manuka honey? If so, which ones?

No, but Total Activity should be able to be used because it validates the NPA activity which in turn can validate the MG & DHA and vice versa.

-ends-

**Submission on Discussion Paper: Options for defining Monofloral Manuka Honey**

MPI Discussion Paper No: 2013/38

We wish to make the following comments on the MPI discussion paper.

We believe it is essential for the future of the domestic and export Manuka honey markets that a definition for Manuka honey is developed and a regulatory framework is implemented around this definition to ensure consumers around the world have a guarantee the honey they are buying is true to label.

The MPI discussion paper identified three options for defining Manuka honey, we believe Option 3 is the best option but this option needs to be modified to acknowledge the different purposes of each of these methods.

Pollen count should be used to identify the source of the honey along with the Bee Products Standards Committee organoleptic and physiochemical properties and then Methylglyoxal activity (MGO) should be used to identify the activity of the honey.

We recommend this as we have tested a number of South Island honeys using the pollen count method and the MGO method and in some instances results have shown high pollen counts upwards of 90% and low MGO activity. This honey which has all the properties of Manuka honey as identified by the Bee Products Standards Committee should be able to be marketed as Manuka honey but with no additional Antibacterial activity. Our understanding is in particular Manuka Honey from the South Island can have lower antibacterial activity with a high pollen count, therefore having a methodology which basis it purely on antibacterial activity will disadvantage South Island manufacturers. We have had no instances of low pollen count and high MGO activity.

We believe initially a pollen count test should be undertaken to verify source of the honey with 70% pollen source being used as the minimum for a monofloral honey. Once this has been completed the honey can then be tested for antibacterial activity using the MGO method and marketed according to the results. The current values of MGO (MGO 30, 100, 250, 400 and 550+) should be kept as these are already in the market and changing these will lead to more consumer confusion.

Lastly we believe no peroxide claims should be allowed as these are not unique to Manuka honey and research has shown peroxide activity is not stable (in heat, light and the body). Currently products promoting total activity are causing confusion in the market as many believe these products have MGO/NPA activity whereas in fact they often don't.

-ends-

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?
The same discussion points arise now as when the BPSC first asked for industry comment.

Q2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?
The original UMF rating system - although as with pollen analysis, the trials have shown discrepancies in the rating

Q3: What are the likely impacts of Option 1 for businesses?
Business viability - rebranding, re-education of consumers, increased costs ...

Q4: What are the likely impacts of Option 1 for consumers?
UMF 'numbers' seems to be the only measure the consumer is aware of and cares about.

Q6: If a definition based on pollen count is adopted:

what is the appropriate percentage of pollen to indicate a monofloral honey?
51% - manuka is often pollen weak.

what, if any, additional parameters should be included?
Defining South Island Manuka as separate from North Island Manuka

Examples of internationally traded honey that includes multiple genera but is marketed under a common name.
From NZ, CLOVER honey is the obvious answer

**Cost and benefit**
Manuka 'blend' is an undesirable statement.

Manuka that is does not conform to the strict regime is still Manuka. Change the name for what is tested as 'active' Manuka.

Q7: What are the likely impacts of Option 2 for businesses?
Who will 'own' the rights to call the active Manuka - how will the businesses that have spent millions on their brand be affected by this?

Q10: If a definition based on methylglyoxal activity is adopted:
Then we all have to "buy" the MGO brand?

**Analysis**
I disagree with the term used here 'authentic' Manuka honey. The vast majority of Manuka honey sold in NZ is the 'real deal'. It cannot be Manuka blend if it tests as manuka. South Island Manuka is not as 'active' and thus would be relegated to Manuka blend under your definitions. This is not equitable and will seriously jeopardise businesses based on Manuka production in the SI.

Q14: Are claims related to peroxide activity appropriate for manuka honey? If so, which ones?
Data sets exist which quantify the peroxide activity levels of the various honey types in NZ.

I believe that Dr Molan has in fact tabled this information. There is merit to use TOTAL activity as the defining nature of each honey. Bringing peroxide activity and non peroxide activity into the labelling of honey would give the consumer the information they desire.
On the whole, the consumer is still very much using the definition of UMF and that some Manuka has more 'medical value' than other. They are rightly confused by the fractions in the industry and holes in the testing regime have allowed Manuka to be 'blended' for maximum financial return. This is partly why the term 'blend' is undesirable for use with Manuka that does not meet the criteria the MPI is suggesting. The consumer considers 'blending' to be a man-made process and one which is undesirable when referring to what they consider to be a natural product.
A few years ago, we ran a label for our (out of interest and public comment) which read and universally the question was "who blended it and with what" the answer was of course, the bees, but by this time the consumer is put off thinking they are getting a second-rate product. We run our label only as and with no reference to activity.

**My questions are:**

Who/what body will oversee any testing or certification of Manuka honey? Are we just going to have yet another consumer-confusing matter to deal with.

What will happen to the businesses who have invested millions in their brand?

Why cannot the UMF system be revamped to incorporate the MG testing? (because it is a private trademarked entity just like MGO I expect) as this is what the consumer understands.

## Executive Summary

The core issue facing the industry is one of passing off. The majority of Manuka honey producers have made use of non-peroxide activity, a unique characteristic of Manuka honey, to set their product apart from others. Unfortunately there are other honey producers who exploit the opportunity for consumer confusion and make unfair comparisons. This is the issue that has gained recent media attention and prompted the apparent urgency to find a solution once and for all. It is view that solving the issue of passing off is the only immediate action required. More detail on this is covered below. actively involved in the UMFHA Manuka ID project and strongly believes this project will satisfactorily address the requirements for a definition. The Manuka ID project has set out to
identify the chemical characteristics that will ultimately lead to a scientifically robust definition of what may be called wholly or mainly Manuka honey. It is view that any attempt to shortcut that process will not provide a satisfactory definition, as the current methods used by the industry are not sufficiently robust. That said, are in favour of an interim definition, as outlined below.
The MPI discussion paper outlines three potential options. In view none of these are entirely satisfactory for the reasons explained in Part 3.
acknowledges its role as the industry leader, both in supporting research and supporting the good of the industry as a whole. It is in this spirit that we make recommendations for the approach MPI should take.

1. Immediately prevent through regulation, the use of 'active' or peroxide content claims on Manuka honey where expressed as numerical values
2. Acknowledge support for the UMFHA Manuka ID project and wait for this work to provide the science necessary to define what is wholly or mainly Manuka honey
3. Publish an interim guideline defining the minimum acceptable criteria for product labelled as Manuka honey. The current industry consensus appears to be as follows:
a. A non-peroxide activity level of not less than 5; or,
b. A methylglyoxal level of not less than 100 mg/kg; or,
c. A Manuka/kanuka pollen count of not less than 70%.

Introduction

In this submissior provides recommendations to MPI for both the short and longer term

Part 1: Aligning Expectations

*What Seems to be the Problem?*

The enormous value that has been created for Manuka honey, resulting in prices of over 10-times that of other 'table honeys', is almost solely related to the non-peroxide activity (NPA, and often expressed under the registered quality mark UMF®). In New Zealand, NPA is unique to honey from the nectar of the Manuka tree (Leptospermum scoparium).

It is important to reinforce here that only Manuka honey contains non-peroxide activity

To the best of our knowledge all recognised sub-varieties of Manuka produce dihydroxyacetone, the precursor to methylglyoxal and ultimately non-peroxide activity

If there is no trace of non-peroxide activity then it is unlikely to be Manuka honey.

NPA has been the basis of numerous research papers spanning more than 20 years. Consumer demand for UMF® branded honey has been growing steadily throughout this time. Initially based on the reported anti-microbial properties of this novel type of honey, as time has gone on, this mega trend has surpassed any 'fad' type of status, as consumers report other, remarkable health-giving attributes.

The published research conducted to date indicates that the success of Manuka honey in treating wounds is attributable to a 3-way action:

1. Antibacterial
2. Anti-inflammatory
3. Immunostimulatory

Whilst we have a good understanding about the first aspect, the second and third are still the subject of investigation by our research network. The working hypothesis to explain the benefits claimed by consumers, when taken internally, is that of an internal wound context; all the same biochemical aspects are there. One day we will understand how Manuka honey works internally, but in the meantime it is important that we don't allow the category to lose its integrity, or for consumers to be misled into using products that no longer work for them.

For the past 18 years, since it was first conceived, the UMF® rating system has given consumers guidance on the relative potency of Manuka honey. The prices they have been willing to pay for their Manuka honey has reflected this UMF® rating system. For example, UMF® 20+ sells for around 5-times the price of UMF® 5+ or more than 10-times the price of a so-called Manuka honey blend with no UMF® rating (i.e. it has no non-peroxide activity).

High NPA Manuka honey is only produced in New Zealand and is of limited supply (very small quantities can be found in lower South Australia and Tasmania but not in commercially sustainable volumes).

Current best estimates would put the average annual production of bonafide Manuka honey at just 3,000 tonnes per annum.

Given the large price differential for UMF® Manuka honey over other honeys, farm gate prices of Manuka honey have grown significantly and so too has the pressure to lock in reliable supply.
It has also become increasingly common to attempt to fool consumers into believing that:
Any smoky brown honey from New Zealand is Manuka; that Kanuka and Manuka are the same; that non-peroxide (UMF®) activity is the same as total peroxide activity (this is perhaps the most damaging perception).
All honeys have the ability to produce peroxide in the presence of moisture. However, this of itself - or through correlation - provides no known health benefit when consumed by humans.
Only the non-peroxide (UMF®) activity has shown in numerous clinical studies to have beneficial health properties.
If consumers take a honey that has a claim on its label of high total peroxide activity and they are tricked into believing it is the same as non-peroxide (UMF®) activity, then they will not experience any tangible benefit. The value proposition of high UMF® Manuka honey is therefore undermined, and the consumers have been ripped-off.
The incidence of false profiteering, many would say fraud, has grown to such large proportions that significant volumes of fake Manuka honey are now being sold.
The number of brands in the market, New Zealand registered as well as foreign brands, has grown exponentially and consumers are confused. Our trading partners in the UK and in key Asian markets are frustrated and are asking for guidance on what standards New Zealand has set for determining the rating of Manuka honey.
There has been recent media coverage concerning the potential for consumers to be misled by the claims made by marketers of Manuka honey.
Non-peroxide activity (NPA) has been well accepted by the majority of the Manuka honey industry as a means to:
a) explain consumer value, and
b) a way to distinguish this from other honey types.
NPA has been expressed as UMF® for the last 18 years and is often accompanied by a number that denotes the NPA content; e.g. UMF®10+, meaning Manuka honey containing a non-peroxide activity level of at least 10.
The original Manuka honey marketers achieved some success with this approach, which prompted other honey producers to emulate this with substantially similar terms. Unfortunately some marketers are expressing total peroxide activity levels rather than NPA. On a label this may be expressed as, for example, Active 10+. This is a deliberate attempt at passing off as the already well-established equivalent; UMF®10+.

*The Heart of the Issue*

The media are attracted to stories of food fraud and the consumer is understandably disappointed to learn that Active 10+ is not the same as UMF®10+.

The wide acceptance of NPA as the testing standard is reflected in Figure 1. Laboratories in major international markets have already adopted the NPA standard as a means by which to verify label claims. It is inevitable then that marketers trying a different approach will be compared to this standard and found out if they are cheating.

*What do Consumers Expect?*

Manuka honey is regarded as a health food by consumers, and anecdotal reports point particularly to benefits in digestive health. Consumers know and accept this even though the hard science to back up the wealth of this anecdotal evidence is still a work in progress.
Consumers also understand the value scale. They will pay more for UMF®20+ than they will for UMF®10+ because they know the number on the label relates to a characteristic of the honey that is unique to Manuka. As noted earlier, consumers are disappointed when the Active 10+ they have bought does not contain any NPA; the characteristic unique to Manuka. Trade partners are looking for guidance.

In summary, the consumer expectation is that what is represented on the label should relate to NPA/ UMF®.

***Recommendation to MPI***

Exporters of product labelled as Manuka Honey, and carrying an activity claim (of whatever description) must be required to provide verification that the activity content of the product at least matches that claimed on the label. As outlined above, the expectations of regulators and consumers in our major markets is that Active 10+ (or similar) means NPA/UMF®10+ and must therefore be treated as such.

There are currently two accepted methods for determining NPA:

1. The original well diffusion assay, or;
2. Measurement of methylglyoxal content and conversion to NPA.

We recommend that:

Priority is given to ensuring that Manuka honey leaving New Zealand with numerical content claims is verified by the accepted methods above.

MPI provide recognition via OMAR's that these methods are already in use by our major trading partners.

The above action ensures product leaving New Zealand will meet the established expectations of our trading partners and our end consumers.

Part 2. Protecting Our Future

*Where Have We Come From?*

The science supporting the characterisation of Manuka honey has accelerated in recent years as the analytical tools improve, depicted in Figure 2. Researchers from around the world have worked individually and in collaboration to advance our understanding. Manuka honey has international attention, and we must ensure that any position we take stands up to that level of scrutiny.

There has been a trend in the research toward powerful analytical techniques that remove the need for outdated and sometimes subjective assessments. Of note are the number of chemical markers cited in various research papers (Table 1), and the increasing degree of agreement in identifying the key compounds that define and distinguish Manuka honey from other honey types

*Where is the Science Heading?*

We now have the ability to qualitatively identify a Manuka honey with confidence. The next step is to determine quantitative measures that allow us to confidently determine where to draw the line for 'wholly or mainly'.

*The UMFHA Manuka ID Project*

This project has just commenced. A key component is the collection of nectar from target species, as well as substantially pure monofloral honeys. These samples will then be tested and the levels of literally hundreds of compounds will be determined. Using a large sample set from the length of New Zealand will then allow an assessment to be made of compounds. These compounds will be used to identify and quantify the purity of Manuka honey.

The first significant phase of this project is scheduled for completion by March 2014. At that stage we hope to have sufficient data to propose a scientifically robust means to not only identify Manuka honey, but to provide an estimate of purity.

Recommendation to MPI

Provide the support necessary to ensure the Manuka ID project delivers on its intended purpose.

Communicate MPI's support of this industry-led initiative.

Urge patience where pressure is exerted to reach an earlier decision that cannot be supported by the current body of science.

Part 3. Discussion Paper Addressing the Specific Questions Raised by MPI

Summary

does not support Option 1.

Pollen count/percentage in honey is not a reliable means of defining monofloral Manuka honey for the following reasons:

- Pollen content is not directly proportional to nectar source(s)
- Pollen grains from Leptospermum scoparium and Kunzea ericoides are indistinguishable
- There is limited independent testing available
- Pollen may be easily added to honey, or selectively removed, so as to skew results
- Extraction methods

***Consideration of Option 1: Definition Based on Pollen Count***

The use of pollen analysis to identify the floral nectar composition has been challenged by a number of authors. Most importantly in the terms of this document is the review by Professor Peter Molan describing the shortcomings of melissopalynology from a range of factors that vary from the pollen contribution of the flowers to the attractiveness of the pollen to honeybees. It is well recognised that the worker bee population in a hive forages for nectar and pollens independently and will utilise the best available source in an energy-efficient manner. Furthermore it is also acknowledged that the pollen grains of Leptospermum scoparium and Kunzea ericoides are essentially indistinguishable.

have supplied a set of historic pollen results which that company had completed in 2008, 2009, and 2010 on honeys that had also been analysed for nonperoxide (UMF) activity.

***Questions from MPI***

*1. Are the BPSC parameters for organoleptic and physicochemical properties of Manuka honey appropriate? Can they be improved?*

*2. Are there alternative options for defining Manuka honey?*

The current parameters are not well correlated to monofloral Manuka honey and/or are too subjective to be of use. Part 2 of this submission has outlined where we would like to head.

The specific questions under Option 1 of the MPI document are considered below.

*3. What are the likely impacts of Option 1 for businesses?*

It is most likely that up to half of the non-peroxide active Manuka honeys being harvested throughout the North Island would not contain 70% Manuka/kanuka pollen. We estimate up to and perhaps exceeding 800 tonnes of NPA Manuka honey would be excluded. The cost to smaller apiary operations could in many cases lead to business failure.

*4. What are the likely impacts of Option 1 for consumers?*

Consumers will be purchasing a varying blend of Leptospermum scoparium and Kunzea ericoides honeys, as pollen counts do not allow these species to be differentiated. That carries a risk and we would need to be upfront about that in our definition in order to avoid accusations of misleading consumers.

In practice Manuka honey sold with non-peroxide claims, e.g. UMF®10, may be measurably different in composition to 'table grade' Manuka honey; the former being predominantly sourced from Leptospermum scoparium whereas the latter could be predominantly sourced from Kunzea ericoides. As noted earlier in this submission, the analytical tools to qualitatively differentiate honey derived from these species already exists. Marketers of high NPA Manuka honeys will certainly want to differentiate themselves from the perceived lower-grade blends, and the ensuing marketing messages will inevitably create confusion.

We don't believe a definition based on pollen is going to be robust enough to give consumers confidence that they are getting what they paid for.

*5. What practical steps are required to effectively implement Option 1?*

A number of independent certified laboratories offering this service would be required in New Zealand to provide competition and verifiable ring-testing results. There would need to be a proven correlation between pollen content and 'wholly or mainly'.

*6. If a definition based on pollen count is adopted:*

*a. What is the appropriate percentage of pollen to indicate a monofloral honey?*

There is insufficient evidence to establish this. The 70% figure that is commonly used is drawn from Moar's paper in the 1980s and the samples were poorly defined in this publication; certainly non-peroxide activity or any other chemical test of monoflorality was not applied.

*b. What, if any, additional parameters should be included?*

This has been considered earlier in this submission.

***Consideration of Option 2: Definition Based on Methylglyoxal Content***

Summary

supports Option 2 as an interim standard.

No other New Zealand sourced honey contains appreciable levels of MGO, therefore it is an excellent defining characteristic of Manuka honey. However, it does have some limitations.

recommends as an interim step a minimum level of MGO or NPA of 100mg/kg or 5 respectively as part of the overall solution. Chemical fingerprinting will provide a more robust definition, as described in Part 2.

Methylglyoxal (MGO) most probably forms from dihydroxyacetone (DHA) in Leptospermum honey due to the acidic conditions (Adams et al), and the rate of this conversion is influenced by heat. Furthermore, it would appear that the majority of the characteristic antibacterial non-peroxide activity is due to the MGO content of the Manuka honey. It should be noted MGO and DHA are present in the Australian Leptospermum honeys.

Therefore the concentrations of MGO and DHA in a Manuka honey are not constant. In very fresh honey there is a relatively high concentration of DHA and little MGO, yet as the honey ages the concentration of DHA decreases exponentially and MGO concentration increases in a more logarithmic fashion until beginning to decline. The decline is likely to be due to an absence of DHA reservoir in older honeys.

Whilst aging ratio and HMF concentration do appear to be correlated, there is insufficient data at this point to quantify the MGO, DHA, and HMF in a Manuka honey and establish age precisely or identify accelerated aging due to heating.

*Support for NPA / UMF of 5 and above (or MGO 100mg/kg)*

There would appear to be different DHA potentials in the nectar of different varieties of Leptospermum scoparium growing throughout New Zealand. A strongly monofloral fresh Manuka honey harvested from Leptospermum scoparium var. incanum growing on the gumlands of Northland may contain around 4000-5000 mg/kg DHA, but an equally monofloral fresh Manuka honey harvested from Leptospermum scoparium var. myrtifolium present on the hill-country of the Wairarapa is expected to contain around 2000-2500 mg/kg DHA. This pattern can be seen in other regions, and it should be noted that L. scoparium var. myrtifolium or related sub-varieties are often found in the spines of hills that are present throughout New Zealand. Manuka honeys from these regions appear to have very different inherent DHA concentrations. If the DHA concentration is scaled against the relative fluorescence, it is apparent that there are very marked differences (Figure 8). Relative fluorescence uses signal intensity at a distinct excitation/emission wavelength to detect the Manuka honey component in a honey sample. As expected from the earlier comment on variety distribution, there will be some overlap encountered between regions. The northern and southern North Island samples are field collections arranged or completed by Dr Jonathan Stephens, the South Island samples were from the Honey Vault collection.

If the New Zealand Manuka honey crop is going to be treated as a whole the regions whose Manuka honey inherently contains lower concentrations of DHA and MGO must be taken into account.

. These drums were supplied as Manuka honey by the beekeepers.

Clearly a significant proportion of the crop falls within the MGO 80-200 mg/kg bracket, and to dismiss this category would mean that those honeys sourced from regions with inherently less DHA would be inappropriately excluded as these would be predominantly Manuka honeys.
The risk of apiarists adding either chemical DHA or MGO in bee feed or post-harvest adulteration is considered to be an industry threat. This is one of the many reasons why full chemical fingerprinting outlined in Part 2 of this document remains the future solution. Chemical fingerprinting will allow the establishment of ratios of a range of compounds which would make chemical adulteration almost impossible

***Questions from MPI***
The specific questions under Option 2 of the MPI document are considered below.
*7. What are the likely impacts of Option 2 for businesses?*
The current minimum expectation for a honey to be labelled Manuka is that it will have measurable non-peroxide activity on the agar diffusion assay. This means the honey will contain around 100 mg/kg MGO. If this lower limit is was raised to 200 mg/kg MGO this would equate to non-peroxide activity of 8. This would exclude roughly half the predominantly Manuka honey that is being harvested in regions such as the Central North Island, Whanganui and Wairarapa.
*8. What are the likely impacts of Option 2 for consumers?*
Under this Option, Manuka honey should carry a measurable non-peroxide activity and thus will contain at least NPA/UMF® 5 or 100 mg/kg MGO.
*9. What practical steps are required to effectively implement Option 2?*
There are a number of independent commercial laboratories providing methylglyoxal and/or NPA testing. An inter-laboratory comparison programme is available to these laboratories to provide additional assurance. The test is quick, accurate and cheap, and available around the world.
*10. If a definition based on methylglyoxal activity is adopted:*
*What are the appropriate levels of methylglyoxal to include?*
Until a full independent honey collection is analysed, the minimum level of methylglyoxal should be 100 mg/kg. This concentration is detectable on the agar diffusion assay as nonperoxide activity.
*What, if any, additional parameters should be included?*
As described previously, chemical fingerprinting with a range of compounds is most likely to provide a robust method of identifying Manuka honey

***Consideration of Option 3: Definition Based on Methylglyoxal Content and Pollen Count***

Summary
does not support Option 3 as currently written, but has suggested an alternative.
A definition requiring minimum levels of pollen AND methylglyoxal is not a viable option as a substantial portion of genuine Manuka honey would be excluded.
An alternative interim guideline has been suggested as follows:
a. A non-peroxide activity level of not less than 5; or,
b. A methylglyoxal level of not less than 100

Combining two methods that are fraught with difficulties is unlikely to promote a robust and contestable method for defining Manuka honey monoflorality status.

Increasing the minimum requirement to >300 mg/kg MGO would mean the volume of Manuka honey being retailed with non-peroxide activity would be significantly reduced. The comment on Page 10 of the MPI discussion paper that Manuka honeys with >300mg/kg MGO will contain >70%

Manuka/Kanuka pollen is misleading. If >300mg/kg MGO was adopted as a minimum, the data demonstrates around half of all MGO-containing Manuka honey harvested currently with would have less than the suggested 70% Manuka/Kanuka pollen content. This figure is most probably an under-estimate; it does not adequately factor in the large volumes produced in the central & lower North Island.
Overall, it is estimated the imposition of a standard requiring >300mg/kg MGO & >70% Manuka/Kanuka pollen content would reduce overall current volume of non-peroxide activity Manuka honey by at least three-quarters, including a substantial quantity of genuine Manuka honeys.

Recommendation to MPI

Publish an interim guideline, subject to the completion of the Manuka ID project, defining the minimum acceptable criteria for product labelled as Manuka honey. The current industry consensus appears to be as follows:
a. A non-peroxide activity level of not less than 5; or,
b. A methylglyoxal level of not less than 100 mg/kg; or,
c. A pollen count of not less than 70%..

*Questions from MPI*

The specific questions under Option 3 of the MPI document are considered below.
*11. What are the likely impacts of Option 3 for businesses?*
The imposition of this standard would reduce supply if an 'and/and' system is adopted. It is very probable that a significant amount of honey that is predominantly Manuka derived would be excluded.
*12. What are the likely impacts of Option 3 for consumers?*
This standard would eliminate the 'Quadrant 3' honeys referred to above provided adulteration is policed. To control this effectively chemical profiling of honeys, beyond DHA & MGO, would be required.
*13. What practical steps are required to effectively implement Option 3?*

It is suggested that an interim either/or approach be employed. The standard could be that Manuka honey would '... either exceed 70% Manuka/kanuka pollen and/or NPA5 and/or 100 mg/kg methylglyoxal'. Kanuka and Manuka monofloral honeys would be included, kanuka/Manuka blended honeys, and reasonable grades of Manuka blended with other honey types would be included.

***Consideration of Section 4: Making Content Claims***

14. Are claims related to peroxide activity appropriate for Manuka honey? If so, which ones?
Manuka honey will carry non-peroxide activity, so other claims regarding 'peroxide' or 'total' activity appear misleading and may be designed to mislead the consumer. This aspect has been comprehensively addressed in Part 1

Submissions to MPI Discussion Paper No: 2013/38 – Options for Defining Monofloral Manuka Honey.

Q1: With regard to the BPSC parameters for organoleptic and physicochemical properties of Manuka honey:
~ Organoleptic properties –to us Manuka honey has an aroma of sweet, heather aromatic and a sweet, slightly bitter, tangy flavour.
Q2: Alternative options for defining Manuka honey -
In the current debate over Manuka honey purity, a 'Manuka' honey is allowed to contain 50% of another honey type, say clover or rewarewa, based on pollen analysis, and still be labelled 'Manuka'. Since Kanuka pollen cannot be distinguished from Manuka pollen, and as both these honey's have a thixotropic (jelly like) characteristic, there is no need to differentiate as the trees are in the same generic family (Myrtaceae). Honey's produced from both these species have natural healthy antibacterial properties.

The true tonnage of pure Manuka honey currently produced in NZ is relatively small- 20 to 25% of the total so called Manuka honey crop which has been sold in NZ and exported.
75% of the Manuka honey producing areas in NZ has both Manuka and Kanuka trees flowering with an overlap of nectars collected being mixed by the bees in the hive.
Manuka and Kanuka honey should be sold as a generic brand and not as a 'blend'.

Some marketing companies claim if the honey contains methylglyoxal (MG) it is Manuka honey regardless of the taste, colour, pollen analysis or thixotropic properties. To do this is very presumptuous and misrepresents the real product.
It is dangerous to assume that high levels of MG is good for you and safe to eat as MG over 300 becomes a toxin and may destroy your good healthy gut flora if high MG honey is consumed on an empty stomach as is recommended by some marketers.
The practice of some participants in the Manuka honey industry of artificially stimulating the honey and thereby increasing the MG levels is dangerous and morally unsound as this is destroying the natural composition and structure of the honey. The high levels of MG (400 – 18 NPA) currently being promoted by some in the industry is irresponsible and risks destroying the entire Manuka industry for all honey producers.
Currently the Canadian FDA and the USA FDA do not support labelling of honey showing high levels of MG for products sold in those countries.

Q3: Impacts of option 1 for businesses – to define Manuka honey on pollen count alone would mean that a lot of North Island produced Manuka honey would not qualify to be sold as Manuka and therefore may become of lower value.

Q4: Most consumers are unaware of what they are eating now as very little statistical data is supplied by honey packers to the customer, apart from MG strengths. Most people who eat Manuka honey do so because they believe it is a product that is beneficial to their health and it tastes great.

The antibacterial properties of hydrogen peroxide activity in generic Manuka honey has satisfied thousands of clients the world over who have benefited from consuming total activity honey,

TPA, with very low MG. Total peroxide activity in honey should not be overlooked as a beneficial characteristic of Manuka honey.

-ends-

The only thing of note was that hardly any of the members there had tested their honeys for pollen counts and with so little knowledge, we must go with chemical signatures and MG. all agreed that central North Islands honey would not meet the colour standard suggested.

30 9 13 **"Manuka" defintion – submission by**

Dear Sir,

I write briefly because tomorrow I will return to work my hives at risk from swarming.
Seasonally MPI have chosen a very bad time to gain the opinion of working beekeepers.
I object to the fact that despite being a member of the NBA and BIG/Federated Farmers MPI did not send me a copy of the consultation document directly and I only received it by chance.
Under the OI Act I ask to be involved in all future consultation and to now receive copies of all relevant documents

I farm livestock and bees This year I hope to derive over 30% of our gross revenue from a mix of my own self managed hives and third party hives placed on the Station in exchange for a percentage of their gross sales. I have a long term vision of revegetation of parts of the Station to benefit bees as shown by :
1 90 ha planted in a mix of eucalypts to ensure a year round supply (other than Dec/Jan the manuka flowering season) funded by the AGS
2 Shareholder and Director of Manuka Plantations PGP

Attached is an aerial photo of the Station showing that more than 5000 ha is covered in a mix of "manuka" leptospermum ericoides and "kanuka" kunzea. Always my manuka honey at harvest at has shown a purity by pollen count over 90% manuka/kanuka, but low NPA of 5+ at harvest.

I have heard that the present problem over "manuka honey" have resulted from foreign persons blending honies and then publicly declaring the result to be manuka honey. As a lawyer I suspect that any of the suggested definitions proposed by MPI will stop this mischief by way of existing consumer protection statutes in UK or NZ or common law. and sosupport any definition rather than none and accept that regulation will be inevitable

I conclude on the basis of the limited information provided :
1 All definitions should also be based on provenance ie traceable sources to avoid adulteration. Probably the definition should require a statement of origins by percentage
2 Options 1 or 3 would be sufficient to avoid adulteration of all 'manuka honey"
3 Option 2 relates to a further category "active manuka honey" best reserved for honies NPA5+ or better and should not be used unfairly to exclude other manuka honies.

-ends-

**MPI Discussion Paper No: 2013/38 - Options for Defining Monofloral Manuka Honey**

Further to the Ministry for Primary Industries Discussion Paper on the options for Defining Monofloral Manuka Honey, please find attached comments from the . Thank you for giving us the opportunity to feed into this discussion.

welcome the MPI's discussion paper on manuka honey and its aim to ensure consumers have confidence in the authenticity of the honey they are buying. We agree that setting some guidelines around the use of the term Manuka and associated activity declarations to describe honey will be helpful to both consumers and the industry alike, and will also . Clearly, because of the uniqueness of manuka and its short flowering window and limited supply, it can attract a price premium that in turn offers scope for fraud. We entirely agree that what is declared on the label should be accurate and must not mislead.

In the UK, food businesses have a legal responsibility to ensure that the food they sell is safe, is correctly labelled and meets the requirements of relevant food law. This is detailed in general food law – Regulation (EC) No 178/2002 (as amended) and in specific legislation on food labelling and composition standards. It is the responsibility of the industry to ensure that the requirements of this legislation are met for the products they supply to their customers. The UK imports nearly 1800 MTonnes of honey from New Zealand each year, the bulk of which we believe is Manuka (presenting a small proportion of the total honey on the UK market).

. Ensuring consumers have enough information to make informed choices is fundamental to ensuring they are not misled. It is also important that businesses are able to compete on an equal footing.

We welcome the use of the Codex standard as a basis to define Manuka. In the UK we have implemented EU rules on honey which are in many cases are very similar to Codex. Additionally all honey must also include an origin declaration or in the case of blends whether it originates from within the EU or non EU or a mixture of both. European Union legislation allows honey to be supplemented with information relating to its floral or vegetable origin:- if the product comes wholly or mainly from the indicated source and possesses the organoleptic, physico-chemical and microscopic characteristics of the source or regional, territorial or topographical origin; if the product comes entirely from the indicated source; or with specific quality criteria. Under Article 2(b) of the Honey Directive [2011/110/EC], a honey should not be described as a manuka honey unless it comes wholly or mainly from manuka. This does not provide for the deliberate mixing of Kanuka with Manuka which, although difficult to distinguish through pollen analysis, are clearly different floral species. Research using DNA characterisation may in the future help solve this difficulty. We understand that Manuka does have quite specific colour and taste parameters, which might be used to differentiate the two.

In terms of Manuka Activity, what is declared on the label must be consistent with what the consumer purchases at retail. In the UK most Manuka honey is sold for its additional antibacterial qualities, which is primarily due to the active substances such as methylglyoxal. However, the way it is marketed may be confusing to the consumer, unless they are very well informed about the types of activity. Label claims for activity on products on the UK market may refer to Manuka's non-peroxide activity (NPA) alone, or to total activity, or primarily to peroxide activity. We understand that the NPA is unlikely to decay significantly over time while the peroxide activity is relatively unstable. Some companies have started referring to the methylglyoxal (MGO) content instead, as a parameter to correlate with NPA activity. This is all very confusing for consumers, who should be able to make an informed choice between the different types of Manuka, whether they buy it for NPA or not, without being misled. A simplified approach to labelling, backed up with clear information to consumers about how the terms are defined, would go some way to improve the current situation. We also hope that the guidelines would help distinguish between a single-source Manuka honey with NPA activity and a honey with Manuka characteristics produced by blending a Manuka-like honey with a high activity honey. Option 3 would appear to give many of these safeguards.

Information from UK companies that trade with New Zealand in - what they believe to be genuine - Manuka suggests that they work to a specification which includes ensuring compliance with UK and EU legislation and a range of other parameters: chemical attributes (such as HMF, moisture, MGO and pollen); physical attributes (such as moisture, colour, flavour/odour, appearance); microbiological content; NPA; pesticide and antibiotic residues; heavy metals; as well as carrying out checks for adulteration and authenticity. We suggest that some of these attributes may be worth including in any guidance for defining manuka.

We appreciate that this is a difficult and complex area and one where research is still on-going, which may in the future pave the way for further differentiation of Manuka. There are laboratories in the UK that offer testing services to verify Manuka authenticity and confirm antimicrobial activity. However, we would welcome recommendations on suitable assessment criteria, because we are aware that there is concern amongst some importers relating to inconsistent analysis to confirm Manuka activity.

**Annex 1: Options for Defining Monofloral Manuka Honey: Comments of**

Floral Honeys are defined by the presence of the pollen in the honey.

Manuka Honey is currently defined in the UK by the presence of Leptospermum pollen. Being a natural product there is generally a mix of pollens found in the honeys but providing there is a predominance of the Leptospermum pollen.

Leptospermum and Kunzea pollens are indistinguishable from each other as they are from the same family, and this causes problems with the distinction between Manuka and Kanuka honeys.

Pollen is the characterising aspect that enforcers use to verify the origin of other honeys, and this should be the same. If there are difficulties in differentiating between the Leptospermum scoparium (Manuka) and Kunzea ericoides (Kanuka) pollens then this is where research should be concentrated (and not on other aspects)..

Until there is a good method of determining the difference between the pollen types there is a view expressed by a number of people that if the term 'manuka' has traditionally been used to describe both Leptospermum scoparium (Manuka) and Kunzea ericoides (Kanuka) then, in a sense 'manuka', has become a customary name for both.

UK consumers are unlikely to know the scientific distinction in the species as per page 7 of the Discussion document. [*both members of the Myrtaceae family. They are morphologically similar and generally co-occur in New Zealand and can have overlapping flowering periods. Until the 1980s they were both classified in the Leptospermum genus.]

Use of a precence of both pollen types as the defining characteristic would appear to be the simplest way for enforcers to be able to detect fraud.

A thought....Is there a difference between the organoleptic characteristics of Maunka and Kanuka honeys?

Using the presence of the methylgloxal as a defining criteria for Manuka Honey moves it away from the purely plant origin of the honey. There would appear to be too much variation in the methylglyoxal to set a standard.

Methylgloxal also has the supposed antibacterial and antiviral properties. This definition then could lead to an implied confirming of the medical uses of this food, which may fall foul of the EU health Claims regulations and would certainly be used to make these types of claims.

We would not be in favour of using the presence of a certain chemical (that has medicinal properties) as that creates a link (muddies the waters) between a food and a medicinal product.

Providing that Manuka has a preponderance of Leptospermum/Kunzea pollen present then it is what it says it is.

We would like to take this opportunity to encourage the NZ manuka industry to submit claims under the Nutrition and Health Claims Regulations 1924/2006 to the European Food Safety Authority in order to bring legal clarity on the status of activity claims and the like, which almost certainly imply a beneficial nutritional/health property to the food to those that pay substantially more for manuka honey.

To whom it may concern

I realise that this is now outside of the submission deadline however I want to make you aware that I believe that pollen count, taste etc. must be used for manuka quality as MGO is more related to activity not the amount of Manuka in the Honey.

-ends-

**MPI Discussion Paper: Options for Defining Monofloral Manuka Honey.**

I am an expanding small time beekeeper heading towards 100 Beehives for this coming Manuka season. The majority of my hives are located in Manuka/ native bush sites.

While I can not provide any scientific evidence, I would like to submit my opinion on the MPI Discussion Paper: Options for Defining Monofloral Manuka Honey.

I support Option 3 Definition based on methylglyoxal content and pollen count.

I do not support Options 1, or 2 as stand alone options.

Option 3 appears to be the most robust definition. Yet it is the guideline levels or set parameters for pollen count and MG content that are the critical factors.

We need to eliminate the potential for fraud without eliminating significant volumes of the honestly collected natural Manuka honey currently being harvested.

Considering that Manuka and Kanuka generally grow and flower together a percentage of Kanuka content is inevitable and would need to be allowed for in the setting of definition parameters.

-ends-

Q1: Are the BPSC parameters for organoleptic and physicochemical properties of manuka honey appropriate? Can they be improved?

- With Mankuka the accompanying honey types influence the colour grade very significantly and at a Codex *mainly* definition of greater than 50% the colour can be as low as 35mm if the other main honey type is either Rata / Clover which are often 0-9mm We often have results outside of the suggested range.
- The other defining factors are OK.

2: Are there alternative options for defining manuka honey (ie not based on MG content or pollen count), and what scientific evidence supports this?

- No reliable Published test

Q3: What are the likely impacts of Option 1 for businesses?

- Many businesses that use mechanical honey removal technics will be heavily penalised and a substantial amount of mono floral product will be available for the market

Q4: What are the likely impacts of Option 1 for consumers?

- With a much reduced quantity available for the market prices will increase to levels that many people will not be able to afford this product. This will be an artificially induced situation with little consumer advantage

Q5: What practical steps are required to effectively implement Option 1?

- To combine it with a NPA measurement of 5+

Q6: If a definition based on pollen count is adopted:

• what is the appropriate percentage of pollen to indicate a monofloral honey?

- *Wholely or Mainly* at least 50% or more – probable 60% would be reasonable

• what, if any, additional parameters should be included?

That the honey conforms to the organoleptic attributes of Manuka honey

Information Sought:

Examples of internationally traded honey that includes multiple genera but is marketed under a common name.

- Sweet clover and field clover in the USA – this is probable the largest single honey type traded in the world and it is from two separate genera that share similar organoleptic qualities and traded under the same name!

Q7: What are the likely impacts of Option 2 for businesses?

- A huge number of businesses will be unable to trade using a commonly used honey type that has been traded since bees first arrived in NZ.
- In our business we have sold Manuka Honey as a monofloral honey sourced from both the Manuka and Kanuka tree for over 30 years.

Q8: What are the likely impacts of Option 2 for consumers?

- Many of your customers have been loyally purchasing our Manuka honey for over 30 years and would be heavily penalised by the inevitable massive price increase by redefining the honey type

Q9: What practical steps are required to effectively implement Option 2?

- With the ease of adulteration of MGO / DHA I cannot see this being a reliable or definitive option.

Q10: If a definition based on methylglyoxal activity is adopted:

• what are the appropriate levels of methylglyoxal to include? (Please provide any available data or scientific evidence to support your submission).

- Most of the South Island only produces 5+NPA pure Manuka

• what, if any, additional parameters should be included? e.g. DHA

## The answers below relates to a combination of Option 1 & 2

## ie the "**OR**" OPTION not AND

Q11: What are the likely impacts of Option 3 for businesses?

- A lot more product available to trade.
- The "Brown" honey currently being sold as Manuka will be removed from the market and that product is currently responsible for undermining consumer confidence and therefor the value in Manuka.

Q12: What are the likely impacts of Option 3 for consumers?

- Consumers will be assured of the authenticity of the honey type they are consuming.
- The main confusion consumers have is the multiplicity of "**Rating"** systems usedto measure Activity of honey that needs to be addressed separately.

Q13: What practical steps are required to effectively implement Option 3?

- **There needs to be a single rating system for Manuka which is logically NPA as these values are now imprinted into the mind of the consumer as the Bio-Active scale. This should be a value converted from an MG test which is the only reliable test method that can be replicated across multiple labs world-wide. Having UMF, MGO, TA,TAA, AAH etc only serves to confuse the consumer and ultimately undermine the brand value of Manuka.**

There are 3 principle components that add value to Manuka Honey and I list these in order

1. The NPA / *number* printed on the front of the label. This is the single most important factor influencing a purchaser decision on how much they are willing to pay for a perceived health benefit.
2. The name Manuka has become a universally recognised brand that portrays health and wellness and a natural sweetener that is good to you
3. The word New Zealand in association with honey that in the consumers mind evokes the 100% Pure brand values of New Zealand

For the benefit of all producers, marketers and consumers we need to address the issues around consumer confidence and authenticity. I do not believe redefining the commonly known honey type called MANUKA which up until now has been sourced from the Kanuka and Manuka tree.

THE MAIN ISSUE IS THE USE OF A SINGLE RATING SYSTEM THAT IS INDEPENDANTLY CERTIFIED

I would like to speck to my submission if there was an opportunity.

Please find some key themes resulting from a discussion with our technical team on the MPI discussion paper – Options for defining Monofloral Manuka Honey

1. Phenol standard method for testing non- peroxide activity has been successfully employed by New Zealand over the last fifteen plus years.

2. The whole NZ manuka honey export industry was based on analysis made using this method.

3. The method is very reliable, precise, consistent and the calculation of results are straight forward and fit for purpose.

4. Inconsistencies in results are due mainly to improper sampling. Sampling is not part of the method but should be made so that results are more reliable and consistent. In house standards used by Eurofins provide highly consistent results over a period of a year or more. Manuka honeys non- peroxide activity is known to increase slightly with storage.

5. There is a method to measure the total activity (associated with all honeys due to presence of peroxide) and also to measure the specific non- peroxide activity using the phenol standards method. MPI has only mentioned of the peroxide or total activity in their guidelines. It would be useful to discuss and further investigate non- peroxide activity measured by the phenol standards method. This would provide a more balanced view of the factors affection the composition and analysis of honey.

6. MGO measures only one chemical that provides the non- peroxide activity in honey. However, like every other natural remedy, or effect the non- peroxide activity is a synergistic effect of numerous components and chemicals in honey. MGO maybe the most critical of this but is not the only one. Therefore, the relation between MGO and non- peroxide activity is not perfect and straight forward and therefore neither accurate nor precise.

7. If MGO was the only reason for non- peroxide activity, any honey could be fortified with artificially added MGO to get the same effect.

8. The present method for MGO testing cannot differentiate between artificially added MGO and original MGO in Manuka honeys.

9. There is a big risk of fraud to NZ manuka industry if this is the only criteria on the basis of which monofloral manuka honeys are judged.

10. MGO can be increased by heating of honeys. In addition the honeys must also be tested for HMF to determine if they have been heated.

11. Professor Peter Molan developed the method 20 plus years ago and always supported it as the only reliable method. He derived royalty from use of this method. Of late the royalty rights have been bought out by the University of Waikato and Professor Molan is not supporting the usage of the method.

12. Professor Molan is now promoting the MGO method and is being courted by a number of industry players who support this method for obvious reasons.

13. This industry segment is a lucrative and growing segment for NZ. The analytical basis for product released to overseas markets needs to have more scientific rigor.

Regards

I have heard that the present problem over "manuka honey" have resulted from foreign persons blending honies and then publicly declaring the result to be manuka honey. As a lawyer I suspect that any of the suggested definitions proposed by MPI will stop this mischief by way of existing consumer protection statutes in UK or NZ or common law. and sosupport any definition rather than none and accept that regulation will be inevitable

I conclude on the basis of the limited information provided :

1 All definitions should also be based on provenance ie traceable sources to avoid adulteration. Probably the definition should require a statement of origins by percentage

2 Options 1 or 3 would be sufficient to avoid adulteration of all 'manuka honey"

3 Option 2 relates to a further category "active manuka honey" best reserved for honies NPA5+ or better and should not be used unfairly to exclude other manuka honies.

***Options for defining Monofloral Manuka Honey***

***MPI Discussion Paper No: 2013/38***

***September 2013-09-30***

To whom this may concern

We believe because of Manuka Honey's world wide publicity, due to its unique properties and benefits, there is a demand for more representation of genuine Manuka Honey in the market place and education to the consumer. Early in Peter Molan's research he stated that this unique honey should be available to everybody on super market shelves at and affordable price for wellbeing and good health. Based on this statement the company explored all avenues to make Manuka Honey ready available to the everyday honey consumer and have struggled to maintain the integrity of the Manuka Honey, due to the soaring , unrealistic prices and other deceptive, often illegal labelling by a wide range of companies in New Zealand, Australia and internationally.

We appreciate the need for a standardisation of Manuka Honey, but we fear this will create ongoing greater price rises and put the product out of the reach of average, daily consumers.

It is already difficult to maintain an international market as there appears to be no consistency or monitoring of Manuka Honey's constant price rise. We believe this is also contributing to a deceptive and manipulated market around Quality Manuka Honey.

We are not in a position to answer all the technical requirements on this discussion, but from a sales point of view, a consumer and shopper, we believe the current labelling is inadequate and confusing for the consumer, both wholesalers and retailers. We are often asked what do the numbers mean, what do the letters mean, why is Manuka Honey different?

Our suggestion is, think from the consumer's point of view and ask yourselves who is this honey for, what is a fair price and how do we explain it to the consumer and allow them to make educated decisions?

Suggestions:

1) Take control of how Manuka Honey is labelled and enforce regulatory standardised labels, no health claims (it is only a food, and we have made a great effort on our labels to minimise any claims)

2) Unfortunately the internet have informed both wrong and right about Manuka honey, this is a worldwide education tool, we suggest once the standards are set use the internet to educate your consumer.

3) On every label standardise information.
As all Manuka honey can be unique depending where it came from, the season, soil, moisture etc.

A guide line on the label may assist the consumer to understand the letters and the numbers and quality of the Manuka Honey. (Keeps it simple)

Must be on all labels: Refer to standardised Manuka Honey Information www. MPI New Zealand

e.g. This Manuka honey you are purchasing is graded at:

| TA = | Peroxide | Non Peroxide (unique factor) | DHA | Total Activity |
|---|---|---|---|---|
| | 4% | 4 % | 6% | = 14+ |
| | **Moisture** | **Colour** | **Flora Pollen Count** | **Taste** |
| | 25% | Tan to Light cream | 50% | Sweet, slightly bitter and smooth |

| UMF = | Peroxide | Non Peroxide (unique factor) | DHA | Total Activity |
|---|---|---|---|---|
| | 6% | 12% | 6% | = 24+ |
| | **Moisture** | **Colour** | **Flora Pollen Count** | **Taste** |
| | 25% | Dark to Tan | 80% | Tawney, bitter and smooth |

| NPA = | Peroxide | Non Peroxide (unique factor) | DHA | Total Activity |
|---|---|---|---|---|
| | 8% | 6% | 6% | = 20+ |
| | **Moisture** | **Colour** | **Flora Pollen Count** | **Taste** |
| | 25% | Dark to Tan | 69% | Tawney, bitter and smooth |

| MGO= | Peroxide | Non Peroxide (unique factor) | DHA | Total Activity | |
|---|---|---|---|---|---|
| | 6% | 6% | 12% | 6% | = 24+ |
| | **Moisture** | **Colour** | **Flora** | **Pollen Count** | **Taste** |
| | 25% | Dark to Tan | 75% | | slightly bitter and smooth |

-ends-

**Submission to MPI: 'Options for Defining Monofloral Manuka Honey'**

Contextual background to our submission:

We have been producing honey that we have called 'Manuka' for almost 20 years for the wholesale market. The honey we produce has not changed in this time and nor has our region of production. We are located on the South Island, . Our apiary sites have a mix of manuka and kanuka. Aside from taste, colour, aroma and it's thixotropic properties, we have used pollen testing as the means of identifying the main floral source of the nectar. As manuka and kanuka are not presently able to be distinguished from each other pollen testing results have always recorded 'manuka' as the main pollen type of the majority of honey we produce and these pollen results are in keeping with forageable sources in our area. The honey that we produce has not changed over the time we have produced it. It has however gone from being a commercially low value honey to a high value honey. As far as we are aware our honey has no or very little MGO present.

Q1. Parameters are appropriate. Could the thixotropic properties of manuka be included?

Option one:

Q3. Prevents low pollen count honey being sold as monofloral.

Q4. Hopefully consumers can be more fully assured that they are buying honey that is actually predominantly manuka (with manuka continuing to be used as a generic term to cover kanuka as well). The consumer could also benefit from possible beneficial properties of kanuka. I recall that there was a research paper presented at the NBA conference in Auckland a few years ago that found that Kanuka was superior to Manuka in two out of three positive benefits. The public could conceivably lose out on those alternative health properties if kanuka is excluded from the 'manuka' mix. Given that the perception of manuka honey is that it has health benefits then retaining kanuka in the mix could be seen as a positive for the consumer.

Q5. Pollen analysis testing needs to be standardised.

Q6. We consider 70% main pollen type manuka to be manuka and really good manuka has a high overall pollen count.

Option two:

Q7. Our honey and others like ours would no longer be able to be called manuka and our markets would become unclear. This is unreasonable if our honey is in fact principally from a manuka nectar source that has no MGO present.

Q8. Consumers could not be assured that they are getting manuka honey only that they are getting the MGO property. As we understand it MGO is a subset of manuka nectar not the other way round.

Q9. /10 Do not support option two as a definition of monofloral manuka honey.

Option three:

Q11. If the definition of manuka honey is changed to high pollen count plus MGO our honey is likely to no longer be defined as manuka honey as to our knowledge it does not have MGO. This is quite a reasonable result if it is principally Kanuka but it is not a reasonable result if it is principally Manuka. At the moment there is no practical way of confirming this. It has always just been called Manuka.

If for 20 years we have in good faith been calling and trading our honey as manuka then it might appear to the general public that we have been dishonest if suddenly it is no longer able to be called manuka.

If MGO is only a subset of manuka nectar then it is possible that some pure manuka nectar honey would not qualify as manuka honey and this does not seem to be common sense.

Q12. Consumers could have greater confidence that they are getting manuka honey as opposed to a blend or an adulteration and if it was MGO properties that they were after, they could have greater confidence that MGO properties are present.

Q14. Any health claims must be real and substantiated. The consumer should be able to have confidence that if it is a specific property of a honey that they are after, that it is in fact present.

In Conclusion:

We believe that for the time being, the definition of Manuka honey should continue to be based principally on pollen count. As research advances make it possible to practically and cost effectively differentiate kanuka and manuka then we can add another string to the NZ honey bow. Definition of Manuka honey for the standard should be separate from value added and substantiated research claims. That said, we support anything that leads to greater integrity of product and in our industry.

-ends-