Import Risk Analysis: Hatching eggs from chickens (*Gallus gallus*) from the European Union, Canada, the United States of America, and Australia

REVIEW OF SUBMISSIONS

28 January 2009

This page is intentionally blank

MAF Biosecurity New Zealand
Pastoral House
25 The Terrace
PO Box 2526
Wellington 6011
New Zealand

Tel: 64 4 894 0100
Fax: 64 4 894 0731

Policy and Risk
MAF Biosecurity New Zealand

Import Risk Analysis: Hatching eggs from chickens (*Gallus gallus*) from the European Union, Canada, the United States of America, and Australia

REVIEW OF SUBMISSIONS

28 January 2009

Approved for general release

Christine Reed
Manager, Risk Analysis
MAF Biosecurity New Zealand

This page is intentionally blank

Contents

This page is intentionally blank

Executive Summary

MAF Biosecurity New Zealand released the document *Import Risk Analysis: Hatching eggs from chickens (Gallus gallus) from the European Union, Canada, the United States of America, and Australia* for public consultation on 18 July 2008. The closing date for public submissions on this document was 29 August 2008.

This risk analysis considered the biosecurity risks associated with the importation of hatching eggs of chickens (*Gallus gallus*) from the European Union, Canada, the United States of America, and Australia.

From a preliminary hazard list of organisms, those that were considered to be potential hazards in the commodity were subjected to individual risk assessments.

As a result of the individual risk assessments, it was concluded that the risk in the commodity was non-negligible for the following organisms:

- avian influenza viruses
- type 1 avian paramyxoviruses
- *Salmonella* Gallinarum-Pullorum
- *Salmonella* Typhimurium DT104
- *Salmonella* Enteritidis
- *Ornithobacterium rhinotracheale*

These organisms were classified as hazards in the commodity and options for the effective management of these risks were presented.

Two submissions were received, from the Poultry Industry Association of New Zealand and from Federated Farmers of New Zealand. As a result of comments made in these submissions, it is recommended that Section 2.1 of the risk analysis (commodity definition) be amended as follows:

The commodity is hatching eggs of chickens (Gallus gallus) from the European Union, Canada, the United States of America, and Australia. The eggs will be sourced from poultry breeding flocks compliant with the standards described in Chapter 6.3 of the 2008 OIE Terrestrial Animal Health Code (or equivalent) and be clean (free of faeces) when collected, unwashed and have intact shells (uncracked). Following collection, the eggs will be disinfected in accordance with Chapter 6.3 of the OIE Code (or equivalent).

Because Chapter 6.3 of the OIE Code includes requirements for salmonella monitoring and hatching egg hygiene and transport, it is also recommended that the amended commodity definition should be reflected in the risk management options presented in the final risk analysis.

1. Introduction

Risk analyses are carried out by MAF Biosecurity New Zealand under section 22 of the Biosecurity Act 1993, which lays out the requirements in regard to issuing Import Health Standards (IHSs) to effectively manage the risks associated with the importation of risk goods.

Draft risk analyses are written by the Risk Analysis Group and submitted to internal, interdepartmental, and external technical review before the draft risk analysis document is released for public consultation. The Risk Analysis Group of MAF Biosecurity New Zealand then reviews the submissions made by interested parties and produces a review of submissions document. The review of submissions identifies any matters in the draft risk analysis that need amending in the final risk analysis although the decision to implement these changes lies with an internal committee of MAF Biosecurity New Zealand. These documents inform the development of any resulting IHS by the Border Standards Group of MAF Biosecurity New Zealand for issuing under section 22 of the Biosecurity Act by the Director General of MAF on the recommendation of the relevant Chief Technical Officer (CTO).

Section 22(5) of the Biosecurity Act 1993 requires CTOs to have regard to the likelihood that organisms might be in the goods and the effects that these organisms are likely to have in New Zealand. Another requirement under section 22 is New Zealand's international obligations and of particular significance in this regard is the *Agreement on Sanitary & Phytosanitary Measures* (the "SPS Agreement") of the World Trade Organisation.

A key obligation under the SPS Agreement is that sanitary and phytosanitary measures must be based on scientific principles and maintained only while there is sufficient scientific evidence for their application. In practice, this means that unless MAF is using internationally agreed standards, all sanitary measures must be justified by a scientific analysis of the risks posed by the imported commodity. Therefore, risk analyses are by nature scientific documents, and they conform to an internationally recognised process that has been developed to ensure scientific objectivity and consistency.

MAF Biosecurity New Zealand released the document *Import Risk Analysis: Hatching eggs from chickens (Gallus gallus) from the European Union, Canada, the United States of America, and Australia* for public consultation on 18 July 2008. Every step was taken to ensure that the risk analysis provided a reasoned and logical discussion, supported by references to scientific literature. The draft risk analysis was peer reviewed internally and externally and then sent for interdepartmental consultation to the Ministry of Health, the Department of Conservation and the New Zealand Food Safety Authority. Relevant comments were incorporated at each stage of this review process. The closing date for public submissions on the risk analysis was 29 August 2008.

Two submissions were received. Table 1 lists the submitters and the organisations they represent.

This document is MAF Biosecurity New Zealand’s review of the submissions that were made by interested parties following the release of the draft risk analysis for public consultation. Public consultation on risk analyses is primarily on matters of scientific fact

that affect the assessment of risk or the likely efficacy of any risk management options presented. For this reason, the review of submissions will answer issues of science surrounding likelihood[1], not possibility[2], of events occurring. Speculative comments and economic factors other than the effects directly related to a potential hazard are beyond the scope of the risk analysis and these will not be addressed in this review of submissions.

Table 1. Submitters and Organisations Represented

Submitter	Organisation Represented/Location
Michael Brooks	Poultry Industry Association of New Zealand (PIANZ)
Ann Thompson	Federated Farmers of New Zealand

[1] Likelihood**:** The quality or fact of being likely or probable; probability; an instance of this.
[2] Possible: Logically conceivable; that which, whether or not it actually exists, is not excluded from existence by being logically contradictory or against reason.

2. Review of submissions

2.1. MICHAEL BROOKS, POULTRY INDUSTRY ASSOCIATION OF NEW ZEALAND (PIANZ)

2.1.1. Industry notes that the commodity is defined as hatching eggs from specified countries, which are "clean (free of faeces) when collected, unwashed and have intact shells". Industry believes that clean should be defined not only as free of faeces, but also free of other unexpected matter such as egg contents. Eggs must also remain clean after collection.

MAFBNZ response: The commodity definition requires eggs to be disinfected in accordance with appendix 3.4.1 of the OIE *Terrestrial Animal Health Code* (2005). Appendix 3.4.1 of previous editions of the OIE *Code* now forms Chapter 6.3 of the current (2008) OIE *Code*. Article 6.3.2 of the Code (Recommendations applicable to hatching egg hygiene and transport) states the following:

- The litter in the laying house should be kept dry and in good condition. The nest box litter should be clean and adequate in quantity.
- Eggs should be collected at frequent intervals of not less than twice per day and placed in clean disinfected containers.
- Dirty, broken, cracked, leaking and dented eggs should be collected in a separate container and should not be used for hatching purposes.
- The clean eggs should be sanitised as soon as possible after collection. The methods of sanitisation are described in Article 6.3.7.
- The sanitised eggs should be stored in a clean, dust free room used exclusively for this purpose and kept at a temperature of 13-15°C (55°-60°F) and at a relative humidity of 70-80%.
- The eggs should be transported to the hatchery in new or clean cases which have been fumigated or sanitised with a liquid disinfectant (see Table 1). The cleaning and *disinfection* of *vehicles* must be a regular part of the hatchery routine.

In response to the point raised here and other issues discussed later (including 2.1.3, 2.1.18, 2.1.21, and 2.2.1), it is recommended that that commodity definition in the draft import risk analysis be amended to limit eggs to those derived from poultry breeding flocks compliant with Chapter 6.3 of the current (2008) OIE Code (for reference, Chapter 6.3 of the Code is included here as Appendix 1). It is recommended that Section 2.1 of the risk analysis (commodity definition) be amended as follows:

The commodity is hatching eggs of chickens (Gallus gallus) from the European Union, Canada, the United States of America, and Australia. The eggs will be sourced from poultry breeding flocks compliant with the standards described in Chapter 6.3 of the 2008 OIE Terrestrial Animal Health Code (or equivalent) and be clean (free of faeces) when collected, unwashed and have intact shells (uncracked). Following collection, the eggs will be disinfected in accordance with Chapter 6.3 of the OIE Code (or equivalent).

2.1.2. Industry notes that the commodity definition requires the eggs to be disinfected in accordance with the OIE Terrestrial Animal Health Code and Industry is supportive of this requirement.

MAFBNZ response: Noted.

2.1.3. Industry believes that the commodity definition should include packaging and a minimum requirement for the use of new and clean packaging as there are a number of diseases considered in the IRA which are horizontally but not vertically transmitted and which are therefore the entry assessment for these organisms is considered negligible (e.g. pneumovirus, infectious bronchitis virus).

MAFBNZ response: The recommended amendment to the commodity definition will require eggs to be transported to in new or clean cases which have been fumigated or sanitised with a liquid disinfectant (see 2.1.1 above).

2.1.4. Industry notes that in table 1, *Campylobacter* is listed (on page 6) as being vertically transmitted (i.e. by infection of the egg). Industry believes that this is still a very contentious issue. Industry requests that MAF provide the reference which has resulted in the conclusion given here as industry wish to further review this work and gain better understanding of the potential for vertical transmission of *Campylobacter*.

MAFBNZ response: Section 2.3.1 of the draft import risk analysis explains that Table 1 was populated with reference to *Diseases of Poultry,* 11th Edition, Ed Y.M. Saif. Page 618 of this text states the following:

> Egg transmission of *Campylobacter* from the breeder flock traditionally has been dismissed as a mechanism of entry into flocks. This is in all probability because of the inability to culture *Campylobacter* from hatchery samples or from newly hatched chicks[3, 4]. Several published studies suggest that egg transmission between generations is possible as workers in Holland isolated *Campylobacter* from 4% of the ovaries of laying hens[5]. Chickens raised in a laboratory without exposure to any

[3] Doyle MP (1984) Association of *Campylobacter* with laying hens and eggs. *Appl Environ Microbiol* 47: 533 - 536

[4] Jones FT, Axtell RC, Rives DV, Scheidler SC, Tarver FR, Walker RL, and Wineland MJ (1991) A survey of *Campylobacter jejuni* contamination in modern production and processing systems. *J Food Prot* 54: 259 – 262.

[5] Jacobs-Reitsma WF (1998) Experimental horizontal spread of *Campylobacter* amongst one-day-old broilers. In AJ Lastovica, DG Newell, and EE Lastovica (eds.). *Campylobacter, Helicobacter and related organisms*. First edition. University of Cape Town: Cape Town, South Africa, 377 – 378.

> farm environment became colonised by *Campylobacter jejuni*[6]. Recent investigation using a sensitive detection method (colony DNA hybridisation) indicated the carrier rate of *Campylobacter jejuni* in the caecal contents of newly hatched chicks to be as high as 35%, suggesting that colonisation occurred prior to delivery[7]. Pearson and colleagues observed little diversity between the types of *Campylobacter* isolated in the hatcheries and those isolated in the subsequent broiler chickens, suggesting that *Campylobacter* contamination may occur by vertical transmission[8] (143)…
>
> …The inability to identify vertical transmission in the past may have been due to low sensitivity of detection methods and inadequate sample size. With the advent of molecular techniques, evidence is emerging that supports the transmission of Campylobacter from parent breeder to progeny. Epidemiological studies are necessary to provide a basis to refine intervention strategies to produce poultry products free of contamination.

Although the role of vertical transmission in the epidemiology of *Campylobacter* introduction into poultry flocks remains unresolved, as explained in the footnotes to Table 1, for the purposes of this analysis, infection of eggs was considered to take place if the literature contains references to vertical transmission of the organism or to infection in eggs. Therefore, the above citation supports the cautious position taken in this risk analysis regarding the potential for transmission of *Campylobacter* infection in eggs.

2.1.5. The New Zealand Poultry Industry supports the conclusion that the risk estimate for avian influenza viruses is non-negligible and that these should be considered a hazard in the commodity.

MAFBNZ response: Noted

[6] Lindblom GB, Sjorgren E, and Kaijser B (1986) Natural *Campylobacter* colonisation in chickens raised under different environmental conditions. *J Hyg* 96: 385 – 391.
[7] Chuma T, Yamada T, Yano K, Okomoto K, and Yugi H (1994) A survey of Campylobacter jejuni in broilers from assignment to slaughter using DNA-DNA hybridisation. *J Vet Med Sci* 56: 697 – 700.
[8] Pearson AD, Greenwood MH, Feltham RK, Healing TD, Donaldson J, Jones DM, and Colwell RR (1996) Microbial ecology of *Campylobacter jejuni* in a United Kingdom chicken supply chain: Intermittent common source, vertical transmission, and amplification by flock propagation. *Appl Environ Microbiol* 62: 4614 – 4620.

2.1.6. ...the risk management options presented are not equivalent in terms of risk mitigation. In addition, the costs of implementation of the proposed measures are not equivalent either and industry suggests that providing a list from which one or more options may be chosen may potentially result in the incorrect assumption that all risk management options would achieve the desired outcome and thus the least expensive option to implement may be used.

Industry therefore does not support the suggestion that one or more of the listed options would be sufficient to effectively manage the risk, and suggests that all of the options listed under section 3.1.3 would be required to prevent the entry of avian influenza virus into New Zealand.

MAFBNZ response: At this stage of the IHS development process, the measures required to meet New Zealand's appropriate level of protection are yet to be determined. Comments on the suitability of the options presented for risk management will be considered by the Animal Imports and Exports Section of the Border Standards Directorate of MAFBNZ when drafting an IHS developed from this import risk analysis, which will specify precisely what measures must be followed when importing this commodity.

Any draft IHS developed from this risk analysis will also be released for a six-week period of stakeholder consultation. Stakeholder submissions in relation to a draft IHS will then be reviewed before a final IHS is issued.

2.1.7. Industry notes the requirement under bullet point iv) that "Eggs could be hatched under secure quarantine conditions in New Zealand and a sample of hatchlings tested prior to clearance". Industry suggests, that as there are already detailed standards in place for avian transitional facilities, these should be referred to in the import health standard and bullet point iv) reworded to read "Eggs must be hatched under secure quarantine conditions in New Zealand, in facilities that comply with MAF Standards 154.02.05 for Avian Transitional Facilities and a samples of hatchlings tested prior to clearance.

MAFBNZ response: This will be considered by the Animal Imports and Exports Section of the Border Standards Directorate of MAFBNZ when drafting an IHS developed from this import risk analysis.

2.1.8. As it is unlikely that it would be possible to differentiate between wild and vaccine strains unless DIVA vaccines were used, industry suggests that an additional requirement for risk management, i.e. that eggs should come from parent flocks which have not been vaccinated against AI, should be included.

MAFBNZ response: Under the OIE *Code* (2008), a parent flock vaccinated against avian influenza can be considered free of avian influenza only if vaccination was carried out in accordance with Articles 10.4.27 to 10.4.33 of the OIE *Code*.

2.1.9. Industry believes that the first sentence of this paragraph should read "Pospisil *et al.* (53) and Capua *et al.* (54) reported findings ...".

MAFBNZ response: No, the full sentence reads, "Pospisil *et al* and Capua *et al* findings of lentogenic and virulent Newcastle disease virus respectively, in

eggs and chickens from infected hens support contentions that APMV-1 may be transmitted transovarially".

2.1.10. The fifth sentence of the second paragraph of this section states "Therefore the opportunity to spread in eggs is reduced or eliminated". Industry disagrees with this statement, as although the opportunity for vertical transmission of the virus is eliminated as the eggs will not hatch, industry does not believe that the opportunity for horizontal transmission of the virus is eliminated. Importation of these eggs into New Zealand would pose a risk as if they were incubated and did not hatch, and subsequently were not disposed in a manner which mitigated the risk, it is possible that horizontal transmission may occur. Industry notes that in the Import Risk Analysis for Egg Powders from All Countries which was recently released for public consultation by Biosecurity New Zealand considered that prior to heat treatment the presence of Newcastle disease virus (NDV) and other avian paramyxoviruses was considered to be a hazard prior in hens eggs prior to heat treatment.

MAFBNZ response: The sentence described is a direct quote from Dr. Paul Selleck, an OIE recognised expert in Newcastle Disease, who MAFBNZ contacted to address uncertainties regarding the vertical transmission of APMVs. The exposure assessment (Section 3.2.2.2) acknowledges that there would be potential for horizontal transmission of NDV, "*The potential routes of spread from an infected hatchery could include mechanical spread (primarily by the movement of people and equipment), movement of infected birds from the hatchery (live or dead), and airborne spread*".

2.1.11. The seventh sentence of the same paragraph states "it is possible that non-virulent NDV may contaminate an egg surface but if the egg is well washed or the surface disinfected the chances are greatly reduced". Industry notes that as the commodity is defined as unwashed eggs, the sentence should be reworded "it is possible that non-virulent NDV may contaminate an egg surface, but if the eggs is disinfected the chances are greatly reduced.

MAFBNZ response: Again, the sentence described is a direct quote from the OIE-recognised expert who was contacted by MAFBNZ to address uncertainties regarding the vertical transmission of APMVs. It would therefore be inappropriate for MAFBNZ to amend the sentence as suggested.

2.1.12. The New Zealand poultry industry supports the conclusion that the risk estimate for *Salmonella* Pullorum-Gallinarum is non-negligible and that should therefore be classified as a hazard in the commodity.

MAFBNZ response: Noted

2.1.13. Industry supports the conclusion that *Salmonella* arizonae is classified as a potential hazard in the commodity.

MAFBNZ response: Noted

2.1.14. Industry acknowledges that the *S.* arizonae is not commonly reported in chickens. However, industry notes that a previous import risk analysis for Belovo egg powders made from hens' (*Gallus gallus*) eggs lists *S.* arizonae as a potential hazard in the commodity as it may appear in or on the shell. Similarly, the import risk analysis for chicken meat and chicken meat products states "Live birds or

hatching eggs from endemically infected flocks would be the greatest risk of introducing these diseases into New Zealand. However, it is likely that broilers from endemically infected flocks could be harbouring infection. Raw or inadequately cooked chicken scraps fed to backyard poultry, particularly those with turkeys, could lead to infection becoming established. For this reason it is concluded that sanitary measures are required that ensure imported chicken meat is free from *S.* arizonae".

Industry therefore believes that further consideration should be given to *S.* arizonae in the risk analysis, particularly as the organism is shed in the faeces of carrier species and has been shown to be vertically transmitted in turkeys.

Industry acknowledges that there is likely to be limited impact on the chicken industry in New Zealand, but believes that the introduction of this organism could have a significant impact on turkey health and production and should therefore be considered, as horizontal transmission of the organism to turkey farms may occur. In addition, industry notes that should the presence of *S.* arizonae become established in breeder flocks, for example as a consequence of the importation of the organism with hatching eggs, the presence of the organism may have a significant impact on the export of hatching eggs or day old poultry from New Zealand as many countries require negative testing.

MAFBNZ response: As stated in the draft risk analysis, literature searches failed to identify any reports of *Salmonella arizonae* in chicken eggs. The most recent (12th) edition of *Diseases of Poultry* (2008, Blackwell publishing), lists seven references that support the claim that *S. arizonae* can be transmitted through turkey eggs:

i. Bruner and Peckham (1952)[9] described an outbreak of paracolon infection in turkey poults shortly after hatching, which resulted in 5% mortality in a Pennsylvania turkey flock.
ii. Edwards et al (1943)[10] studied 44 cultures recovered from poults, adult turkeys, canaries, guinea pigs, swine, a rattlesnake, a Gila monster, and a human. The discussion section of this paper describes the transfer of infection between hatcheries by turkey eggs but there is no evidence to support the transfer of *S. arizonae* through the medium of chicken eggs.
iii. Edwards et al (1947)[11] summarised knowledge of the "Arizona group of paracolon bacteria" and provided epidemiological evidence to support the transmission of infection through turkey eggs although no evidence indicating that chicken hatching eggs might transmit infection is provided.
iv. Edwards et al (1956)[12] summarised the findings of 1308 cultures of Arizona group organisms. 87 of these cultures had been recovered from chicken samples, with 43 of these identified by the authors as serotype 10:1,2,5 (See Edwards et al 1959, below). This paper commented that, among the cultures

[9] Bruner DW and Peckham MC (1952) An outbreak of paracolon infection in turkey poults. *Cornell Vet* 42: 22 – 24
[10] Edwards PR, Cherry WB and Bruner DW (1943) Further studies on coliform bacteria serologically related to the genus Salmonella. *J Infect Dis* 73: 229 – 238.
[11] Edwards PR, West MG and Bruner DW (1947) Arizona group of paracolon bacteria. *Ky Agric Exp Stn Bull* 499
[12] Edwards PR, McWhorter AC and Fife MA (1956) The arizona group of Enterobacteriaceae in animals and man. *Bull WHO* 14: 511 – 528.

from animals, strains from turkeys and snakes were predominant and that it had been demonstrated that, in turkeys, the infections were spread through the medium of eggs.

v. Edwards et al (1959)[13] provided a comprehensive review of studies on the Arizona group of Enterobacteriaceae. This review described epidemiological data supporting the spread of infection in turkeys through eggs. Of special relevance to the point raised in this submission is an unreferenced description of Arizona serotype 10:1,2,5 (serotype 40:Z_4, Z_{23} using current nomenclature) being spread from a chicken breeding flock in North Carolina to hatcheries in Indiana. However, a survey of 858 Arizona subgroup cultures submitted to the United States Center of Disease Control from 1967 to 1976[14] only identified 4 cases of this serotype, all from human samples.

vi. Goetz et al (1954)[15] demonstrated transmission of *S. arizonae* in eggs taken from infected turkey breeding flocks. There was no investigation of chicken flocks.

vii. Hinshaw and McNeil (1946)[16] reported the recovery of a *S. arizonae* isolate from 19 outbreaks over a three year period, identical to one of the isolates described by Edwards et al (1943). The authors concluded that this isolate could be transmitted through turkey eggs and spread in a hatchery. However, again, this paper provides no evidence to support the transfer of *S. arizonae* through the medium of chicken eggs.

The above reports therefore support the position in the risk analysis that there is no documented evidence for transmission of *S. arizonae* associated with chicken eggs.

Furthermore, Geissler and Youssef (1979)[17] demonstrated 100% mortality in chicken eggs artificially innoculated with *Arizona hinshawii* serotype 7a, 7b:1,7,8, (currently described as *S. arizonae* serotype 18:Z_4, Z_{32}) and 30-79% mortality in chick eggs dipped in a culture of this organism. Given this clinical consequence, if natural infection of chicken eggs with this organism were possible, it would be reasonable to expect to find several references to such cases in published literature. However, beside an unreferenced description of such a case over 50 years ago, no cases of vertical transmission of *S. arizonae* in chicken eggs has been identified.

Therefore, the release assessment for *S. arizonae* in chicken hatching eggs should be considered negligible. Furthermore, Chapter 6.3 of the OIE *Code* requires poultry breeding flocks to be single species enterprises, and will ensure eggs are only sourced from well-managed flocks.

---

[13] Edwards PR, Fife MA and Ramsay CH (1959) Studies on the arizona group of Enterobacteriaceae. *Bacteriol Rev* 23: 155 – 174.

[14] Weiss SH, Blaser MJ, Paleologo FP, Black RE, McWhorter AC, Asbury MA, Carter GP, Feldman RA, and Brenner DJ (1986) Occurrence and distribution of serotypes of the Arizona subgroup of Salmonella strains in the United States from 1967 to 1976. *Journal of Clinical Microbiology* 23, 1056-1064.

[15] Goetz ME, Quortrup ER and Dunsing JE (1954) Investigations of arizona paracolon infections in poults. *J Am Vet Med Assoc* 124: 120 – 121.

[16] Hinshaw WR and McNeil E (1946) The occurrence of type 10 paracolon in turkeys. *J Bacteriol* 51: 281 – 286.

[17] Geissler H and Youssef YI (1979) The effect of infection with *Arizona hinshawii* on chicken embryos. *Avian Pathology* 8, 157-161.

2.1.15. Industry acknowledges that where importations are into breeding establishments with hatchery systems meeting the PIANZ and EPF codes of practice for *Salmonella* monitoring and control, the presence of the organism is likely to be detected and dealt with early on, thereby limiting the potential spread of the organism. However, the New Zealand Poultry Industry notes that there are no legal requirements for hatcheries or breeding companies to meet the PIANZ or EPF codes of practice and thus it cannot be guaranteed that all producers (e.g. such as new entrants to the market) will meet these requirements in the future.

MAFBNZ response: The risk analysis (Section 3.7.4.2.3) acknowledges that these standards would only limit consequences in those hatcheries that had systems meeting the PIANZ and EPF standards.

2.1.16. Should the presence of DT104 be detected in a commercial grandparent operation and measures such as culling of the flock be required in order to eliminate the organism, the knock on effect could be significant, as it may limit the breeding of the next generation and depending on plans in place, may subsequently have an impact on the potential supply of day old chicks (both broilers and layers) to the market, with a subsequent impact on the availability of chicken meat or eggs in the market place. Similarly, as the costs of eradicating a disease would have to be borne by the affected company it is likely that either the costs of day old chicks produced by the company would increase, or in the worst case scenario, the company would no longer be profitable and both of these outcomes would have a significant effect on the industry and consumers as a whole.

MAFBNZ response: Noted.

2.1.17. Industry supports the conclusion that *Salmonella* DT104 is classified as a potential hazard in the commodity.

MAFBNZ response: Noted

2.1.18. Industry also suggests that the statement "it could be required that eggs do not come in contact with fomites that might be infected". This is a particularly vague statement and it is unclear whether it is intended to address risks associated with packaging or possibly faecal contamination of eggs. Industry therefore requests that additional clarification is included.

MAFBNZ response: The suggested amendment to the commodity definition includes requirements regarding hatching egg hygiene and transport (see 2.1.1 above). It is recommended that the statement referred to above should be removed from the risk management options in the final risk analysis.

2.1.19. Industry supports the conclusion that the cost of eradicating *Salmonella* Enteritidis from breeding establishments would be significant and notes that the impact on the industry of this would be significant.

MAFBNZ response: Noted

2.1.20. Industry agrees that requiring eggs to be imported from Australia in the absence of sanitary measures for *Ornithobacterium rhinotracheale*, would meet the risk management requirements in the absence of applying the other sanitary measure

listed in points i) to iii). Industry does not believe however, that any of the points i) to iii) could be applied in isolation of the others.

MAFBNZ response: Noted. Please see the response to 2.1.6 above.

2.1.21. Industry acknowledges the conclusion that *Mycoplasma iowae* is only likely to be present in eggs from hens (*Gallus gallus*) which are unhoused and which are exposed to other bird species. However, industry does not believe that this is sufficient to remove the requirement for risk management as there is nothing, aside from possible infection with other hazards of concern listed in the IRA, which would preclude eggs from unhoused flocks which are exposed to other bird species from being imported into New Zealand. Similarly, housed birds can also be exposed to considerable populations of wild birds if sheds are not effectively bird proofed. Industry suggests that this should section should be clarified.

... if Biosecurity New Zealand believes that there is a potential risk of the presence of *M. iowae* in hen's eggs, as defined in the commodity definition, which itself does not detail the housing requirements for the hens from which the eggs are collected, then it must be assumed that these could enter New Zealand on the commodity in questions. Exposure and consequence assessments should then be included and it may or may not be determined that these are negligible. Finally, the risk estimation should be provided and if necessary risk management options proposed.

Industry does not dispute the conclusions that risk would negligible if eggs were sourced from well managed breeding flocks which are not in contact with wild birds, but this needs to be stated and if not included in the commodity definition would constitute a risk management measure.

MAFBNZ response: Please see the response to 2.1.1 above. It is recommended that the commodity definition be amended to limit imports to eggs sourced from poultry breeding flocks compliant with Chapter 6.3 of the 2008 OIE *Code*.

2.2. ANN THOMPSON, FEDERATED FARMERS OF NEW ZEALAND

2.2.1. One of the organisms identified as being of risk was *Mycoplasma iowae*. This organism is able to be transferred trans-ovarially and may be present in unhoused, poorly managed chicken flocks. The risk analysis assumes that eggs will only be sourced from well managed flocks, which may not be the case.

Federated Farmers suggests that all eggs must be sourced from well managed flocks that are owned by reputable companies in order to reduce the risk of importing any diseases.

MAFBNZ response: Please see the response to 2.1.1 above. It is recommended that the commodity definition be amended to limit imports to eggs sourced from poultry breeding flocks compliant with Chapter 6.3 of the 2008 OIE *Code*.

3. Copies of submissions

3.1. MICHAEL BROOKS, POULTRY INDUSTRY ASSOCIATION OF NEW ZEALAND (PIANZ)

Import Risk Analysis: Hatching eggs from chickens (*Gallus gallus*) from the European Union, Canada, the United States of America and Australia.

The Poultry Industry Association of New Zealand (PIANZ), contactable at the above address, represents almost all of the poultry breeding and processing companies in New Zealand. Similarly, the Egg Producers Federation of New Zealand (EPF) represents all commercial egg producers in New Zealand. The PIANZ and EPF Veterinary Technical Committee has reviewed the Import Risk Analysis for the importation of hatching eggs from chickens (*Gallus gallus*) from the European Union, Canada, the United States of America and Australia (subsequently referred to as the IRA). The New Zealand Poultry Industry (including PIANZ and the EPF) subsequently notes the following points in this regard.

2. Introduction

2.1 Commodity definition

Industry notes that the commodity is defined as hatching eggs from specified countries, which are "clean (free of faeces) when collected, unwashed and have intact shells". Industry believes that clean should be defined not only as free of faeces, but also free of other unexpected matter such as egg contents. Eggs must also remain clean after collection.

Industry notes that the commodity definition requires the eggs to be disinfected in accordance with the OIE Terrestrial Animal Health Code and Industry is supportive of this requirement.

However, Industry notes that the packaging associated with hatching eggs could pose a significant risk for the entry of a horizontally transmitted disease organism into New Zealand. Industry notes that sections 3.1.3, 3.2.3 and 3.7.2.3 dealing with Avian Influenza, Avian Paramyxovirus 1 (APMV-1) and *Salmonella* Gallinarum-Pullorum specifically deal with the issue of packaging by requiring the use of new packaging material as a risk management measure. Industry believes that the commodity definition should include packaging and a minimum requirement for the use of new and clean packaging as there are a number of diseases considered in the IRA which are horizontally but not vertically transmitted and which are therefore the entry assessment for these organisms is considered negligible (e.g. pneumovirus, infectious bronchitis virus).

2.3.1. Preliminary hazard list

Industry notes that in table 1, *Campylobacter* is listed (on page 6) as being vertically transmitted (i.e. by infection of the egg). Industry believes that this is still a very contentious issue. Industry requests that MAF provide the reference which has resulted in

the conclusion given here as industry wish to further review this work and gain better understanding of the potential for vertical transmission of *Campylobacter*.

3. Organism risk analysis

3.1.2.4 Risk estimation

The New Zealand Poultry Industry supports the conclusion that the risk estimate for avian influenza viruses is non-negligible and that these should be considered a hazard in the commodity.

3.1.3 Risk management

The first sentence in this section suggests that one or more of the risk management options presented could be considered in order to effectively manage the risk of avian influenza viruses entering New Zealand. However, industry notes that the risk management options presented are not equivalent in terms of risk mitigation.

For example, if point i) were implemented as the single control measure, this would ensure that eggs are clean and have been fumigated and sanitised. However, these measures would have little, if any, impact on the potential risk of avian influenza introduction into New Zealand. Similarly, if the eggs were to be colleted from birds in an AI free country, or in particular a zone or compartment where the prevalence of avian influenza in the surrounding environment is likely to be high, breeders birds would need to have only been tested a maximum of 21 days prior to the eggs being collected. However, under section 3.1.2.1 it is noted that Brugh cited by Swayne and Beck, identified avian influenza virus in 85 to 100 percent of eggs laid on days 3 and 4 following infection. Thus although industry acknowledges that practically it would be impossible to test breeder birds every three to four days, there is always the possibility that the breeder birds become infected with the avian influenza virus during the period from testing to collection of eggs.

As noted above, the risk management options presented are not equivalent in terms of risk mitigation. In addition, the costs of implementation of the proposed measures are not equivalent either and industry suggests that providing a list from which one or more options may be chosen may potentially result in the incorrect assumption that all risk management options would achieve the desired outcome and thus the least expensive option to implement may be used.

Industry therefore does not support the suggestion that one or more of the listed options would be sufficient to effectively manage the risk, and suggests that all of the options listed under section 3.1.3 would be required to prevent the entry of avian influenza virus into New Zealand.

Industry notes the requirement under bullet point iv) that “Eggs could be hatched under secure quarantine conditions in New Zealand and a sample of hatchlings tested prior to clearance”. Industry suggests, that as there are already detailed standards in place for avian transitional facilities, these should be referred to in the import health standard and bullet point iv) reworded to read “Eggs must be hatched under secure quarantine conditions in New Zealand, in facilities that comply with MAF Standards 154.02.05 for Avian Transitional Facilities and a samples of hatchlings tested prior to clearance.

As it is unlikely that it would be possible to differentiate between wild and vaccine strains unless DIVA vaccines were used, industry suggests that an additional requirement for risk management, i.e. that eggs should come from parent flocks which have not been vaccinated against AI, should be included.

3.2.2 Risk assessment

Industry believes that the first sentence of this paragraph should read "Pospisil *et al.* (53) and Capua *et al.* (54) reported findings ...".

The fifth sentence of the second paragraph of this section states "Therefore the opportunity to spread in eggs is reduced or eliminated". Industry disagrees with this statement, as although the opportunity for vertical transmission of the virus is eliminated as the eggs will not hatch, industry does not believe that the opportunity for horizontal transmission of the virus is eliminated. Importation of these eggs into New Zealand would pose a risk as if they were incubated and did not hatch, and subsequently were not disposed in a manner which mitigated the risk, it is possible that horizontal transmission may occur. Industry notes that in the Import Risk Analysis for Egg Powders from All Countries which was recently released for public consultation by Biosecurity New Zealand considered that prior to heat treatment the presence
Newcastle disease virus (NDV) and other avian paramyxoviruses was considered to be a hazard prior in hens eggs prior to heat treatment.

The seventh sentence of the same paragraph states "it is possible that non-virulent NDV may contaminate an egg surface but if the egg is well washed or the surface disinfected the chances are greatly reduced". Industry notes that as the commodity is defined as unwashed eggs, the sentence should be reworded "it is possible that non-virulent NDV may contaminate an egg surface, but if the eggs is disinfected the chances are greatly reduced.

3.2.3 Risk management

As highlighted under point 3.1.3 above, industry is concerned that the first sentence in this section suggests that one or more of the risk management options presented could be considered in order to effectively manage the risk of APMV-1 entering New Zealand, despite the fact that not all of the risk management options presented are not equivalent in terms of risk mitigation.

Industry requests that this section is clarified to prevent any misunderstanding.

3.7.2.2.4 Risk estimation

The New Zealand poultry industry supports the conclusion that the risk estimate for *Salmonella* Pullorum-Gallinarum is non-negligible and that should therefore be classified as a hazard in the commodity.

3.7.2.3 Risk management

Industry reiterates comments made under sections 3.1.3 and 3.2.3 and requests additional clarification for this section. Industry notes in particular that measures such as requiring testing of birds in lay to ensure freedom from *Salmonella* Pullorum-Gallinarum would have considerably more effect as a risk management measure than shipping eggs in clean and unused packaging.

Industry also believes that, at a minimum, eggs should be shipped in clean and unused packaging and that this should not be open for discussion as suggested by the use of the work could in point iii).

3.7.3.1.5 Hazard identification conclusion

Industry supports the conclusion that *Salmonella* arizonae is classified as a potential hazard in the commodity.

3.7.3.2.1 Entry assessment

Industry acknowledges that the *S.* arizonae is not commonly reported in chickens. However, industry notes that a previous import risk analysis for Belovo egg powders made from hens' (*Gallus gallus*) eggs lists *S.* arizonae as a potential hazard in the commodity as it may appear in or on the shell. Similarly, the import risk analysis for chicken meat and chicken meat products states "Live birds or hatching eggs from endemically infected flocks would be the greatest risk of introducing these diseases into New Zealand. However, it is likely that broilers from endemically infected flocks could be harbouring infection. Raw or inadequately cooked chicken scraps fed to backyard poultry, particularly those with turkeys, could lead to infection becoming established. For this reason it is concluded that sanitary measures are required that ensure imported chicken meat is free from *S.* arizonae".

Industry therefore believes that further consideration should be given to *S.* arizonae in the risk analysis, particularly as the organism is shed in the faeces of carrier species and has been shown to be vertically transmitted in turkeys.

Industry acknowledges that there is likely to be limited impact on the chicken industry in New Zealand, but believes that the introduction of this organism could have a significant impact on turkey health and production and should therefore be considered, as horizontal transmission of the organism to turkey farms may occur. In addition, industry notes that should the presence of *S.* arizonae become established in breeder flocks, for example as a consequence of the importation of the organism with hatching eggs, the presence of the organism may have a significant impact on the export of hatching eggs or day old poultry from New Zealand as many countries require negative testing.

3.7.4.2.3 Consequence assessment

Industry does not agree with the conclusion that "costs arising from detection of DT104 in a grandparent or parent breeding hatchery would be considerable but limited to the company" given in this section on two accounts:

• Industry acknowledges that where importations are into breeding establishments with hatchery systems meeting the PIANZ and EPF codes of practice for *Salmonella* monitoring and control, the presence of the organism is likely to be detected and dealt with early on,

thereby limiting the potential spread of the organism. However, the New Zealand Poultry Industry notes that there are no legal requirements for hatcheries or breeding companies to meet the PIANZ or EPF codes of practice and thus it cannot be guaranteed that all producers (e.g. such as new entrants to the market) will meet these requirements in the future.

• Should the presence of DT104 be detected in a commercial grandparent operation and measures such as culling of the flock be required in order to eliminate the organism, the knock on effect could be significant, as it may limit the breeding of the next generation and depending on plans in place, may subsequently have an impact on the potential supply of day old chicks (both broilers and layers) to the market, with a subsequent impact on the availability of chicken meat or eggs in the market place. Similarly, as the costs of eradicating a disease would have to be borne by the affected company it is likely that either the costs of day old chicks produced by the company would increase, or in the worst case scenario, the company would no longer be profitable and both of these outcomes would have a significant effect on the industry and consumers as a whole.

3.7.4.2.4 Risk estimation

Industry supports the conclusion that *Salmonella* DT104 is classified as a potential hazard in the commodity.

3.7.4.3 Risk management

Industry reiterates comments made under sections 3.1.3, 3.2.3 and 3.7.2.3 with regards to equivalence of risk management measures and requests additional clarification for this section.

Industry also suggests that the statement “it could be required that eggs do not come in contact with fomites that might be infected”. This is a particularly vague statement and it is unclear whether it is intended to address risks associated with packaging or possibly faecal contamination of eggs. Industry therefore requests that additional clarification is included.

3.7.5.2.3 Consequence assessment

Industry reiterates comments made under point 3.7.4.2.3 above with regards to the legal applicability of PIANZ and EPF codes of practice for the control of *Salmonella* in the New Zealand Poultry Industry.

Industry supports the conclusion that the cost of eradicating *Salmonella* Enteritidis from breeding establishments would be significant and notes that the impact on the industry of this would be significant.

3.7.5.2.4 Risk management

Industry reiterates comments made under sections 3.1.3, 3.2.3, 3.7.2.3 and 3.7.4.3 with regards to equivalence of risk management measures and requests additional clarification for this section. Similarly, Industry reiterates its comments about o point iii) of section 3.7.4.3 in regards to point iii) of this section.

3.8.2.4 Risk estimation

Industry supports the conclusions of this section.

3.8.3 Risk management

As stated previously (for sections 3.1.3, 3.2.3, 3.7.2.3, 3.7.4.3 and 3.7.5.2.4) industry does not believe that the risk management options listed are all equivalent and would all achieve the same risk management outcome. In this case, Industry agrees that requiring eggs to be imported from Australia in the absence of sanitary measures for *Ornithobacterium rhinotracheale*, would meet the risk management requirements in the absence of applying the other sanitary measure listed in points i) to iii). Industry does not believe however, that any of the points i) to iii) could be applied in isolation of the others.

3.9.2.1 Entry assessment

Industry acknowledges the conclusion that *Mycoplasma iowae* is only likely to be present in eggs from hens (*Gallus gallus*) which are unhoused and which are exposed to other bird species. However, industry does not believe that this is sufficient to remove the requirement for risk management as there is nothing, aside from possible infection with other hazards of concern listed in the IRA, which would preclude eggs from unhoused flocks which are exposed to other bird species from being imported into New Zealand. Similarly, housed birds can also be exposed to considerable populations of wild birds if sheds are not effectively bird proofed. Industry suggests that this should section should be clarified.

3.9.2.2 Risk estimation

Industry believes that the risk estimation should be reviewed in light of the comments made on the entry assessment under point 3.9.2.1 above. In particular, if Biosecurity New Zealand believes that there is a potential risk of the presence of *M. iowae* in hen's eggs, as defined in the commodity definition, which itself does not detail the housing requirements for the hens from which the eggs are collected, then it must be assumed that these could enter New Zealand on the commodity in questions. Exposure and consequence assessments should then be included and it may or may not be determined that these are negligible. Finally, the risk estimation should be provided and if necessary risk management options proposed.

Industry does not dispute the conclusions that risk would negligible if eggs were sourced from well managed breeding flocks which are not in contact with wild birds, but this needs to be stated and if not included in the commodity definition would constitute a risk management measure.

In general the industry is supportive of the process which has been followed in this case and whereby a comprehensive analysis of the risks to New Zealand from a proposed importation is evaluated prior to the importation of risk organism. Industry believes that initiating risk management measures which effectively prevent the entry of unwanted organisms into New Zealand, or which at least ensure that any risk products are quarantined to contain the potential entry of unwanted organisms, is a more appropriate

approach than attempting to limit the spread of an organism once this has been detected within New Zealand.

The New Zealand Poultry and Feed Industries appreciate the opportunity to comment on the draft IRA. We look forward to continued work with Biosecurity New Zealand on this topic to ensure the establishment of a robust and appropriate IHS.

Please do not hesitate to contact our offices should you have any queries.

3.2. ANN THOMPSON, FEDERATED FARMERS OF NEW ZEALAND

SUBMISSION TO THE MINISTRY OF AGRICULTURE AND FORESTRY ON THE IMPORT RISK ANALYSIS: HATCHING EGGS FROM CHICKENS (*GALLUS GALLUS*) FROM THE EUROPEAN UNION, CANADA, THE UNITED STATES OF AMERICA AND AUSTRALIA

1. INTRODUCTION

Federated Farmers welcomes the opportunity to submit on the import risk analysis: Hatching eggs from chickens (*Gallus gallus*) from the European Union, Canada, the United States of America, and Australia.

Federated Farmers of New Zealand is a primary sector organisation that represents farming and other rural businesses. Federated Farmers has a long and proud history of representing the interests of New Zealand's farmers.

The Federation aims to add value to its members' farming business. Our key strategic outcomes include the need for New Zealand to provide an economic and social environment within which our members:

- May operate their business in a fair and flexible commercial environment;
- Families and their staff have access to services essential to the needs of the rural community; and
- Adopt responsible management and environmental practices.

2. RECOMMENDATIONS

In the absence of any specialised knowledge of the poultry industry, Federated Farmers accepts the outcomes of the MAF analysis.

Federated Farmers recommends that the eggs be sourced from well managed flocks owned by reputable companies to decrease the likelihood of importing diseases such as *Mycoplasma iowae*.

3. FEDERATED FARMERS' COMMENT

This risk analysis examines the biosecurity risks surrounding importation of hatching eggs of *Gallus gallus*, a species of hen. Import Health Standards (IHS) exist for the importation of hatching eggs from some countries but not others, and a request to import hatching eggs from a country that has no IHS has prompted MAF to undertake the risk analysis to bring the whole IHS for hatching eggs within current policy,

The product coming into the country would be hatching eggs whose entire (non-cracked) shells would be disinfected in accordance to OIE regulations. There is the possibility that eggs may hatch en-route to New Zealand, but this was not mentioned and is not of importance. Organisms considered as being a risk are those pertinent to the poultry industry and some which may also infect other creatures e.g. man, cattle.

Some of the organisms considered were able to be carried within the egg (i.e. were infected trans-ovarially) and so posed a risk. A variety of these organisms did pose a risk to New Zealand, according to the analysis, and risk management options were given.

Of particular note to New Zealand's agricultural scene are salmonella species, in particular *S. abortusovis* and *S. dublin*, which infect sheep and cattle respectively but not exclusively. The risk management for salmonella species concluded that eggs could come from breeding establishments which are recognised as being free from infections caused by salmonella species and compliant with the OIE code.

One of the organisms identified as being of risk was *Mycoplasma iowae*. This organism is able to be transferred trans-ovarially and may be present in unhoused, poorly managed chicken flocks. The risk analysis assumes that eggs will only be sourced from well managed flocks, which may not be the case.

Federated Farmers suggests that all eggs must be sourced from well managed flocks that are ownder by reputable companies in order to reduce the risk of importing any diseases.

4. CONCLUSION

Federated Farmers in the absence of its own specialised knowledge of the poultry industry supports the analysis put forwards by MAF. It does, however, ask that all hatching eggs be sourced form well-managed flocks that are owned by reputable companies.

4. Appendix 1 – Chapter 6.3 Of 2008 OIE Code

CHAPTER 6.3.

HYGIENE AND DISEASE SECURITY PROCEDURES IN POULTRY BREEDING FLOCKS AND HATCHERIES

Article 6.3.1.

Recommendations applicable to breeding establishments

1. The choice of a suitably isolated geographical location, taking into account the direction of the prevailing winds, facilitates hygiene and disease control. The *establishment* should be surrounded by a security fence and a gateway to control traffic and access to the site. A sign indicating restricted entry should be posted at the entrance.

2. Poultry breeding *establishments* should be single purpose - single species enterprises, and ideally an all in all out single age group principle should be adopted whenever possible.

3. Where several *flocks* are maintained on one *establishment*, the individual *flocks* should be managed as separate entities.

4. Buildings housing poultry or those used to store feed or eggs should be free of vermin and not accessible to wild birds.

5. Poultry houses should be constructed so that all surfaces inside the buildings are of an impervious smooth material so that cleaning and *disinfection* can be carried out adequately.

6. The area immediately surrounding the poultry houses should be free from vegetation and debris and ideally this should consist of an area of concrete or other similar material. An exception to this would be trees for heat control, with the exception of fruit trees which could be attractive to birds.

7. Domestic animals should not be permitted access to poultry houses.

8. Appropriate disease security precautions, which could include showering and changing facilities, should be adopted for all visitors to the *establishment* and for all staff entering individual poultry houses.

9. When a poultry house or *establishment* is depopulated, all manure should be removed from the houses and effective cleaning and *disinfection* procedures applied. Bacteriological monitoring of the efficacy of *disinfection* procedures is recommended. When necessary, rodent and insect control procedures should also be carried out.

10. Repopulation of poultry houses or *establishments* should only be made from poultry *flocks* of known high health status and which are regularly monitored for salmonella and other poultry pathogens.

11. All feed used in poultry houses and *establishments* should be monitored for salmonella prior to use. The use of pelletised feeds or feeds subjected to other salmonella decontamination procedures is recommended. Feed should be stored in clean closed containers.

12. The water supply to poultry houses should be of a satisfactory potable status.

13. Sick and dead birds should be removed from poultry houses as soon as possible and effective and safe disposal procedures implemented.

14. Full records relating to mortality, disease diagnosis, treatments and vaccinations should be maintained on an individual flock basis within the *establishment*. Such records should be readily available for inspection.

Article 6.3.2.

Recommendations applicable to hatching egg hygiene and transport

1. The litter in the laying house should be kept dry and in good condition. The nest box litter should be clean and adequate in quantity.

2. Eggs should be collected at frequent intervals of not less than twice per day and placed in clean disinfected containers.

3. Dirty, broken, cracked, leaking and dented eggs should be collected in a separate container and should not be used for hatching purposes.

4. The clean eggs should be sanitised as soon as possible after collection. The methods of sanitisation are described in Article 6.3.7.

5. The sanitised eggs should be stored in a clean, dust free room used exclusively for this purpose and kept at a temperature of 13-15°C (55°-60°F) and at a relative humidity of 70-80%.

6. The eggs should be transported to the hatchery in new or clean cases which have been fumigated or sanitised with a liquid disinfectant (see Table 1). The cleaning and *disinfection* of *vehicles* must be a regular part of the hatchery routine.

Article 6.3.3.

Recommendations applicable to hatchery buildings

1. The choice of a suitably isolated geographical location facilitates hygiene and disease control. The building should be located as far as possible from other buildings housing livestock and poultry in particular, and the direction of the prevailing winds should be taken into consideration.

2. The design of the hatchery should be based on suitable work flow and air circulation principles. It should be constructed so that there is a one way flow for the movement of eggs and chicks, and the air flow also follows this same one way direction.

3. The hatchery buildings should include physical separation of all work areas. If possible, separate ventilation should be provided for these work areas, namely, the rooms for:

   a) egg receiving and egg storage;

   b) egg traying;

   c) fumigation;

   d) setting or initial incubation;

   e) hatching;

   f) sorting, sexing and placing chicks in boxes;

   g) material storage, including egg and chick boxes, egg flats, box pads, chemicals and other items;

   h) facilities for washing equipment and disposal of waste;

   i) room for employees to have meals;

   j) office.

4. Openable windows, ventilators and other open areas should be screened against insects and vermin.

Article 6.3.4.

Recommendations applicable to hatchery building hygiene

1. The area adjacent to the hatchery buildings should be surrounded by a security fence and a gateway to control all traffic.
2. Wild birds, domestic and wild animals must be excluded from the hatchery area. When necessary, a specific programme for fly control should be implemented.
3. The hatchery area should be maintained free from all hatchery waste, garbage of all kinds and discarded equipment.
4. Approved disposal methods and adequate drainage must be available.
5. All hatchery equipment, tables and horizontal surfaces in rooms must be promptly and thoroughly vacuumed, cleaned, washed, scrubbed, rinsed with clean water and finally disinfected with an approved disinfectant.

Article 6.3.5.

Requirements applicable to personnel and visitors

1. Clean coveralls or overalls, hats and footwear must be provided for all personnel and visitors entering the *establishment* or the hatchery.
2. A disinfectant foot-bath for footwear is necessary and the disinfectant solution should be changed frequently. Washing the hands in disinfectant solution or with soap and water should be required.
3. Personnel and visitors should have no direct contact with other poultry or poultry products.

Article 6.3.6.

Hygiene measures during the handling of eggs and day-old birds

1. Egg handlers in the hatchery should wash their hands with soap and water and change to clean outer garments before handling *hatching eggs* received from the poultry farm.
2. Chick sexers and chick handlers must wash and disinfect their hands and change into clean protective clothing and boots before commencing work and between different lots of chicks.
3. Day-old chicks or other poultry must be delivered or distributed in new chick boxes; or in used boxes made of suitable material which have been thoroughly cleaned and disinfected or fumigated.
4. The chicks should be delivered directly from the hatchery by personnel wearing clean, disinfected outer clothing. Outer clothing should be changed or disinfected between each delivery.
5. The delivery truck must be cleaned, and disinfected before loading each consignment of chicks.

Article 6.3.7.

Sanitisation of hatching eggs and hatchery equipment

Sanitisation means:

a) fumigation with formaldehyde, or

b) spraying with or immersion in an egg shell disinfectant in accordance with the manufacturers instructions, or

c) made hygienic by another method approved by the *Veterinary Authority*.

Formaldehyde gas has been used for many years for the *disinfection* of *hatching eggs* and hatchery equipment. As a fumigant, formaldehyde gas has proved to be a very effective means of destroying micro-organisms on eggs, egg cases, chick boxes, hatching machines and other hatchery equipment, provided these items have been subjected to preliminary cleaning. When the correct mixture of formalin and potassium permanganate is used, a dry brown powder will remain after the reaction is completed.

At the present time, there is lack of uniform opinion on the optimum concentration of formaldehyde required for the sanitisation of eggs and hatchery equipment. In general, three levels of concentration have been used. Also, two methods of use have been adopted.

1. Method 1

   a) Concentration A

      53 ml formalin (37.5%) and 35 g potassium permanganate per m^3 of space.

      This can be expressed as:

      5.25 oz by volume (148.5 ml) formalin (37.5%) and 3.5 oz by weight (98 g) potassium permanganate per 100 ft^3 (2.8 m^3) of space.

   b) Concentration B

      43 ml formalin (37.5%) and 21 g potassium permanganate per m^3 of space.

      This can be expressed as:

      4 oz by volume (120 ml) formalin (37.5%) and 2 oz (60 g) potassium permanganate per 100 ft^3 (2.8 m^3) of space.

   c) Concentration C

      45 ml formalin (40%) and 30 g potassium permanganate per m^3 of space.

      This can be expressed as:

      4.5 oz by volume formalin and 3 oz potassium permanganate per 100 ft^3.

   d) Procedure

      Fumigation of *hatching eggs* and equipment should be carried out in a special chamber or in a room or building constructed of impermeable material which can be made as airtight as possible. A fan is necessary to circulate the gas during fumigation and to expel it after fumigation is completed.

      The total volume of the room is determined accurately from the internal measurements. The space occupied by trays, or eggs, or articles to be fumigated, is to be disregarded. The quantities of materials required are based on the total volume.

      Place in the centre of the floor, one or preferably several large metal basins, metal trays or containers of earthenware, enamelware, asbestos or other non-inflammable material.

      PLASTIC OR POLYETHYLEN CONTAINERS ARE NOT TO BE USED due to the heat generated by the chemical reaction. To avoid possible fire hazards, the containers should slope outwards. Also, the containers must be large enough so that the two chemicals occupy no more than one quarter of the volume of the container. Preferably, the container should have a capacity of at least 10 times the volume of the total ingredients.

      The eggs should be placed on wire racks, in wire baskets or on cup-type egg flats stacked in a manner that will permit air circulation and exposure to the formaldehyde gas.

      An electric or hot water heater should be available in the chamber to maintain the temperature at 75°-100°F (24°-38°C). Water pans or other equipment should be available to provide a relative humidity of 60-80%.

Place required amount of potassium permanganate into the containers **BEFORE** adding the formalin.

Pour the required amount of formalin onto the potassium permanganate in the containers.

Leave the chamber as quickly as possible and close the door. Some operators may wish to use a gas mask when pouring the formalin into the containers.

The door of the chamber should be securely closed and permanently labelled to prevent accidental opening.

The fans should be operated to circulate the formaldehyde and the fumigation time should be 20 minutes.

After 20 minutes, the gas should be expelled through a controlled vent leading to the outside of the building.

The door may be opened to facilitate expelling the formaldehyde to the outside.

2. Method 2

An alternative method to the above is to use formaldehyde gas produced by the evaporation of paraformaldehyde. Proprietary preparations are available and the operation is carried out by placing the requisite amount of powder on a pre-heated hot plate.

In this method it is necessary to ensure that the relative humidity of the chamber is sufficiently high (60-80%).

Ten g paraformaldehyde powder or pellet is used per m^3 of space.

3. Warning

In carrying out fumigation, the following points should be borne in mind:

a) Caution is necessary when formalin and potassium permanganate are mixed together in large amounts because of the risk of personal injury and fire through careless use. Formaldehyde gas causes irritation to the eyes and nose of the operator and the use of a gas mask is advised.

b) Effective fumigation depends on optimum conditions of temperature and humidity. Formaldehyde gas rapidly loses its efficiency at low temperatures or in a very dry atmosphere.

Article 6.3.8.

Fumigation procedures at the hatchery

1. Fumigation of eggs in setting machines

Eggs should be fumigated within 12 hours after setting and after the temperature and humidity has returned to normal operating levels. The temperature of the machines must remain at the operating level.

The setting machine doors and ventilators should be closed, but the circulation fan should be kept operating.

After fumigation for 20 minutes, the ventilators should be opened to the normal operating position in order to release the gas.

Warning

Do not fumigate eggs that have been incubated for 24 to 96 hours, as this can result in embryo mortality.

2. Fumigation of eggs in hatching machines

This is a common practice in certain areas and under certain conditions. The eggs should be fumigated after being transferred from the setting machine to the hatching machine and before **10%**

of the chicks have begun to break the shell. After transfer of the eggs, the hatching machines are permitted to return to normal operating temperatures and humidity. The ventilators are closed and fumigation is conducted with the fans running. In some countries, the standard amounts of formalin (53 ml) and potassium permanganate (35 g) per m^3 are used. Fumigation time is 20 minutes. In other countries, 0.8 cc formalin (37.5%) is added to 0.4 g potassium permanganate for each ft^3 of space; or 25 ml formalin to 12.5 g potassium permanganate per m^3. Fumigation time is 20 minutes.

3. Fumigation of empty setting and hatching machines

Following removal of all the eggs or the chicks and the subsequent cleaning and *disinfection* of the empty machine, the disinfected egg trays are replaced and the machine prepared for the next batch of incubating eggs.

The doors and ventilators should be closed and the temperature and humidity returned to normal operating levels. Fumigation time should be at least 3 hours or preferably overnight, using the standard amounts of formalin and potassium permanganate (Concentration A).

The machines should be well ventilated before use to remove any residual fumigant.

Warning

The above fumigation procedure applies to a machine in which there are no *hatching eggs*. Eggs and chicks cannot be fumigated using the above fumigation time.

4. Neutralisation of formaldehyde gas

This can be achieved with a 25% solution of ammonium hydroxide using an amount not more than one half the volume of formalin used. The ammonia can be spread on the floor of the machine and the doors closed quickly.

Table 1. ***Properties and uses of disinfectants***

Properties	Chlorine	Iodine	Phenol	Quats	Formaldehyde
Bactericidal	+	+	+	+	+
Bacteriostatic	-	-	+	+	+
Fungicidal	-	+	+	±	+
Virucidal	±	+	+	±	+
Toxicity	+	-	+	-	+
Activity with organic matter*	++++	++	+	+++	+
Use area					
Hatchery equipment	+	+	+	+	±
Water equipment	+	+	-	+	-
Personnel	+	+	-	+	-
Egg washing	+	-	-	+	+
Floor	-	-	+	+	+
Foot baths	-	-	+	+	-
Rooms	±	+	±	+	+

Quats	=	Quaternary ammonium compounds
*	=	Number of + indicates degree of affinity for organic material and the corresponding loss of disinfecting action
+	=	Positive property
-	=	Negative property
±	=	Limited activity for specific property

Monitoring of poultry breeding flocks and hatcheries for salmonella

1. At the present time the only method for monitoring poultry breeding *flocks* and hatcheries for salmonella is by means of bacteriological examination of samples obtained from these *establishments*.

2. Samples for bacteriological monitoring of poultry *flocks* are obtained in the case of rearing *flocks* from the premises in which the birds are housed or in the case of adult laying birds either from the premises in which the birds are housed or from the hatchery to which the *hatching eggs* from that flock are consigned.

3. The samples to be taken are:

   a) on the premises in which birds are housed - fresh faeces (each sample at least one gram), dead or culled birds, or in the case of *day-old birds* the chick box liners;

   b) at the hatchery - meconium, dead in shell and culled chicks.

   Additionally, it is recommended that environmental samples such as drag swabs, litter, feather, down and dust, are also taken in both the premises and the hatchery at a similar frequency. Where the laying flock is sampled only on the premises, environmental sampling of the hatchery is required.

4. The total number of samples to be taken on each occasion is shown in Table 2 and is based on the random statistical sample required to give a probability of 95% to detect one positive sample given that infection is present in the population at a level of 5% or greater.

Table 2. ***Number of samples***

Number of birds in the flock	Number of samples to be taken on each occasion
25-29	20
30-39	25
40-49	30
50-59	35
60-89	40
90-199	50
200-499	55
500 or more	60

5. All samples should be selected at random to represent the house or in the case of samples taken at the hatchery to represent the *hatching eggs* from that poultry flock.

6. The following minimum frequency of sampling is recommended:

   a) Rearing flocks

      At day-old and 3 weeks before moving to laying accomodation.

      Where birds are moved from the rearing premises other than direct to laying accomodation, a further sample should be taken 3 weeks before such a movement.

   b) Breeding flocks in lay

      The laying *flocks* should be sampled at least at monthly intervals during the laying period.

7. All samples should be fully marked and identified as to the date of sampling and the *flock* to which the samples relate.

8. Samples should be stored in a refrigerator at between 1°C and 4°C until they are dispatched to the laboratory (not more than 5 days).

9. All samples should be examined in a laboratory authorised for that purpose by the *Veterinary Authority*.