

***Import risk analysis:* chicken meat and chicken meat products; Bernard Matthews Foods Ltd turkey meat preparations from the United Kingdom.**

## **REVIEW OF SUBMISSIONS**

**Biosecurity Authority  
Ministry of Agriculture and Forestry  
Wellington  
New Zealand**

**21 September 1999**

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Bernard Matthews Foods Ltd turkey meat preparations from the  
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**Review of Submissions**

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Ministry of Agriculture and Forestry  
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**21 September 1999**

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Animal Biosecurity  
Biosecurity Authority

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Approved for general release

Dr B D O'Neil  
Group Director  
Biosecurity Authority

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## APPENDIX 1

New Zealand Newcastle disease status

## ACRONYMS

AQIS	Australian Quarantine and Inspection Service
BMFL	Bernard Matthews Foods Ltd
BMFL TMPs	Bernard Matthews Foods Ltd turkey meat products (from the United Kingdom)
DoC	Department of Conservation (New Zealand)
FAA	Food Assurance Authority (MAF New Zealand)
MAF	Ministry of Agriculture and Forestry (New Zealand)
MAFF	Ministry of Agriculture, Fisheries and Food (United Kingdom)
MoH	Ministry of Health (New Zealand)
PIANZ	Poultry Industry Association of New Zealand
USDA	United States Department of Agriculture

# INTRODUCTION

The completion of the Chicken meat risk analysis<sup>1</sup> was notified in the MAF publication *Biosecurity*, issue 11, 1 May 1999. The deadline for submissions was initially set as 15 June 1999. That deadline was extended following requests from some stakeholders who had not been able to complete their submissions on time. The final submission received was dated 13 August 1999.

MAF received submissions from the following:

## Overseas Countries

1. United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) and Foreign Agricultural Service (FAS). 16 June 1999. Covering email from Dr Lisa Ferguson, and submission of 7 pages
2. Email from Mr Marty Scabarozzi of IDF, apparently somewhere in the USA, 28 May 1999. 4 paragraphs on 1 page.
- 3a. Tyson Foods Inc, Springdale USA. 28 May 1999. Letter signed by Dr RE Good, 2 pages.
- 3b. Tyson Foods Inc, Springdale USA. 13 August 1999. Letter signed by Dr RE Good, 1 page.
4. Dr Eduardo Real, apparently from Argentina. 20 July 1999. Email, 1 page.
5. Australian Quarantine and Inspection Service (AQIS), 12 July 1999, emailed letter from Dr David Banks, 2 pages.
- 6a. Ministry of Agriculture, Fisheries and Food, UK. 26 July 1999. Fax from Mr RA Bell, comprising cover page and a 4-page letter signed on behalf of the UK CVO Mr JM Scudamore, and one page of references.
- 6b. Ministry of Agriculture, Fisheries and Food, UK. 30 July 1999. Fax from Mr RA Bell, comprising cover page, a one-page covering letter signed by UK CVO Mr J M Scudamore, and 9 pages consisting of three enclosures referred to in the 26 July 1999 submission.
7. Bernard Matthews Ltd, UK. 14/6/99. Email comprising one page of covering letter from Mr Nick Simons, and a submission of 3 pages.
8. European Commission DG VI. Undated unsigned letter from Mr A Checchi-Lang to Dr Carryl Shailer, sent by email.

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<sup>1</sup> Animal Health and Welfare Group MAF Regulatory Authority. Import risk analysis : chicken meat and chicken meat products; Bernard Matthews Foods Ltd turkey meat preparations from the United Kingdom. Ministry of Agriculture and Forestry, Wellington, New Zealand. 228 pp. March 1999.. ISBN : 0-478-07987-7.

## New Zealand

9. Poultry Industry Association of New Zealand. 24 May 1999. Covering letter of 2 pages signed by Mr RJ Diprose, and submission of 9 pages
10. Ministry of Health. 16 July 1999. Submission of 5 pages signed by Dr Gillian Durham.
11. Department of Conservation. 16 June 1999. Submission of 2 pages, signed by Ms Olivia McHalick
12. Dr. Steve Hathaway, Technical Development and Risk Analysis Group, Ministry of Agriculture (Meat and Seafood), 16 June 1999, emailed comments, 3 pages.

# REVIEW OF SUBMISSIONS

## **1. UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)**

- 1.1 USDA believes that the risk of disease introduction to New Zealand is overestimated for products such as leg quarters and breast meat, and cooked products such as nuggets, patties and breast meat.
- 1.2 The major concerns of USDA are in regard to IBD, ND and salmonellae – the required safeguards would negatively impact on the ability of the USA to trade with New Zealand.
- 1.3 USDA is of the opinion that the three levels of importation modelled are arbitrary.

*MAF Comment:*

As New Zealand has never imported these commodities previously, there are no actual data on which to base predictions of trade. This kind of sensitivity analysis is a standard method of dealing with uncertainty in quantitative models. The total annual consumption of chickens in NZ is known, and it is also known that approximately 60% of this consumption is in the form of cuts. Therefore, the levels of market penetration that were modelled for bone-in and boneless cuts (0.1%, 1% and 10% or total poultry consumption) represent 0.17%, 1.7% and 17% of the total consumption of this form of chicken meat, which is a reasonable range to model.

- 1.4 USDA questions the assumption that the consumption of imported chicken would be uniform.

*MAF Comment:*

Backyard chicken flocks in New Zealand tend to be kept for egg production or as a hobby, but generally not for meat. MAF suggests that old layers would not take the place of broilers in the diet of backyard chicken keepers.

- 1.5 USDA supposes that the rate of feeding of kitchen scraps to backyard flocks in New Zealand would be low as it is claimed to be in the USA.

*MAF Comment:*

It is MAF's understanding that in New Zealand households which keep backyard chickens, the waste from the household kitchen is commonly fed to the chickens.

*The following USDA comments on specific diseases apply only to boneless or bone-in products that have no organ tissue (particularly lung, kidney, or bursa) attached.*

### *Infectious Bursal Disease (IBD)*

- 1.6 USDA provides reasoned argument to support their contention that there is not an equal probability of the flock becoming infected with IBD virus on any day from day one to day 49. In particular, USDA contends the following:
- a) exposure to field strains would occur after maternal antibody waned at about 14 to 21 days of age;
  - b) for the same reason as above, flocks are typically vaccinated for IBD at 14 to 21 days of age;
  - c) vaccine-induced immunity begins after 7 days;
  - d) therefore, in nearly all cases, infection of broilers with field or vaccine strains of IBD virus would take place between 14 and 28 days of age, which is well removed from the final 6 days of the growing period;
  - e) in the USA the age at slaughter would usually be 42-56 days, rather than the 32 to 49 days modelled by MAF.
  - f) US law prohibits the slaughter of birds within 21 days of receiving any live virus vaccine.

*MAF Comment:*

MAF intends to remodel the quantitative risk analysis for boneless or bone-in cuts taking this USDA information into account.

- 1.7 USDA contends that not only is there a low probability that the virus will be present in muscle tissue for export, the overall risk to New Zealand is low because :

- a) Feeding garbage to poultry is a rare practice;

*MAF Comment:*

As already stated, this is not a rare practice in New Zealand.

- b) The commodity is unlikely to generate any raw scraps;

*MAF Comment:*

MAF acknowledges that such products would have a lower probability of generating raw scraps than would whole chicken carcasses (see p 153 of the risk analysis). However, raw scraps are not included in the quantitative model, so any risk from raw scraps would be in addition to the calculated risk.

- c) The titre of the virus in tissues, if present, would be extremely low;

*MAF Comment:*

The level of virus in tissues was discussed in detail in appendix 2 of the risk analysis (see p 170).

- d) The effect of cooking, considering the low starting titre in muscle would reduce the contamination level to  $10^{-1}$ ;

*MAF Comment:*

In 1988  $10^{-1}$  was more or less what was regarded as our appropriate level of protection, but it has since become apparent that the thermostability of the virus was not fully appreciated at that time. Further modelling work with the latest thermostability results incorporating the initial titre and likely numbers of chickens exposed to infectious material is presented in Appendix 2. While the risk per chicken may be small, when large numbers of chickens are exposed, the likelihood of initiating an outbreak are significant.

- e) Even if a backyard flock were to become infected, it is not likely that commercial flocks would become exposed. Indeed, USDA cites the fact that IBD has almost been eradicated from the commercial sector in New Zealand without placing any restrictions on the slaughter and marketing of birds as evidence for the lack of an exposure pathway between backyard flocks and commercial flocks.

*MAF Comment:*

MAF does not want IBD to be introduced into any flocks in New Zealand.

### *Newcastle disease (ND)*

- 1.8 USDA asserts that "it is well understood that lentogenic ND viruses are restricted in their tissue distribution to the respiratory and intestinal tracts". The chapter by Dennis Alexander in Calnek 10th edition is cited in support. USDA contends that "Therefore the risk of finding these [PMV-1] viruses in meat is virtually nil".

*MAF Comment:*

The quoted chapter by Alexander does not completely support the USDA contention. On page 550 it is explained that lentogenic viruses can only replicate in tissues such as the respiratory and intestinal tracts, whereas virulent viruses can replicate in a range of tissues and organs. On page 556, under the heading "Samples". The following is stated : "The two main sites of replication of NDV in infected poultry appear to be the respiratory and intestinal tracts." But there is no mention of tissue distribution of the virus as a result of viraemia, let alone differentiation of such tissue distribution by pathotype. It was precisely because of the lack of information on tissue distribution of ND virus that MAF commissioned work on this matter. The trial done in the USA and quoted as reference 20 in the risk analysis used a mesogenic strain. In the absence of other information, it is

reasonable to assume that all PMV-1 viruses have tissue distributions during viraemia similar to the mesogenic strain mentioned in reference 20.

- 1.9 USDA considers it inappropriate for MAF “to equate the virulent viruses with the low virulent lentogenic viruses in their risk to produce disease in domestic poultry”

*MAF Comment:*

The MAF risk analysis does not do this. Rather, MAF takes the position that some PMV-1 viruses which are known as lentogenic strains may cause some clinical signs in poultry, but it is difficult to predict how these viruses would behave if they got into native bird species in this country. Such strains do not occur in New Zealand, and it is MAF’s responsibility to keep them out. Furthermore, recent Australian experience indicates that PMV-1 viruses may not be as ‘stable’ in terms of pathotype as was once thought; until this is clarified MAF considers a precautionary approach is justified.

- 1.10 USDA contends that the ICPI values for New Zealand isolates of PMV-1 are based on a single laboratory test, and that “the reproducibility of the 0.0 ICPI result in experimental replicates is highly improbable.”

*MAF Comment:*

MAF is aware that the ICPI determination may not be completely repeatable, particularly when dealing with viruses which have ICPI values of around 1.5, since if a single bird dies a day early or gets sick a day later, then the ICPI result will be different. Thus it is not possible to say that viruses with say ICPI 1.4 or 1.6 are different. However, it is important to keep in mind that an ICPI result of 0.0 means that not only did no birds die, but also **no birds showed any clinical signs at all** over the 10-day test period. Therefore, this result may be expected to be far more repeatable than any non-zero results.

Moreover, it is not correct to say that the ICPI determinations done on New Zealand PMV-1 strains are based on a single laboratory test. In fact, for 6 of the viruses there have been two replicates each, and for two of those, one calculation of ICPI was done at NCDI in New Zealand while the other calculation of ICPI was done at the Central Veterinary Laboratory in the UK by Dennis Alexander. In all cases, both replicates gave a result of 0.0 (see attached paper on ND surveillance in New Zealand).

Furthermore, since the risk analysis was completed the OIE definition of Newcastle disease virus has changed, and the new definition incorporates sequencing of the fusion protein gene of the virus. The results of this sequencing work of the 15 strains of PMV-1 which are available at NCDI indicate that all are typical of avirulent strains, a result which strongly corroborates the previous ICPI results.

- 1.11 Regarding the risk of introduction the point is made by USDA that it would be unlikely for US vaccine or field strains to produce viraemia.

*MAF Comment:*

MAF is unclear as to whether this is an assumption on the part of USDA or whether there is published or unpublished evidence to support the assertion. From the MAF-commissioned work carried out in the US (reference 20), MAF understands that a mesogenic strain of the virus was present in meat at 4 days post-infection (page 90 of the risk analysis). In the absence of other information MAF believes it is reasonable to assume that all PMV-1 viruses behave similarly in terms of duration of viraemia.

- 1.12 USDA contends that infection with field strains is likely to occur early in life before vaccine-induced immunity.

*MAF Comment:*

MAF tends to agree with this point. Indeed, in a MAF-commissioned trial carried out in the USA (reference 20) there was no virus in any tissue 10 days after infection. As with IBD, it is likely that most vaccinated birds would not have virus in any tissues at the time of slaughter. However, although vaccination usually protects against the more serious consequences of disease, virus replication and shedding (possibly including viraemia?) may still occur, albeit at a reduced level (Calnek, p 559). MAF intends to carry out further modelling on this matter.

- 1.13 USDA contend that there would be a low risk to commercial flocks from scraps being fed to backyard flocks.

*MAF Comment:*

As stated before, MAF is also concerned about the health of the backyard flocks, and the presence of PMV-1 viruses in backyard flocks would increase the risk to native birds as well as to commercial flocks.

- 1.14 USDA are of the opinion that the cooking times proposed are extreme.

*MAF Comment:*

The cooking times shown on page 93 of the risk analysis, i.e. 70°C/50 mins or 80°C/9 mins, are the current MAF conditions for imported poultry meat, required to inactivate IBD and ND viruses. These were not the result of Appendix 3 but rather were tested in Appendix 3 for efficacy against ND, by way of contrast with IBD in Appendix 2.. Nevertheless, MAF concedes that Appendix 3 would support a different time/temperature combination, and this is being reviewed.

- 1.15 USDA contends that there is inadequate work to support New Zealand's claim that there are no PMV-1 viruses in native birds.

*MAF Comment:*

This point is closely related to the point made by USDA in 1.10. MAF concedes that the risk analysis included limited information on New Zealand's PMV-1 status, not only in native birds but in all avian species. A further document on this matter has since been prepared summarising all surveillance that has been carried out on ND in this country (see attached paper on ND surveillance in New Zealand).

### *Salmonella Pullorum and Gallinarum*

- 1.16 USDA questions the need to have a flock accreditation programme for both the breeder and the broiler flocks.

*MAF Comment:*

MAF's position in the risk analysis did not necessarily require testing of broilers anyway. Rather, the key issue was an acceptable biosecurity system to ensure that broilers have no contact with potentially infected birds (p 26).

### *Paratyphoid Salmonellae*

- 1.17 USDA questions how frequently NZ animals and poultry are infected with these phage types (Typhimurium DT104, and Enteritidis PT4).

*MAF Comment:*

As is explained on page 35 of the risk analysis, these phage types are rare in animals in New Zealand. For example, from 1991 to 1998 there were only six isolates of ST DT104 in animals, all from cattle. Similarly, there have been no isolates of SE PT4 from animals since 1992 and none from poultry.

- 1.18 USDA is of the opinion that MAF is overestimating the risk of establishment of *Salmonella typhimurium* DT 104 and *Salmonella enteritidis* PT4 in commercial poultry through the feeding of chicken scraps to backyard flocks. USDA contends that since DT104 and a variety of SE phage types have been isolated from domestic animals in NZ over the past decade, the fact that they have not become established in poultry indicates the pathway is not important.

*MAF Comment:*

As these particular salmonellae are in fact very rare in animals in New Zealand, the fact that these organisms have not become established in poultry does not mean that they could not establish if they were present in imported poultry meat, given that scraps may be fed to backyard poultry. Although MAF did not concentrate particularly on this exposure pathway for salmonellae, it is the opinion of MAF that this pathway is the most likely one for any poultry pathogens imported with poultry meat to become established in any poultry flocks in NZ. On page 34 of the risk analysis MAF also pointed out that cats appear to play a significant role in the

epidemiology of *Salmonella typhimurium* DT104, at least in the UK, and MAF considers that domestic cats could well receive chicken scraps. However, as MAF pointed out on page 36 of the risk analysis, the most significant effect of these organisms would be on human health.

- 1.19 USDA considers it unrealistic to expect a HACCP program to deliver freedom, and rather than that MAF should adopt “a paratyphoid monitoring system with reasonable detection limits”. Although these detection limits are not specified, it is implied that the Swedish system, which is expected to detect contamination in imported product of 5% or greater, should be adopted.

*MAF Comment:*

This matter is outside the mandate of the Biosecurity Authority. This will need to be considered together with other matters in the review of *Salmonella* in general to be carried out by MAF Food Assurance Authority and the Ministry of Health (MAF FAA / MoH).

#### *Salmonella Arizonae*

- 1.20 USDA suggests that the risk from this agent would be covered by whatever is accepted for typhimurium.

*MAF Comment:*

MAF accepts this view.

## **2. M. SCABAROZI**

Mr Scabarozi's company, IDF, manufactures mechanically separated chicken meat.

- 2.1 The submission states "I am not aware of any company that can legitimately supply raw mechanically separated chicken that is salmonella negative unless it has been irradiated".

*MAF Comment:*

These aspects will need to be considered together with other matters in the review of *Salmonella* in general to be carried out by MAF FAA / MoH.

### **3. TYSON FOODS INC**

3.1 In its letter of 27 May 1999, Tyson Foods Inc claims that its products pose no risk in terms of IBD or ND, and gives the following reasons:

- a) The products that Tyson Foods Inc wishes to export to New Zealand do not contain organs;
- b) IBD vaccines are not used in their broilers;
- c) There has been no diagnosis of IBD in any broiler flocks for more than 5 years;
- d) There has been no diagnosis of ND in any broiler flocks for more than 5 years;
- e) A lentogenic ND vaccine used in broiler flocks but not within 4 weeks of slaughter.

3.2 In its letter of 27 May 1999, Tyson Foods Inc points out that their operations participate in the NPIP for salmonella and avian influenza administered by USDA.

*MAF Comment:*

NPIP provides assurances for Pullorum and Gallinarum, but does not address *Salmonella typhimurium* or *Salmonella enteritidis*. These aspects will need to be considered together with other matters in the review of *Salmonella* in general to be carried out by MAF FAA / MoH.

3.3 In its letter of 13 August 1999, Tyson Foods Inc gives further details on IBD vaccination schedules. Layers are vaccinated at 4 weeks with live vaccine, and at 10 and 19 weeks with killed vaccines, and hatching eggs are collected from 25 weeks of age.

*MAF Comment:*

MAF notes that Tyson Foods Inc does not vaccinate broilers against IBD at all; the company relies on maternal immunity for protection. This is apparently not a common practice in the USA, as the USDA submission stated [broiler] "flocks typically receive live IBD virus vaccines at 14-21 days of age". Earlier information provided by USDA reported that another major producer vaccinates broiler chickens against IBD at 1 day of age in order to immunise those chicks that do not get adequate maternal antibody.

#### **4. DR EDUARDO REAL**

- 4.1 Dr Real questioned the cooking times for Newcastle disease on page 93 of the risk analysis.

*MAF Comment:*

This point was also made by USDA. The cooking times shown on page 93 of the risk analysis, i.e. 70°C/50 mins or 80°C/9 mins, are the current MAF conditions for imported poultry meat, required to inactivate IBD and ND viruses. These were not the result of Appendix 3 but rather were tested in Appendix 3 for efficacy against ND, by way of contrast with IBD in Appendix 2.. Nevertheless, MAF concedes that Appendix 3 would support a different time/temperature combination, and this is being reviewed.

## **5. AUSTRALIAN QUARANTINE AND INSPECTION SERVICE (AQIS)**

- 5.1 Regarding HPAI, AQIS considers that the MAF risk analysis was accurate in stating that the only report of disease in wild birds associated with HPAI virus has been in South African terns, but the submission lists a number of bird species from which influenza viruses have been isolated.

*MAF Comment:*

The MAF risk analysis was making a distinction between disease and infection. In the discussion on the epidemiology of HPAI on page 68 of the risk analysis, it is stated that infection with influenza viruses has been demonstrated in avian species representing most of the major bird families throughout the world. The point, therefore, is that although infection is common, disease is very uncommon in species other than chickens and turkeys. The isolation of viruses from the species mentioned in the AQIS submission does not challenge that point.

- 5.2 Regarding PMV-1, AQIS asks how the last “case” would be defined, given that the MAF risk assessment considers PMV-1 viruses with ICPI>0.0 to be of concern. The question is raised as to the level of surveillance that would be necessary to provide assurances.

*MAF Comment:*

The precise levels of surveillance considered acceptable would be established at the time of negotiating a specific trade. In general, surveillance would have to be capable of demonstrating that the flock of origin was either free of PMV-1 viruses or that any PMV-1 viruses present or circulating had ICPI values that were not greater than 0.0. MAF recognises that the proposal for zonal freedom of PMV-1 viruses with ICPI>0.0 is impracticable. MAF is examining whether zonal freedom from viruses which fit the OIE definition for Newcastle disease is required in addition to flock freedom from viruses with ICPI>0.0.

- 5.3 AQIS recognises the right of New Zealand to decide the “Acceptable Level of Protection” for this country.

## **6. MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, UK (UK MAFF)**

- 6.1 UK MAFF questions the claim by NZ MAF that there are no PMV-1 viruses in this country with ICPI>0.0. UK MAFF considers that inadequate surveillance has been carried out to justify this conclusion.

*MAF Comment:*

The MAF risk analysis did not attempt to present an exhaustive review of surveillance done in this country for PMV-1 viruses. The two papers / reports cited were representative of a much larger body of evidence which is available as a country freedom statement (attached to this review of submissions). However, MAF recognises that the proposal for zonal freedom of PMV-1 viruses with ICPI>0.0 is impracticable. MAF is examining whether zonal freedom from viruses which fit the OIE definition for Newcastle disease is required in addition to flock freedom from viruses with ICPI>0.0.

- 6.2 UK MAFF contends that “the role of feral birds in outbreaks of Newcastle disease is now well documented.”

*MAF Comment:*

Not only is the role of feral (i.e. escaped domestic species which have reverted to the wild) birds not at all well documented, the role of wild birds in general is unclear with respect to the epidemiology of PMV-1 viruses. MAF considers that the recent re-definition of NDV by the OIE will require a new approach for surveys and epidemiological investigations, and until further information is available, the role of wild or feral birds remains uncertain. However, MAF notes that BMFL keep all their poultry flocks in bird-proof houses.

Note: on page 89 of the risk analysis MAF incorrectly quoted reference 14 in saying “apparently due to mutation of a lentogenic strain from wild birds”. In fact, the lentogenic strain referred to appears to be a poultry strain, and there is no evidence of any involvement of wild birds.

- 6.3 UK MAFF points out that the proposed import requirements for ND are inconsistent with international standards and the supportive argument behind them is deficient.

*MAF Comment:*

MAF recognises that the proposed safeguards for PMV-1 are more stringent than international standards for ND virus, and MAF considers that the risk analysis provides sufficient justification for these. In particular, MAF must consider that in view of the recent Australian experience, the stability of PMV-1 viruses of low virulence is uncertain, and when deciding the “Acceptable Level of Protection” for this country MAF must consider potential risks to endangered native bird species.

- 6.4 UK MAFF asks that the requirements be altered to permit the use of live vaccines of ICPI<0.4 or killed vaccines. UK MAFF propose that the turkeys destined for processing into products for export to NZ should be subject to virological sampling

and testing to detect NDV 5 days prior to slaughter, following the protocols laid down in the EU decision 95/117/EC.

*MAF Comment:*

European Commission decision 95/117/EC states: "The test should be regarded as negative if no haemagglutination activity is detected and no virus is isolated." This would satisfy NZ MAF, however the decision goes on to prescribe the measures to determine the origin of the virus should any be isolated, and implies that virus of vaccine origin is acceptable. New Zealand would not accept the presence of any PMV-1 virus with an ICPI >0.0.

- 6.5 UK MAFF describes the assurances which could be given against cross-contamination during production, slaughter and processing of Bernard Matthews Foods Ltd turkey meat preparations (BMFL TMPs). These assurances would be based on written declarations from the company veterinarian.
- 6.6 UK MAFF considers that Appendix 6 of the risk analysis dealt with cross-contamination with disease agents in general.

*MAF Comment:*

Appendix 6 of the MAF risk analysis explicitly restricts consideration to IBD virus.

- 6.7 UK MAFF indicates that certification for freedom from PMV-2, PMV-3 and PMV-7 could be provided, based again on written declarations from the company veterinarian.
- 6.8 UK MAFF indicates that on the basis of the BMFL *Salmonella* monitoring programme, it is possible to certify flock of origin freedom from certain salmonellae. However, 3-7% of samples are positive for *Salmonella typhimurium* DT104 (this is described as "sporadic occurrence") and positive birds may be treated with antibiotics.

*MAF Comment:*

MAF does not consider 3-7% to be "sporadic occurrence". Furthermore, MAF is uncertain whether infections with multiple-drug-resistant salmonellae should be treated with antibiotics. These aspects will need to be considered together with other matters in the review of *Salmonella* in general to be carried out by MAF FAA / MoH.

- 6.9 UK MAFF refers to the *Salmonella* controls in place by Sweden as "zero tolerance eradication programmes."

*MAF Comment:*

As pointed out on page 36 of the risk analysis, the Swedish authorities aim to detect a level of contamination above 5% in imported meat. This is not "zero tolerance."

- 6.10 UK MAFF considers that cross-contamination safeguards for salmonellae have been addressed in their comments on Newcastle disease.

*MAF Comment:*

As stated in the MAF comment to 6.6, Appendix 6 addressed IBD, not ND or salmonellae.

- 6.11 UK MAFF appears to be under the impression that clinical cases of salmonellosis as well as isolations from animals are reportable in New Zealand.

*MAF Comment:*

Salmonellae are not notifiable organisms under the Biosecurity Act.

- 6.12 UK MAFF appears to be under the impression that in New Zealand meat preparations “lightly” contaminated with salmonellae could be released for human consumption after a “freeze treatment” of 42 days.

*MAF Comment:*

This is incorrect. This misunderstanding may have arisen from the following: Prior to 1995 red meat products that were found to be positive to salmonellae were frozen and re-tested after a minimum of 6 weeks. If the products then tested negative, they were released to the originally intended market. This policy no longer operates for red meat, and has never applied to poultry meat.

- 6.13 UK MAFF agrees with the risk analysis conclusions regarding IBD1 and IBD2 in BMFL TMPs.

## **7. BERNARD MATTHEWS FOODS LTD (BMFL)**

- 7.1 BMFL disagrees with the extent and scope of some of the specific safeguards as recommended in the risk analysis.
- 7.2 Regarding salmonellae, BMFL states that its HACCP programmes are specifically targeted at salmonellae in the whole production system including feed supply mills, commercial farms and production plants. However, BMFL state that it does not know of any HACCP programme that is able to ensure the final product is free from salmonellae.

*MAF Comment:*

This view is supported by several other submissions.

- 7.3 BMFL claims to use “cultural freedom from *Salmonella* contamination” for exports of meat preparations to Scandinavian countries, and offers to implement the same testing for exports to New Zealand..

*MAF Comment:*

Specific details of this are provided in the UK MAFF submission.

- 7.4 BMFL does not believe that constraints placed on importers should be any more stringent than those placed on domestic producers.

*MAF Comment:*

The measures recommended in the risk analysis are to deal with salmonellae which are exotic to New Zealand poultry.

- 7.5 BMFL, like UK MAFF, appears to believe that “products in New Zealand which are positively contaminated with salmonella can be released for sale onto the domestic market after being held frozen for a period of 42 days.”

*MAF Comment:*

As explained in the comment to the same point from UK MAFF, this impression of BMFL is incorrect.

- 7.6 BMFL agrees with the NZ MAF conclusions regarding IBD, and point out that serological tests are available which can differentiate between serotypes 1 and 2 should serotype 2 ever be found in New Zealand.

- 7.7 BMFL points out that compliance with country freedom from PMV1 with ICPI>0.0 is not possible for the UK, and it strongly contests NZ MAF’s requirements.

*MAF Comment:*

As explained in the comment to the same point from UK MAFF and USDA, NZ MAF recognises that the proposal for zonal freedom of PMV-1 viruses with ICPI>0.0 is impracticable. MAF is examining whether zonal freedom from viruses which fit the OIE definition for Newcastle disease is required in addition to flock freedom from viruses with ICPI>0.0.

- 7.8 BMFL questions New Zealand's Newcastle disease status in the same way as UK MAFF.

*MAF Comment:*

As explained in the comment to the same point from UK MAFF, the two papers / reports cited in the risk analysis were representative of a much larger body of evidence which is available as a country freedom statement (attached to this review of submissions).

- 7.9 BMFL contends that "Experience in Australia shows that the risk of introduction of virulent ND by wild domestic and or migratory birds and waterfowl is far greater than from imported turkey meat preparations."

*MAF Comment:*

The MAF risk analysis has set out to objectively examine the risk of disease introduction by the proposed importation of BMFL TMPs. MAF has not attempted to compare the risk of introduction of ND viruses through imported poultry meat with any uncontrollable background risk posed by migratory birds. As is explained in the context of a similar comment made by UK MAFF, NZ MAF considers that the role of wild birds in the epidemiology of PMV-1 viruses birds is not clear. However, with regard to the Australian experience, reports from the Australia CVO to the OIE have not implicated any wild birds in the recent ND outbreaks in NSW. Note: on page 89 of the risk analysis MAF incorrectly quoted reference 14 in saying "apparently due to mutation of a lentogenic strain from wild birds". In fact, the lentogenic strain referred to appears to be a poultry strain, and there is no evidence of any involvement of wild birds.

- 7.10 BMFL considers that NZ MAF is incorrect to focus on pigeons as a source of virulent ND.

*MAF Comment:*

This view appears at odds with the previous comment by BMFL which suggested that there were risks associated with wild birds (see 7.7). Moreover, MAF did not "focus" on pigeons with regard to virulent ND. The few statements that were made regarding these birds were based on published literature. However, MAF does note that BMFL turkeys are kept in bird-proof houses.

- 7.11 BMFL suggests that freedom from ND viruses with ICPI>0.4 could be based on cloacal swabs taken 14 days prior to slaughter on a batch by batch basis.

*MAF Comment:*

According to a copy of European Commission decision 95/117/EC provided by UK MAFF, the sampling procedure actually requires cloacal and tracheal swabs to be taken 5 days prior to slaughter, not 14 days.

- 7.12 BMFL points out that it can demonstrate freedom from PMV-2 and PMV-7 by whatever regime is required.
- 7.13 BMFL points out that all breeding flocks are vaccinated against PMV-3 with a killed vaccine, and that PMV-3 has never been known to cause disease in commercial flocks [MAF interprets this to mean in turkey broilers].

## **8. EUROPEAN COMMISSION DG VI**

- 8.1 The [undated] submission was to be a provisional comment only as the evaluation of the MAF RA was “more time consuming than expected.”

*MAF Comment:*

No further submission has been received by MAF as of 21 September 1999.

- 8.2 The commission considers that the risk analysis relates to a large extent to imports from the UK, and it is contended that the risk analysis should have been carried out so that it applied to the entire EU.

*MAF Comment:*

So far as chicken products are concerned, MAF rejects this, as the document is entirely generic. However, MAF acknowledges that as part of the broader risk analysis the document contains a smaller analysis restricted to turkey meat products from a single producer in the UK.

## **9. POULTRY INDUSTRY ASSOCIATION OF NEW ZEALAND (PIANZ)**

### *General*

- 9.1 In its covering letter, PIANZ supports the findings and recommendations of the risk analysis for chicken meat and chicken meat products, but it does not accept all recommendations regarding BMFL turkey meat preparations from the UK.
- 9.2 Re: 1.2 – PIANZ considers that there is a need to clarify that the risk analysis applies only to broiler chickens which are slaughtered at 5-7 weeks of age.

#### *MAF Comment:*

This point is in fact specified in exactly those terms on page 4 of the risk analysis. However, the USDA submission points out that the practice in the US is to slaughter at 6-8 weeks, and MAF intends to rework the quantitative risk analysis to take cognizance of this and other matters raised by the USDA. Any import health standard which might be developed from the revised risk analysis would specify the age range of the birds covered by that IHS.

- 9.3 Re: table 2.5 – PIANZ, citing one of the 15 technical reviews of an earlier draft of this risk analysis which were made available to PIANZ under an Official Information Act request, asks that *Salmonella enteritidis* phage types 7, 8, and 13 should be given “equal consideration, as in the USA they cause the same human health problems as PT4”.

#### *MAF Comment:*

On pages 28 and 35 of the MAF risk analysis the most important phage types of *Salmonella enteritidis* which are associated with poultry meat are discussed. Phage types 8 and 13a are included in that discussion. From the published literature, phage type 7 does not appear to be an issue in poultry meat. MAF is seeking more information on this matter. This will need to be considered together with other matters in the review of *Salmonella* in general to be carried out by MAF FAA / MoH.

### *Salmonella pullorum and gallinarum*

- 9.4 Re: 1.3.1.6.9 (p 27) – PIANZ does not accept first of the day processing, as it does not believe that cross contamination can be prevented.

#### *MAF Comment:*

This will need to be considered together with other matters in the review of *Salmonella* in general to be carried out by MAF FAA / MoH.

- 9.5 Re: I: 3.1.6.9 (p 27) – PIANZ requires definition of a free zone.

*MAF Comment:*

Specific details would be formulated during negotiations of a specific trade.

- 9.6 Re: I: 3.1.6.9 (p 27) – PIANZ requests evidence that the internal temperature listed is sufficient to destroy the organisms.

*MAF Comment:*

MAF refers PIANZ to the table on page 32, the text on page 30, and to the primary literature cited.

- 9.7 Re: I: 3.1.6.9 (p 27) – PIANZ asks whether there is a need for a time parameter as well as a temperature parameter.

*MAF Comment:*

As is explained in the text of the chapter in question, it is the attaining of a specific internal temperature that is the critical matter rather than the time taken to achieve that temperature or the time it is maintained. MAF refers PIANZ to table 3.1.6-1 on page 32 for a summary of experiments done on thermal inactivation of salmonellae in various foods.

### *Paratyphoid salmonellae*

- 9.8 Re: II: 3.1.6.9 (p 37) – PIANZ makes several comments with regard to Paratyphoid salmonellae which are identical to their comments regarding Pullorum and Gallinarum. PIANZ states : “we believe that it must be stated that the HACCP programme is fully verified and validated”.

*MAF Comment:*

On page 37 of the MAF risk analysis it is recommended that the HACCP programme is to be approved by MAF; “verification and validation” would be a part of such an approval process.

### *Infectious Bronchitis*

- 9.9 Re: 3.3.2.8, PIANZ states : “reinsert the recommendation that boneless and bone-in cuts must be totally free of any internal organ pieces – need to define these products.”

*MAF Comment:*

MAF does not completely understand this point in the PIANZ submission, but considers that the second recommendation in the risk analysis section 3.3.2.8 p 56 is adequate in regard to this disease agent.

- 9.10 PIANZ states : “for whole chicken carcasses we require evidence there is no virus in the flock”.

*MAF Comment:*

MAF considers that the first recommendation in the risk analysis section 3.3.2.8 p 56 is adequate in this regard.

#### *Avian rhinotracheitis*

- 9.11 PIANZ, citing one of the 15 technical reviews of an earlier draft of this risk analysis which were made available to PIANZ under an Official Information Act request, states : “we believe there is a real risk of introduction of TRT virus on imported chicken meat products”. PIANZ also states : “up to 10% of carcasses may have retained lung tissue.”

*MAF Comment:*

This PIANZ belief is not supported by the known epidemiology of the avian rhinotracheitis. In addition to the technical review of an earlier draft referred to by PIANZ, MAF had the final draft of the text on this disease scrutinised by a leading world authority on avian paramyxoviruses, immediately before its inclusion in this risk analysis document. This expert did not disagree with MAF’s conclusion that the risk of introduction of this virus in imported chicken meat products was negligible.

#### *Big liver and spleen disease*

- 9.12 PIANZ states “we believe that evidence must come from serological testing of the flocks in the previous six months, not simply just clinical signs.”

*MAF Comment:*

It is not clear whether PIANZ believes that serological testing should be applied to the parent flocks or the broiler flocks themselves. MAF considers the recommended safeguard in section 3.3.5.7 of the risk analysis to be adequate.

#### *Infectious bursal disease*

- 9.13 Regarding cooked or uncooked chicken meat, PIANZ states that the mechanism to demonstrate that broiler flocks are free from IBD must be specified. In a similar vein, PIANZ states that it is its preference to have “specific details of what possible strategies would confirm freedom from infection of IBD virus in the flock”. PIANZ elaborates that : “we would require the results from Polymerase chain reaction (PCR) or some similar test that can identify the presence of the virus at the time of testing and not rely on development of antibodies at a later date.”

*MAF Comment:*

MAF has deliberately not specified the means of establishing flock freedom in the risk analysis. As is explained in several places in the risk analysis, “Where it has been concluded that flock of origin freedom is a necessary safeguard for a particular disease, the specific details of testing, monitoring and certification are not prescribed, as there are often many possible ways that this might be achieved. Specific details would be formulated according to the detailed proposals being considered at the time a particular trade is negotiated.” MAF investigations have confirmed that a PCR for use on bursal tissue is available. MAF is consulting further on this matter, but it appears that the presence of virus in bursa may not indicate the presence of virus in meat.

- 9.14 PIANZ considers that any product imported must be sourced from “totally IBD virus free material” and birds that have not been vaccinated with live IBD vaccines.

*MAF Comment:*

As mentioned with regard to the USDA submission, MAF intends to remodel the quantitative risk analysis for boneless or bone-in cuts taking the new USDA information into account.

*Newcastle disease and other paramyxoviruses*

- 9.15 PIANZ does not accept the principle of first of the day processing for birds destined for export to New Zealand, as it believes there is “a real risk of cross contamination”.

*MAF Comment:*

PIANZ provides no evidence to support their belief. The MAF position with regard to cross-contamination of carcasses with viruses is that although faecal contamination during slaughter might result in limited contamination of the skin of an infected bird at slaughter, unlike bacteria of public health concern viruses will not multiply on the carcass surface.

*BMFL turkey meat products*

- 9.16 The PIANZ points made on salmonellae in BMFL-TMPs are a reiteration of those it made for chicken meat.
- 9.17 Regarding IBD, PIANZ does not agree that no safeguards are required for BMFL-TMPs. PIANZ believes:
- a) The “serological state of turkey flocks” for IBD1 and IBD2 must be known “for ongoing risk assessment”.

*MAF Comment:*

MAF interprets the above as meaning that PIANZ wants ongoing serological testing of BMFL turkey flocks for IBD.

- b) “The flock of origin must be shown to be negative of IBD1 virus”.

*MAF Comment:*

This appears to be a reiteration of the PIANZ comment with respect to IBD in chicken meat, i.e. that flocks be shown to be virus free by PCR. However, as stated in section 7.2.7.4 of the risk analysis MAF does not consider testing to be necessary for IBD1 in turkeys.

- 9.18 Regarding the second paragraph of the PIANZ comments under the heading “7.2.7.6 Recommendations for Risk Management (p 133), which begins “We fully support the approach by MAF...”, PIANZ agrees that the safeguards recommended by MAF for IBD in BMFL TMPs are appropriate.

*MAF Comment:*

This paragraph is identical to the paragraph which appears earlier in the PIANZ submission on the subject of IBD in chicken meat. However, these comments appear out of context in this part of the submission, since MAF has not recommended any safeguards for IBD in BMFL turkey meat products from the UK.

#### *Newcastle disease*

- 9.19 PIANZ makes reference to ND as section 7.2.8, whereas the section of the risk analysis dealing with this disease was 7.2.9. PIANZ does not accept the principle of first of the day processing for birds destined for export to New Zealand, as it believes there is “a real risk of cross contamination”.

*MAF Comment:*

The PIANZ comments on ND in BMFL TMPs from the UK are identical to the comments PIANZ made in respect of ND in chicken meat.

#### *Turkey viral hepatitis*

- 9.20 PIANZ makes reference to TVH as section 7.2.9, whereas the section of the risk analysis dealing with this agent was 7.2.10. PIANZ agrees with the risk analysis but does not agree with the recommended safeguards. PIANZ wants serological testing of the source flock, and also clarification of the meaning of the recommended safeguard.

*MAF Comment:*

MAF considers that the recommended safeguard is appropriate in view of the epidemiology of the disease. The levels of liver condemnation that are seen in infected flocks are mentioned in the risk analysis. Regarding the PIANZ belief that serological evidence of flock freedom from infection is required for this disease, MAF is unaware of any serological tests for TVH. Standard texts on poultry diseases (see reference 1 in the risk analysis, and also pp773-7 of Calnek's "Diseases of Poultry" 10<sup>th</sup> edition) indicate that diagnosis of this condition is not based on serology but on lesions in liver and pancreas. That is the reason that MAF's safeguard focuses on lesions. Specific details would be formulated at the time a particular trade is negotiated.

*Summary*

- 9.21 Re: 8.1.1, PIANZ asks whether it is still the case "in the one specific abattoir approved by the competent authority".

*MAF Comment:*

PIANZ has mis-quoted the MAF risk analysis. What MAF actually wrote on this matter was : "in an abattoir approved by the competent authority."

- 9.22 Re: 8.1.4, PIANZ insists that bird age be specified.

*MAF Comment:*

It is stated on page 100 of the risk analysis that turkeys are slaughtered at 8, 12, and 23 weeks of age.

- 9.23 PIANZ states that HACCP must be implemented at all points in the feed production, livestock production, and slaughter & processing operations.

*MAF Comment:*

PIANZ gives no reasons for this position, nor for why they do not consider that similar conditions are not needed for chicken meat.

## **10. MINISTRY OF HEALTH (MOH)**

- 10.1 MoH states “An increased risk of New Zealanders being exposed to Salmonella Enteritidis PT4 and/or Salmonella Typhimurium DT 104 is of concern and the Ministry of Health believes a precautionary approach should apply”

*MAF Comment:*

In subsequent discussions, MoH has informed MAF that the preferred MoH “course of action is for biosecurity provisions to remain in the short term until a public health / food safety risk assessment can be completed to determine the circumstances that would compromise New Zealand’s unique salmonellae status”.

- 10.2 MoH notes that although an internal temperature is specified, there is “no reference to a holding time, bone-in or volume”. MoH states that this allows the temperature requirement to be misinterpreted.

*MAF Comment:*

It is unclear how this can be misinterpreted. As is explained in the text of the chapter in question, it is the attaining of a specific internal temperature that is the critical matter rather than the time taken to achieve that temperature or the time it is maintained. MAF refers MoH to table 3.1.6-1 on page 32 for a summary of experiments done on thermal inactivation of salmonellae in various foods.

- 10.3 MoH questions the usefulness of having products certified fit for human consumption when the risk assessment has not evaluated the public health risks to the New Zealand population.

*MAF Comment:*

Such certification is a normal requirement for all meat products imported into New Zealand for human consumption, just as it is required for meat exported for that purpose from this country [note the wording on the NZ MAF sanitary certificate for meat and meat products].

- 10.4 MoH claims that the biosecurity risk assessment modelled by MAF to protect avian health in NZ is not adequate to protect public health in this country. The submission states: “The Ministry of Health MoH considers that these changes would increase the public health risk and need to fully assess these risks.”

*MAF Comment:*

MAF interprets this point as meaning that MoH considers that they need to fully assess the public health risks posed by these products, and to identify whether any safeguards over and above the New Zealand domestic food safety regulations are necessary.

10.5 MoH identifies a number of issues that need to be investigated, under the following headings:

- a) antibiotic resistance
- b) compromised human host
- c) cross contamination

*MAF Comment:*

These issues are outside the mandate of MAF Biosecurity Authority, and need to be evaluated by MoH / MAF FAA. However, MAF considers that most of the issues raised were covered in detail in the risk analysis sections on salmonellae. MAF also considers that the precise meaning of the section headed "cross-contamination" is unclear.

10.6 MoH states in the section headed "Compromise" that "there is a need to establish the actual status of product being exported to New Zealand."

*MAF Comment:*

From subsequent discussions with MoH, MAF understands that the intent of the MoH comment was : "the systems employed to provide safe food would be fully investigated by the Ministry of Health under the Food Act 1981".

10.7 In the section headed "Internationally" MoH states : "The Swedish experience is that international certification provided by countries exporting poultry products has not given the assurances required" and that "39% of poultry imports with correct certification contained salmonella."

*MAF Comment:*

MAF notes this, and reiterates that the issue of salmonellae is to be reviewed by MoH / MAF FAA.

10.8 In an unreferenced statement MoH claims : "In the US, the prevalence of *Salmonella* in broilers after 12 months introduction of HACCP had seen an increase in the prevalence from 10.7% to 10.9% in just three months."

*MAF Comment:*

MAF questions whether an increase from 10.7% to 10.9% is either statistically or biologically significant. Moreover, as MAF pointed out on page 34 of the risk analysis, USDA claims a reduction from 20% to 10.7% in 9 months. This point was re-iterated in the USDA submission.

10.9 Under the heading "Conclusion", MoH states :

- a) "The Ministry of Health needs to review the effectiveness of the Salmonella control plans introduced by countries before any imported [sic] arrangements can be negotiated."

- b) “It is inappropriate to alter border restrictions until a full assessment of the public health impact has been completed.”
- c) Once the public health assessment has been completed the border arrangements can be reviewed.”

*MAF Comment:*

MAF notes these conclusions, and reiterates that the issue of salmonellae is to be reviewed by MoH / MAF FAA.

## **11. DEPARTMENT OF CONSERVATION (DOC)**

- 11.1 DoC considers that New Zealand native wildlife species are likely to be more susceptible to exotic diseases of poultry than introduced wildlife.

*MAF Comment:*

No reasons are given for this assumption. MAF does not understand the basis for this assertion.

- 11.2 DoC believes that “importation of chicken meat should only be imported [sic] from flocks demonstrated to be free of infectious bursal disease.:

*MAF Comment:*

In the MAF risk analysis it is stated : “As IBD virus causes disease only in chickens, its introduction would be expected to impact only on the poultry industry.” As discussed in the epidemiology of IBD there is no evidence that disease occurs in any species other than chickens, and it is not clear to MAF why DoC consider IBD to be an important conservation risk.

## **12. DR STEVE HATHAWAY**

- 12.1 Dr Hathaway confined his comments to microbiological hazards that have zoonotic potential, and which have been associated with human consumption of poultry products – in particular, *Salmonella typhimurium* DT104 and *S. enteritidis* PT4.
- 12.2 In the absence of a quantitative risk assessment model, Dr Hathaway agreed with the conclusions of the risk analysis.
- 12.3 However, Dr Hathaway doubts whether any HACCP plan could currently achieve these objectives, and he outlines three reasons for taking this view.
- 12.4 Dr Hathaway contends that although “first of the day processing” will significantly reduce the level of cross-contamination with *Salmonella*, it will not eliminate it entirely.
- 12.5 Dr Hathaway concludes that the public health significance of a low level of exposure of New Zealand consumers to these hazards can only be determined by a quantitative risk assessment model.

*MAF Comment:*

**The Biosecurity Authority is not in a position to carry out such a quantitative risk assessment. That would have to be addressed by the Food Assurance Authority. Dr Hathaway’s position is not inconsistent with the position taken by MoH. Appendix 1. New Zealand Newcastle disease status**

## Appendix 1. New Zealand Newcastle disease status

*New Zealand has never had an outbreak of Newcastle disease. An avirulent strain of avian paramyxovirus type 1 (PMV-1), with an intracerebral pathogenicity index (ICPI) of 0.0, is endemic in this country.*

### Early surveillance

The first serological evidence of avian paramyxoviruses in New Zealand poultry flocks was in 1966<sup>(1)</sup>. This was the same year that the V4 strain of PMV-1 was first isolated from chickens in Queensland, Australia<sup>(2)</sup>.

MAF's Animal Health Laboratories commenced passive surveillance for avian paramyxoviruses by attempting to isolate the virus from chickens submitted for respiratory disease or reduced egg production investigations. Between 1972 and 1977, no paramyxoviruses were detected in the approximately 800 chickens submitted to Ruakura and Wallaceville laboratories for such investigations<sup>(3)</sup>.

However, there was further serological evidence of PMV-1 infection in poultry in 1972 and 1973, including 6 to 8-week-old broilers hatched from imported eggs and two out of 37 commercial flocks in the Christchurch area<sup>(3)</sup>. But attempts to isolate PMV-1 from 460 imported eggs that failed to hatch were not successful<sup>(3)</sup>.

Pre-export testing of pheasants (*Phasianus colchicus*) in 1973, and of peafowl (*Pavo cristatus*) in 1976 revealed seroprevalence rates for PMV-1 of 75/220 and 4/6 respectively<sup>(3)</sup>.

In a survey of seabirds undertaken between 1975 and 1978 at several locations in the southern half of the South Island no paramyxoviruses were isolated from any of the 252 birds tested : 54 red-billed gulls (*Larus novaehollandiae*), 58 black-backed gulls (*Larus dominicanus*), 40 white-fronted terns (*Sterna striata*), or 100 sooty shearwaters (*Puffinus griseus*)<sup>(4)</sup>. The first isolation of a PMV-1 virus from ducks was in 1976, from tracheal and/or cloacal swabs from six out of 87 clinically normal mallard ducks (*Anas platyrhynchos*) from a wildlife refuge 30 km north of Dunedin. These isolates were all classified as strain A/mallard/NZ/132/76<sup>(4)</sup>.

The first isolations of PMV-1 viruses from poultry were in February 1978 during investigations into ill-thrift, respiratory problems and low egg production in four South Island poultry flocks<sup>(1)</sup>. Other causes were found for the clinical syndromes observed, and it was concluded that the viruses were in each case incidental findings<sup>(1)</sup>. In 1980 these four viruses were classified by a number of methods, as were four isolates from the mallard ducks sampled in 1976<sup>(4)</sup>, as well as one virus isolated from a red-breasted musk parrot (*Prosopieia tabuensis*) which was imported illegally from Fiji<sup>(5)</sup>. It was concluded that all nine viruses were avirulent<sup>(5)</sup>.

### Recent surveys

The poultry industry undertakes routine serological testing of commercial breeder flocks for PMV-1. Samples are taken from eight to ten birds at approximately 10 weekly intervals throughout the life of the flock. Broilers and commercial layer flocks are tested occasionally<sup>(6)</sup>. The serological testing for PMV-1 antibodies is performed either by the poultry industry laboratories or by the Ministry of Agriculture and Forestry's Animal Health

Reference Laboratory , National Centre for Disease Investigation (NCDI)<sup>2</sup>. In 1997, 8,376 sera from commercial poultry flocks were tested and 202 had positive titres<sup>(7)</sup>, while in 1998 8,113 sera were tested and 12 were positive<sup>(8)</sup>. Most positive reactions were in flocks either in Taranaki or in West Auckland, and the virus does not usually carry over into the young flock following clean-out<sup>(6)</sup>. However, the epidemiology of PMV-1 infection in New Zealand poultry flocks has not been elucidated, and there is sometimes repeated detection of antibodies in successive flocks on the same site<sup>(9)</sup>.

The Animal Health Reference Laboratory periodically carries out surveys of non-commercial avian species for orthomyxoviruses and paramyxoviruses . Surveys of wild ducks for avian paramyxoviruses have been carried out in 1989<sup>(10)</sup>, 1990<sup>(11)</sup>, and 1997<sup>(12, 13)</sup>. A survey of feral pigeons and four species of wild and captive native birds was carried out in 1994<sup>(14, 15)</sup>. A survey of caged and wild birds was carried out over the period 1997 to 1999<sup>(16)</sup>. The results of these surveys are presented in Table I.

In the 1989 and 1990 duck surveys, no PMV-1 viruses were isolated, possibly because sampling was carried out in May when few juvenile birds were present<sup>(10,11)</sup>. The 1997 survey was carried out earlier in the year when there was a high ratio of juvenile to adult ducks. This resulted in the isolation of 10 PMV-1 viruses from tracheal and cloacal swabs, and serological reactions to PMV-1 were found in 76% of ducks<sup>(12)</sup>.

The 1993 survey showed no evidence of PMV-1 in feral pigeons or native birds<sup>(14)</sup>. Although further survey work over the period December 1997 to April 1999 showed a low prevalence of antibody titres in caged and wild birds(11/231 and 9/522 respectively), no paramyxoviruses were isolated from 271 cloacal swabs<sup>(16)</sup>.

### **Risk of introduction of PMV-1 by migratory birds**

It is believed that migratory water birds might play an epidemiologically important role in the spread of Newcastle disease in some countries by acting as reservoirs of PMV-1 viruses with possible subsequent transmission to commercial flocks<sup>(17)</sup>.

Banding studies show that wild ducks disperse widely throughout New Zealand, but they are not migratory<sup>(18)</sup>, and although there are isolated reports of long distance transmarine movements of some species, there is no evidence that Palaearctic ducks reach New Zealand<sup>(19)</sup>. Therefore, while ducks may be important in spreading the existing PMV-1 viruses within this country, the risk of new virus strains being introduced by these birds appears to be minimal.

The main migratory birds in this country are shorebirds in the family *Scolopacidae* (sandpipers and allies) within the order *Charadriiformes*. These birds breed in the low Arctic regions of Europe, Asia and North America, and they migrate south for the boreal winter. The most numerous species that migrate to New Zealand are : bar-tailed godwit (*Limosa lapponica*), lesser knot (*Calidris canutus*), ruddy turnstone (*Arenaria interpres*), curlew sandpiper (*Calidris ferruginea*), red-necked stint (*Calidris ruficollis*) and pacific golden plover (*Pluvialis fulva*)<sup>(18)</sup>.

A PMV-1 virus has been isolated from a species of sandpiper of the genus *Calidris* in Western Australia in 1979-80<sup>(20)</sup>, but PMV-1 viruses have not been reported in any of the species which migrate to New Zealand<sup>(21)</sup>. The 1997 survey of wild birds included 26 lesser knots and one bar-tailed godwit. Six of the lesser knots (23%) were positive for PMV-1 antibodies<sup>(16)</sup>, suggesting that it may be possible for new strains of the virus to be introduced into the country by these birds.

### Definition of Newcastle disease

Until recently the OIE definition of Newcastle disease was “a disease of birds caused by strains of avian paramyxovirus type 1, significantly more virulent than lentogenic strains”<sup>(22)</sup>. This definition rests on the grouping of Newcastle disease viruses into five pathotypes on the basis of clinical signs seen in infected chickens<sup>(23)</sup>. There has never been any evidence of pathogenic strains of PMV-1 in New Zealand, and on that basis this country has been considered free of Newcastle disease.

However, the lack of objectivity in assigning viruses to these pathotype groups has long caused difficulties in international trade, and this led to the development of other tests to distinguish between strains. The most widely used tests are the intracerebral pathogenicity index (ICPI) in day-old chicks and the intravenous pathogenicity index (IVPI) in 6-week-old chickens<sup>(23)</sup>.

More recently, sequencing studies of the fusion protein of paramyxoviruses have elucidated a molecular basis for pathogenicity<sup>(24)</sup>. It appears that the amino acid sequence at the cleavage site of the virus fusion protein is a key determinant for infectivity and pathogenicity. Strains of the virus with multiple basic amino acids at the F<sub>0</sub> cleavage site are virulent for their hosts, while those strains with F<sub>0</sub> molecules that have single basic residues are avirulent<sup>(25)</sup>. In view of this, at the 67<sup>th</sup> General Session of the OIE the definition of Newcastle disease was changed as follows<sup>(26)</sup>:

“Newcastle disease is defined as an infection of birds caused by a virus of avian paramyxovirus serotype 1 (APMV-1) that meets one of the following criteria for virulence:

- a) The virus has an intracerebral pathogenicity index (ICPI) in day-old chicks (*Gallus gallus*) of 0.7 or greater.
- or
- b) Multiple basic amino acids have been demonstrated in the virus (either directly or by deduction) at the C-terminus of the F2 protein and phenylalanine at residue 117, which is the N-terminus of the F1 protein. The term ‘multiple basic amino acids’ refers to at least three arginine or lysine residues between residues 113 and 116<sup>3</sup>. Failure to demonstrate the characteristic pattern of amino acid residues as described above would require characterisation of the isolated virus by an ICPI test.”

The wording of the new definition of Newcastle disease has several implications for international trade. Firstly, the classification of PMV-1 isolates into pathotype groups is no

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<sup>3</sup> In this definition, amino acid residues are numbered from the N-terminus of the amino acid sequence deduced from the nucleotide sequence of the F<sub>0</sub> gene, 113-116 corresponds to residues -4 to -1 from the cleavage site.

longer appropriate. Secondly, an infection of any bird species with a virus fitting the new definition would affect the status of the country concerned, as disease in poultry is no longer the only focus.

### **Pathogenicity of New Zealand isolates**

In view of the new definition of Newcastle disease, work has begun to characterise the New Zealand PMV-1 isolates using biological and molecular approaches<sup>(27, 28)</sup>. The results so far are presented in Table II. Of the 15 PMV-1 isolates characterised, three were isolated from chickens, one from a parrot, and 11 from wild mallard ducks.

To assess the ICPI, 1-day-old specific pathogen free (SPF) chickens were inoculated intracerebrally with the viruses and scored according to the clinical signs observed, following the method outlined in the *OIE Manual of Standards*<sup>(23)</sup>. None of the viruses produced any clinical signs in the test chickens so the ICPI for each isolate was 0.0.

RT-PCR techniques were used to amplify nucleotide sequences of the fusion protein gene cleavage site of the PMV-1 isolates. The products obtained were sequenced and the amino acid sequences were deduced<sup>(28)</sup>. For all isolates the amino acid sequences of the F2/F1 cleavage site were <sup>112</sup>G/E-K/R-Q-G/E-R-L<sup>117</sup> which is typical of viruses of low virulence<sup>(29)</sup>.

### **Conclusion**

The avirulent strains of PMV-1 which are present in New Zealand appear to be widespread in many species of wild bird and commercial poultry. It is possible that migratory waders might introduce strains of higher virulence, which could be spread by non-migratory waterfowl. Further survey work on migratory waders is warranted.

### **References**

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**Table I. Surveys of New Zealand wild birds for avian paramyxovirus type 1**

Year	Bird species surveyed	Time of year	Samples taken	Location	Findings	Reference
1989	Ducks (wild mallards, <i>Anas platyrhynchos</i> , shot by hunters)	May	277 faecal samples 45 cloacal swabs 19 tracheal swabs 3 pond water samples	16 areas (12 North Island, 4 South Island)	no PMVs isolated	10
1990	Ducks, wild, shot by hunters (mainly mallard ducks, <i>Anas platyrhynchos</i> , but also a few paradise shell ducks, <i>Tadorna variegata</i> , and grey ducks, <i>Anas castanea</i> )	May	85 faecal samples 52 cloacal swabs 66 tracheal swabs 5 pond water samples	16 areas (same as 1989 survey)	one PMV-4 isolate	11
1993	54 Feral pigeons ( <i>Columbia livia</i> ), 61 native birds 40 Kaka ( <i>Nestor meridionalis</i> ), 12 Kea ( <i>Nestor notabilis</i> ), 7 Weka ( <i>Gallirallus australis</i> ), 2 New Zealand pigeons ( <i>Hemiphaga novaeseelandiae</i> ).	April-August	54 Feral pigeons: <ul style="list-style-type: none"> <li>• 53 serum samples</li> <li>• 54 tracheal swabs</li> <li>• 54 cloacal swabs</li> <li>• 54 faecal samples</li> <li>• 54 intestinal tissue samples</li> </ul> 61 Native birds: <ul style="list-style-type: none"> <li>• 55 serum samples</li> <li>• 61 cloacal swabs</li> <li>• 61 faecal samples</li> </ul>	Feral pigeons: <ul style="list-style-type: none"> <li>• Auckland</li> <li>• Wellington</li> <li>• Christchurch</li> </ul> Native birds: <ul style="list-style-type: none"> <li>• Kapiti Is.</li> <li>• Little Barrier Is.</li> <li>• Auckland zoo</li> <li>• Wellington zoo</li> <li>• Mt Bruce</li> <li>• Peacock springs</li> </ul>	no PMVs isolated, no antibody to PMVs	14, 15
1997	Ducks 346 mallard ( <i>Anas platyrhynchos</i> ), mostly juveniles, trapped in wire mesh traps	January-March	315 serum samples 321 tracheal swabs 321 cloacal swabs	North Island: <ul style="list-style-type: none"> <li>• Bay of Plenty</li> <li>• Fielding</li> <li>• Carterton</li> </ul> South Island: <ul style="list-style-type: none"> <li>• Temuka</li> <li>• Invercargill</li> </ul>	76% of sera had PMV-1 titres $\geq$ 1/8  33 viruses isolated from 28 ducks (10 tracheal, 23 cloacal): <ul style="list-style-type: none"> <li>• 10 isolates of PMV-1,</li> <li>• 15 isolates of PMV-4</li> <li>• 6 isolates of avian influenza (H5N2, H4N6)</li> </ul>	12, 13
1997-1999	231 caged birds of 24 species 126 Psittaciformes 51 Passeriformes	December 1997 to April 1999	231 serum samples 116 cloacal swabs	14 sites <ul style="list-style-type: none"> <li>• 9 North Island</li> <li>• 5 South Island</li> </ul>	11 sera with PMV-1 Ab no PMVs isolated	16

Year	Bird species surveyed	Time of year	Samples taken	Location	Findings	Reference
	35 Galliformes 19 Columbiformes					
1997-1999	522 wild birds of 24 species: 456 Passeriformes 31 Charadriiformes 17 Psittaciformes 6 Columbiformes 4 Gruiformes 3 Falconiformes 1 Anseriformes 1 Galliformes 1 Coraciiformes	December 1997 to February 1999	522 serum samples 155 cloacal swabs	13 sites <ul style="list-style-type: none"> <li>• 7 North Island</li> <li>• 6 South Island</li> </ul>	9 sera with PMV-1 Ab 22 sera with PMV-2 Ab 4 sera with PMV-4 Ab no PMVs isolated	16

**Table II. Classification of New Zealand isolates of PMV-1 by ICPI and fusion protein amino acid sequence.**

<b>PMV-1 isolate</b>	Species of origin	Date of isolation, reference	<i>ICPI</i>	Number of replicates	Amino acid sequence at F1/F2 cleavage site, from position 112 to 117
7579	chicken	1976-78 5	0.0 ♣	2	GKQGRL
8038	chicken	1976-78 5	0.0 ♣	2	GKQGRL
3528	parrot	1976-78 5	0.0 ♣	2	GKQGRL
8043	chicken	1995 26	0.0 ♣	2	GKQGRL
PMV1/D/NZ/1/97	mallard duck	1997 16	0.0 ♠	2	ERQGRL
PMV1/D/NZ/2/97	mallard duck	1997 16	0.0	1	GKQGRL
PMV1/D/NZ/3/97	mallard duck	1997 16	nt		GKQGRL
PMV1/D/NZ/4/97	mallard duck	1997 16	0.0	1	GKQGRL
PMV1/D/NZ/5/97	mallard duck	1997 16	0.0 ♠	2	GKQGRL
PMV1/D/NZ/6/97	mallard duck	1997 16	nt		GKQGRL
PMV1/D/NZ/7/97	mallard duck	1997 16	0.0	1	GKQGRL
PMV1/D/NZ/8/97	mallard duck	1997 16	0.0	1	GKQGRL
PMV1/D/NZ/9/97	mallard duck	1997 16	0.0	1	GKQGRL
PMV1/D/NZ/10/97	mallard duck	1997 16	0.0	1	GKQGRL
PMV1/D/NZ/132/76	mallard duck	1976 4	nt		GKQGRL

Notes:

nt = not tested

♣ two ICPI replicates carried out at NCDI

♠ one ICPI replicate carried out at NCDI, another carried out at CVL, Weybridge, UK