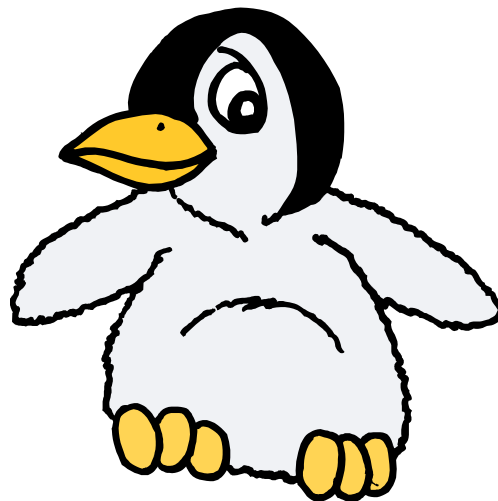




Australian Government

Biosecurity Australia

Policy review of the biosecurity risks associated with the importation of penguins from New Zealand



February 2008

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Glossary of Terms and Abbreviations

| | |
|---------------|---|
| ABARE | Australian Bureau of Agriculture and Resource Economics |
| AI | Avian Influenza |
| ALOP | Appropriate Level of Protection |
| AQIS | Australian Quarantine and Inspection Service |
| ARAZPA | Australasian Regional Association of Zoological Parks and Aquaria |
| HPAI | Highly pathogenic avian influenza |
| HEPA | High Efficiency Particulate Air |
| IATA | International Air Transport Association |
| IBDV | Infectious bursal disease virus |
| KTUW | Kelly Tarlton's Antarctic Encounter and Underwater World |
| LPNAI | Low pathogenic notifiable avian influenza |
| MAF NZ | Ministry of Agriculture and Forestry, New Zealand |
| MAQ | Melbourne Aquarium |
| ND | Newcastle disease |
| OAG | Oceanis Australia Group |
| OIE | World Organisation for Animal Health |
| PAQ | Post-arrival quarantine |
| PEQ | Pre-export quarantine |
| QAP | Quarantine approved premises |
| QC3 | Quarantine Containment Level 3 Facility |
| QC4 | Quarantine Containment Level 4 Facility |
| SPS Agreement | WTO Agreement on the Application of the Sanitary and Phytosanitary Measures |
| WTO | World Trade Organization |

Executive Summary

This policy review is in response to a request from the Oceanis Australia Group (OAG) for the permanent importation into Australia of two species of penguin from Kelly Tarlton's Antarctic Encounter and Underwater World (KTUW) in Auckland, New Zealand. These species are the King penguin (*Aptenodytes patagonicus*) and the Gentoo penguin (*Pygoscelis papua*).

The penguins have been managed as a distinct population in a controlled environment in New Zealand for nearly twelve years. It is anticipated that up to seventy seven penguins will be imported into Australia over four seasons: twenty four King and fifty three Gentoo penguins (most likely fledglings or adults 1-2 years of age). It is proposed that they will be transported to Australia using existing and proven methods developed by KTUW, and in accordance with any Australian Quarantine and Inspection Service (AQIS) requirements. Transport will be by air by the most direct route.

In Australia, the penguins will be managed as a distinct population in a purpose-built, climate controlled facility at the Melbourne Aquarium (MAQ) in Victoria, separate from the surrounding environment. The penguins will be in effective containment (i.e. quarantine) within the facility and at no stage will any penguins be released into the Australian environment.

The policy review proposes that the quarantine risks associated with importation of penguins from KTUW into MAQ is negligible and thus meet Australia's appropriate level of protection (ALOP). The conclusion is based on the good health status of New Zealand, the closely controlled source flock in New Zealand, test results confirming freedom from avian influenza, Newcastle disease and infectious bursal disease and the closely controlled conditions in Australia.

1 Background

1.1 Introduction

Biosecurity Australia is a prescribed Agency within the Australian Government Department of Agriculture, Fisheries and Forestry. Biosecurity Australia is responsible for developing quarantine policy for animal and animal product imports, and for liaising with overseas veterinary authorities to determine their requirements for exports of Australian animals and their genetic material.

As part of the policy review, Biosecurity Australia identified and categorised hazards potentially associated with the importation of penguins. Risk assessments of these disease agents were undertaken when required. Scientific literature, existing policies and the recent *Draft Generic Import Risk Analysis Report for Chicken Meat* (Biosecurity Australia, 2006)¹ were used as a reference during the preparation of this report.

1.2 Proposal

This policy review has been undertaken in response to a request from the Oceanis Australia Group (OAG) for the permanent importation into Australia (specifically, the Melbourne Aquarium (MAQ) in Victoria) of two species of penguin from Kelly Tarlton's Antarctic Encounter and Underwater World (KTUW) in Auckland, New Zealand. The two species are the King penguin (*Aptenodytes patagonicus*) and the Gentoo penguin (*Pygoscelis papua*).

Over a number of years, representatives of KTUW and Thorburn Consultants (NZ) Limited have provided technical and scientific information to support their proposal. An officer from Biosecurity Australia visited New Zealand in October 2006 for meetings and a site visit to the Antarctic exhibit at KTUW. Several meetings have since been held in Canberra with representatives from Thorburn Consultants (NZ) Limited, OAG and Biosecurity Australia. The information gathered from these meetings is also considered in this review.

1.3 Scope

This policy review considers the quarantine risks that may be associated with the importation into Australia of King and Gentoo penguins from the facility at KTUW in Auckland, New Zealand. The review includes an assessment of all the potential disease agents that may be introduced to Australia via the importation of these birds.

The source flock of penguins has been managed as a distinct population in a controlled environment at KTUW since December 1995 (over twelve years), and will be similarly managed as a distinct population in a controlled environment within a purpose built facility at MAQ in Victoria, Australia.

The Melbourne based facility will be specifically designed to meet the American Zoo and Aquarium Association standards (AZA, 2005) and as a Quarantine Containment Level 3 (QC3) Facility (AQIS, 2005) in order to provide adequate biosecurity for the penguins. The penguins will be in effective permanent containment (quarantine) within the purpose built

¹ See <http://www.daffa.gov.au/ba/ira/current-animal/chicken-meat> (accessed July 2007)

facility for the term of their natural lives and at no stage will any penguins be released to the Australian environment.

It is unlikely that penguin reproduction will be intentionally restricted as breeding behaviour is not only an indicator of good mental and physical health, it also aids the penguins in synchronising physiological processes such as feather moulting. Once the facility in Australia is fully stocked, fertile eggs may be replaced with 'dummy' eggs and surplus hatched penguins potentially exported to facilities overseas to aid in preserving the genetic diversity of captive penguins around the world.

1.4 Australia's quarantine policy for the importation of live birds and genetic material

- New conditions for the import of live birds (pigeons and psittacines) were finalised in 1989 from countries where Newcastle disease (ND) had not occurred in the past 6 months. Importation of live birds under these conditions commenced in 1990.
- Another review of the live bird importation program was completed in 1993 and as a result, the importation of live birds, other than pigeons, was suspended in 1995 with the exception of individually owned pet birds from New Zealand which are permitted under specific conditions.
- Imports of live pigeons were revised in 1999 and amended in 2005. Details of these conditions are available at <http://www.daff.gov.au/aqis> or by contacting Animal Programs in AQIS.
- Import conditions for hatching eggs of domestic hens, turkey and ducks were established in 1989 and have since been amended, most recently in 2005 and 2006. Details of these conditions are available at <http://www.daff.gov.au/aqis> or by contacting Animal Programs in AQIS.

1.5 Domestic movement regulations

The Australian Government is responsible for regulating the movement of animals and their products into and out of Australia, but the State and Territory governments have primary responsibility for animal health controls within their jurisdictions. Legislation relating to resource management or animal health may be used by State and Territory government agencies to control interstate movement of animals and their products.

Inter-state movement of birds is subject to State wildlife legislation. In addition, restrictions have existed from time to time, due to outbreaks of exotic disease such as virulent Newcastle disease (in certain areas of New South Wales between 1998 and 2002 and in Victoria in 2002), or avian influenza (most recently in New South Wales in 1997). These outbreaks were managed by stamping out or, in the case of Newcastle disease, stamping out and vaccination.

1.6 Potentially affected Australian industries

The introduction of an exotic disease could potentially affect several Australian industries or sectors. A brief description of each industry is given below.

1.6.1 Native birds and the environment

Australia has significant populations of native birds, many of which do not occur naturally elsewhere. The conservation value of native birds is extremely high, but is difficult to measure. Some of Australia's native species have been shown by overseas experience to be susceptible to the major exotic diseases of poultry. The potential effects of an outbreak of exotic disease in our wild bird populations are difficult to estimate but would be severe.

1.6.2 Avicultural community

The aviculture community in Australia covers a wide spectrum of the population, from individuals with a single pet bird, to commercial enterprises worth millions of dollars. The most recent available figures from the Australian Bureau of Statistics on pet ownership in Australia showed that in 1994, the most common pets were birds (6.0 million) followed by fish (4.3 million), dogs (3.1 million) and cats (2.5 million). In Australia, 16% of households keep pet birds, with 35% keeping three or more birds ((Australian Bureau of Statistics 1995).

1.6.3 Zoological gardens

Zoological parks and aquariums (i.e. animal, fauna, bird and reptile parks, aquariums, aviaries, butterfly houses and dolphinariums) are primarily engaged in the breeding, preservation, study and display of native and/or exotic fauna in captivity, and are accessible to the general public (Australian Bureau of Statistics, 2007). They may keep a wide range of avian species, many of which are of great value, and some of which are listed as endangered species.

The Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) represents zoological gardens and aquaria in the Australasian region. ARAZPA's aims and objectives include cultural enhancement, conservation and education.

The importance of zoos in Australia has been recognised for a long time. Many of the major Australian zoos were established last century. Their popularity is shown by the high level of visitors; in 2005-2006, some 46% of people aged 25-44 years old attended a zoo or aquarium (Australian Bureau of Statistics, 2007).

More than eight million people visit captive wildlife facilities across Australia each year (Australian Bureau of Statistics 1998). They are an integral part of local economies through the attraction of visitors. The Australian zoo industry has an annual turnover of \$A143 million and employs almost 2,000 people (Australian Bureau of Statistics 1998).

1.6.4 Commercial chicken meat industry

The chicken meat industry is located in New South Wales (35%), Victoria (28%), Queensland (18%), South Australia (9%), Western Australia (9%) and Tasmania (1%) (Australian Chicken Meat Federation 2005).

The Australian Bureau of Agriculture and Resource Economics (ABARE) forward estimate for poultry meat production in 2007-08 was 847 kilotonnes (ABARE, 2007). In 2005, Australian production was 817 kilotonnes (ABARE, 2006). Chicken meat consumption per person is projected to increase to 39.1 kg per person in 2007-2008 (ABARE, 2007).

In 2000 to 2001, exports accounted for only 1.8% of turnover in the chicken meat industry (Anonymous 2002 as cited in the *Draft Generic Import Risk Analysis Report for Chicken Meat*, June 2006), with some export markets closing in response to Newcastle disease outbreaks in New South Wales and Victoria in 1998, 2000 and 2002. Poultry meat exports were forecast to reach 22.0 kilotonnes in 2007-08 (ABARE, 2007). Major export markets are Hong Kong/China, South Africa and the Pacific Island nations.

There is a growing export market for Australian breeding stock. Potential growth of this market however, will depend, among other things, on the continued absence of major poultry diseases in the Australian breeder flock.

1.6.5 Commercial poultry egg industry

There are about 480 commercial egg producers in Australia, with a national flock size of around 15.8 million (Dubs 2005). Approximately 39% of egg production is located in New South Wales, 23% in Victoria, 22% in Queensland, 8% in Western Australia, 5% in South Australia, 2% in Tasmania and 1% in the Northern Territory (Dubs 2005).

The egg industry in Australia is dominated by egg production from the domestic chicken. However, there are niche markets for duck, goose, quail and pigeon eggs. In contrast with the chicken egg industry, non-chicken eggs are produced by small operators or as a sideline to a meat industry.

Domestic retail sales of shell eggs were estimated at \$A199.3 million between July 2005 and July 2006. The value of exports (shell egg and egg products) was \$A2.264 million in 2005 (Australian Egg Corporation Limited, 2007).

1.6.6 Turkeys and other game birds

All Australian States have a small game-bird industry, with New South Wales and Victoria being the largest production centres.

Approximately 17 million game birds were processed in Australia in 2001-2002, with duck, quail and turkey accounting for 95%. Duck production occurs in most states, with two companies producing most of the Pekin type duck for the restaurant and hospitality sectors. The majority (77%) of Australia's 4.7 million turkeys are produced by large, vertically-integrated chicken meat companies, with the remainder being produced by large independent growers or smaller producers in each state. A single New South Wales company accounts for about 75% of the 6.5 million quail processed in Australia each year, with smaller producers in New South Wales, Victoria and South Australia. Squab producers are located in Queensland, New South Wales and Victoria, while pheasant, guinea fowl, partridge and geese producers are concentrated mainly in New South Wales and Victoria (Leech *et al.* 2003).

The retail value of the game bird market is estimated at \$A290 million per year (Leech *et al.* 2003). Export markets have been severely compromised by outbreaks of Newcastle disease in New South Wales and Victoria in recent years.

1.6.7 Ostrich industry

While relatively small compared with the chicken meat and egg industries, the Australian ostrich industry had grown in recent years. Significant export markets had been developed for ostrich meat, before restrictions were placed on access due to outbreaks of Newcastle disease in New South Wales and Victoria.

1.6.8 Pigeons

While it is not a large or well-organised industry in Australia, there are a number of individuals who have put considerable resources into developing international markets for racing and show pigeons. Restrictions on exports from New South Wales and Victoria due to outbreaks of Newcastle disease in those states have caused financial losses to some pigeon breeders.

1.6.9 Backyard poultry

About 6-7% of Australian households keep poultry and it is estimated that 10% of all eggs are produced by small operators or backyard producers. (Agriculture and Resource Management Council of Australia and New Zealand 1996)

1.7 New Zealand avian health status

1.7.1 Background

New Zealand claims country freedom from infectious bursal disease virus (IBDV), low pathogenic notifiable avian influenza (LPNAI) and highly pathogenic avian influenza (HPAI), Newcastle disease (ND; paramyxovirus 1), avian infectious bronchitis virus, various salmonellae and certain other paramyxoviruses. It has a high level of border and on-farm security, and the New Zealand Ministry of Agriculture and Forestry (MAF NZ) and industry continue to work together to ensure appropriate measures are in place should an outbreak of disease occur in the country. A brief description of New Zealand's disease status for IBDV, avian influenza (AI) and ND is presented.

1.7.2 Infectious bursal disease

Infectious bursal disease (IBD) is an acute, highly contagious viral infection of young chickens. The IBD virus has a world-wide distribution. IBD serotype 1 (IBD1) viruses mainly infect fowl and antibodies are common in ducks, turkeys, geese, silver gulls and penguins, for example. There are many strains of IBD1. IBD serotype 2 (IBD2) viruses are prevalent in turkeys and antibodies are common in chickens and ducks. However, IBD2 has not been shown to cause disease in any avian species (Lukert and Saif, 1997).

A low pathogenic strain of IBD virus was introduced into New Zealand (MAF NZ, 1999) in 1993 with a relatively small proportion of farms infected. Following attempts to eradicate this strain, the last flock seropositive to IBD was detected in January 1999 (MAF NZ, 1999).

The New Zealand poultry industry currently operates a 'Country Freedom Quality Plan' for IBD surveillance and flock accreditation. As it is impossible to distinguish clinically, pathologically or serologically between exotic low-virulence strains of serotype 1 infectious

bursal disease virus and the strain previously seen in New Zealand, all suspect cases of IBD have to be reported to the MAF NZ Investigation and Diagnostic Centre.

No IBDV has been reported since 1999 (Tana, 2007). Results of monitoring indicate that the agent has been successfully eradicated.

1.7.3 Avian influenza

Avian influenza (AI) is caused by viruses of the genus Influenzavirus A in the family Orthomyxoviridae. It is a viral infection that can affect many species of birds.

The World Organisation for Animal Health (OIE) defines highly pathogenic strains of AI as *able to produce mortality in six or more (>75%) of eight susceptible 4-8 week old chickens within 10 days of intravenous inoculation*. The European Commission has a similar definition using the intravenous pathogenicity index (Council of the European Communities, 1992). All reported outbreaks of HPAI have been of the H5 or H7 subtype although many H5 and H7 subtype viruses isolated from birds have been of low virulence (Alexander, 1997).

Migratory waterfowl (ducks and geese) present a natural reservoir for AI viruses and have been responsible for the primary introduction of infection in other countries. New Zealand is not on a migration pathway of any waterfowl, except very occasionally vagrants from southern Australia. Wild birds are considered to be a very low disease risk to New Zealand.

In New Zealand, the majority of migratory birds are shorebirds or waders, including bar-tailed godwit, lesser knot, ruddy turnstone and Pacific golden plover that arrive from Siberian breeding grounds in September-October. There is evidence that some fly directly to New Zealand but others stop off in Asia and Australia. Shorebirds present a much lower disease risk than waterfowl (geese/ducks) because they shed less virus and mix less with poultry.

MAF NZ has long been aware of the potential risk of introduction of AI viruses by migratory birds and since 1984, has been monitoring migratory shorebirds soon after their arrival in the country. In the last two years, almost 2000 samples have been collected from bar-tailed godwits, knots and wrybills (a non-migratory wader that is in very close contact with the migrants from the time of their arrival in New Zealand) and mallard ducks in the vicinity of arrival locations. No H5N1 or other HPAI viruses were isolated from any of these samples, or from the less intensive sampling that was conducted in previous years (Egg Producers Federation of New Zealand, 2007).

Since the beginning of 2006, there have been a number of reports of new AI infections of wild birds and backyard poultry in several countries in both Asia and Europe, and in commercial poultry in Africa. However, the situation in New Zealand remains unchanged. The New Zealand poultry industry is free from HPAI and has never experienced an outbreak of any pathogenic AI.

1.7.4 Newcastle disease

Newcastle disease (ND) is caused by a member of the genus Rubulavirus in the family Paramyxoviridae. Nine distinct serogroups of avian paramyxoviruses have been defined and are designated APMV-1 to APMV-9. Newcastle disease virus (NDV) has been designated APMV-1 (Alexander, 2003).

The natural hosts of NDV are domestic poultry, including chickens, turkeys, ducks, geese, pigeons, quail, pheasants, guinea fowl and ostriches, and many species of captive caged birds and wild birds (Alexander 2000). Susceptibility varies between species, with chickens the most likely to show clinical ND and water birds the least likely to be affected clinically (Kaleta and Baldauf 1988).

MAF NZ reports quarterly to the OIE and in the October to December 2006 report stated that *New Zealand has never experienced an outbreak of Newcastle disease. An asymptomatic enteric strain of avian paramyxovirus type 1 (APMV-1), with an intracerebral pathogenicity index (ICPI) of 0.00-0.16, is endemic in this country. The poultry industry operates a serological surveillance programme for avian paramyxoviruses. Surveillance data is reported annually in the June issue of Surveillance magazine, and in the annual report to OIE (Anon, 2006).*

1.8 Details of the source flock

1.8.1 Kelly Tarlton's Antarctic Encounter and Underwater World

Kelly Tarlton's Antarctic Encounter and Underwater World (KTUW) is an aquarium and Antarctic display operating in Auckland, New Zealand. The Antarctic exhibit was created in 1993 to house King and Gentoo penguins. The penguin facility meets the conditions of MAF NZ Biosecurity Authority Standard 154.03.04 Containment Standards for Zoo Animals, and is audited by MAF NZ annually. It is a closed environment with demonstrable air quality and staff containment practices. Random audits may be undertaken by MAF NZ.

1. Water – a water treatment plant is used, which includes mechanical and biological filtration. Ozone treatment keeps the pool clean and free of organic waste (e.g. ammonia compounds from the penguins' droppings). The pool water is chilled to 9°C.
2. Air quality and temperature – the fresh air into the penguin area is filtered down to 3 microns through IPSCO MF95 filters (EU9). Air quality testing is done by an independent laboratory at 6 monthly intervals. The refrigeration system is capable of holding air temperature at -10 °C, although the penguins are more comfortable in -2 °C to +2 °C temperatures.
3. Lighting – computer controlled lighting produces the correct hours of light and dark (as found at the bottom of South America in Drake's Passage, to include sunrise, sunset and the correct mix of ultraviolet light). As in the sub-Antarctic, the shortest day is June 19 and the longest day is December 17.
4. All staff undergo garment changes (waterproof overalls, gumboots, gloves and jackets) before working within the exhibit, and foot baths are used at each entry point within the facility. All equipment within the exhibit always remains in the area.
5. The penguins are not exposed to other animals.

The first penguins to be imported into KTUW were 20 King penguins from Sea World, San Antonio in the United States of America on 19 September 1994, followed on 2 December 1995 by 29 Gentoo penguins from Edinburgh Zoo in Scotland. Each import of penguins arrived under MAF NZ supervision and they were quarantined in a high secure avian transitional facility built to MAF NZ Standard 154.02.05 before being transferred to the

Antarctic display at KTUW in Auckland. The penguins have remained at the Antarctic facility under full time care since then. There have been no additions since December 1995.

1.8.2 Health of the source flock

The KTUW penguin colony has maintained excellent health since its establishment. A detailed history, including the breeding records, is presented in Appendix 1.

All penguins are individually banded, and individual health, moult and breeding records are maintained. MAF NZ requires that individual records be maintained, and any penguin illness or death due to disease must be reported to them. All deceased animals must undergo a post-mortem examination and MAF NZ must be notified.

The health of the penguin colony is constantly monitored by staff and veterinarians, with scheduled MAF NZ inspections. A blood sample has been taken from the majority of the birds for sexing and to get values for normal ranges. If a bird is unwell, faecal samples will usually be taken before blood is collected, as obtaining blood from penguins is not an easy procedure.

Adult mortalities

- Gentoo penguins - there have been 5 adult deaths between 1995 and April 2007. One died from accidental causes, and one died from a torn jugular during MAF NZ blood sampling in post arrival quarantine in 1995. There were no significant findings on the post-mortem examinations on the remaining 3 birds.
- King penguins – there have been 2 adult deaths between 1994 and April 2007. Both died during the MAF NZ post-arrival quarantine due to an adverse reaction to medication for oocysts found in faecal samples. The source of these oocysts was eventually found to be the fish fed to the penguins and not a penguin parasite (B.Westera personal communication, April 2007).

Medical files

KTUW maintains files that record medical details of the penguins. There are occasional physical injuries, but no contagious infectious diseases. The main mechanical injuries received by the penguins are generally toenail injuries (e.g. breakages), sore legs/feet, flipper injuries and punctures/scratches from other birds.

1.9 Previous penguin exports from the source flock

In most seasons, penguin reproduction at KTUW is not restricted. Surplus penguins have been exported to several international facilities (e.g. China, Spain, Taiwan and Japan) as part of the captive breeding program at KTUW.

From 2000 to 2007, there have been 8 exports to a variety of countries for a total of 110 birds. Testing that was performed (with negative results; see Appendix 1) to meet requirements for the 2006 China and Hong Kong exports were for:

- Avian influenza – H5 and H7 antigen; using the haemagglutination inhibition test (at a serum dilution of 1:8) and polymerase chain reaction.
- Newcastle disease – using the haemagglutination inhibition test (at a serum dilution of 1:8).
- Chlamydiosis – using the complement fixation test.

1.10 Penguin transportation

Over a period of several years and with a number of international exports, staff at KTUW, in conjunction with independent consultant Scott Dreishman (Wildlife Concepts International), have developed a transport method and routine that has proven 100% successful.

The transport conditions for travel to Australia would need to meet the requirements of both AQIS and the International Air Transport Association (IATA). Details of the proposed transport to Melbourne are presented in Appendix 2.

1.11 The Melbourne Aquarium and the penguin facility

The Melbourne Aquarium (MAQ) was founded in 1999 on the banks of the Yarra River in central Melbourne. It is the newest and most state-of-the-art aquarium in Australia, and there have been plans to construct a King and Gentoo penguin exhibit since 2001.

MAQ is proposing to import live King and Gentoo Penguins from KTUW to a purpose built, climate controlled facility, for the purposes of:

- Establishing a second breeding colony of King and Gentoo penguins in the southern hemisphere to facilitate a long term regional species management plan.
- Improving the genetic diversity of the New Zealand flock (via the proposed importation of fertile penguin eggs from the USA in the future).
- Developing a public display focusing on Australia's Antarctic Territories as a conservation and educational experience.
- Creating the first Antarctic display in Australia with penguins.

The penguin facility will be built within an external building structure providing protection from weather and other external risks. It has been designed based on the general requirements of AS/NZ 2243.3.2002 level 3 containment and will have the following key features:

1. The facility will include temperature controlled land and air space (-2°C to +5°C) as well as a cooled saltwater pool (< 9°C).

2. All incoming and exiting air will be filtered to 99.97% at 0.3 microns through a High Efficiency Particulate Air (HEPA) filter. This is to protect the penguins from naturally occurring pathogens in the Melbourne region (especially *Aspergillus spp.*), and to minimise the risk of exposing susceptible Australian species to any infectious agent present in the facility.
3. All waste water (except sewer water) will be capable of being chlorinated as directed by AQIS before discharge to waste.
4. Staff uniforms/overalls used within the exhibit will not be removed from the quarantine approved premises (QAP). Laundry facilities will be available.
5. There will be two separate isolation/quarantine rooms for holding birds off exhibit.
6. Public viewing will be through acrylic panels above and below the water
7. The exhibit and husbandry practices will be developed to meet AQIS' requirements, as well as catering to the environmental needs of the birds.
8. Access to the building will be restricted to the minimum number of staff. It will be locked and inaccessible by members of the public, and except for emergency exits, the main access doors will be constructed as air locks. The facility will be fully monitored and alarmed.

1.12 Current status of King and Gentoo penguins in Australia

While King and Gentoo penguins do not frequent Australia's mainland shores, they are present in large numbers on Australia's sub-Antarctic territories of both Macquarie and Heard Islands.

King and Gentoo penguins are listed with the Australian Government Department of Environment and Water Resources as specimens suitable for live import for non-commercial purpose only, excluding household pets, and for high security facilities only. The new facility at MAQ should meet these requirements when completed.

Apart from the absence of quarantine measures, there are no other controls in Australia that might prohibit the importation of King and Gentoo penguins from captive populations in New Zealand.

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2 Risk assessment

2.1 Overview

Biosecurity Australia is responsible for developing and reviewing quarantine policy for the import of animals and plants and their products. It does this through a science-based risk analysis process. According to the OIE, a risk analysis comprises hazard identification, risk assessment, risk management and risk communication. At the completion of its process, Biosecurity Australia makes a recommendation for a policy determination to Australia's Director of Animal and Plant Quarantine. This determination is taken into account by AQIS when considering applications to import.

Australia's science-based risk analysis process is consistent with Australian Government policy and Australia's rights and obligations under the SPS Agreement.

Australia has a long-standing conservative approach to quarantine risk. The level of risk Australia is prepared to accept is known as Australia's ALOP and is expressed as providing a high level of protection aimed at reducing risk to a very low level, but not to zero.

Australia has a consistent approach to addressing risks. Those risks that are very low or less meets Australia's ALOP and no risk management measures are required. For those quarantine risks that exceed Australia's ALOP, i.e. those risks that are greater than 'very low', risk management measures are recommended to reduce the level of risk in order to achieve the ALOP.

2.2 Hazard identification

Hazard identification is defined in the OIE Code as the process of identifying the pathogenic agents that could potentially produce adverse consequences if introduced in an imported commodity. Hazard identification is a classification step, identifying pathogenic agents as potential hazards or not.

The OIE Code states that, to be identified as a potential hazard, a pathogenic agent:

- Should be appropriate to the animal species to be imported, or from which the commodity is derived;
- Should be capable of producing adverse consequences in the importing country;
- May be present in the exporting country; and
- Should not be present in the importing country. (If present, the pathogenic agent should be associated with a notifiable disease, and be subject to an official control or eradication program).

In this review, hazard identification was initiated by generating a preliminary list of potential pathogenic agents, or 'potential hazards'. The list consisted of pathogenic agents associated with each of the OIE-listed diseases, and other diseases relevant to the importation of live penguins from an international source. This list was refined by applying the criteria stated above to each disease agent and, taking into account the penguins will be sourced from one closed facility, the animal health status of New Zealand and the closed facility at MAQ.

2.3 Hazard list

An initial hazard list was drawn up by reference to the OIE disease list and other internal Biosecurity Australia policy documents. The list of potential hazards, together with details of the reasons on whether to retain or reject pathogenic agents as ‘hazards’, is presented below under the following headings:

- OIE listed avian disease agents.
- Non-OIE listed avian disease agents (recorded in penguins).
- Other avian disease agents considered relevant to the importation of penguins.

Although only two species of penguins are identified for the importation, all seventeen (17) penguin species (Reilly, 2000) were considered when developing the potential hazard list.

Many avian diseases of economic and environmental concern have not been recorded in penguin species. That is not to say that they are not susceptible, but just that the isolated nature of penguin colonies may have prevented the spread of disease to them. Furthermore, when compared to economic species such as the domestic chicken (*Gallus gallus*), there have been few studies into the disease status of wild penguins. However, Antarctic penguin colonies in captivity are maintained in very high biosecurity facilities and the risk of disease introduction is therefore minimal. Their health status is also closely monitored.

As previously discussed, the penguins kept at KTUW have been maintained as a closed colony for 12 years with no infectious diseases recorded. It is proposed they will be transported to Australia under strict guidelines and will be maintained for life in a purpose built facility at the Melbourne Aquarium.

2.4 OIE listed avian disease agents¹

1. Avian chlamydiosis (*Chlamydia psittaci*)
2. Avian infectious bronchitis
3. Avian infectious laryngotracheitis
4. Avian mycoplasmosis (*Mycoplasma gallisepticum*)
5. Avian mycoplasmosis (*Mycoplasma synoviae*)
6. Duck virus hepatitis
7. Fowl cholera (avian pasteurellosis)
8. Fowl typhoid (*Salmonella Gallinarum*)
9. HPAI and LPNAI in poultry as per Chapter 2.7.12. of the Terrestrial Animal Health Code
10. IBD (Gumboro disease)
11. Marek's disease
12. ND
13. Pullorum disease (*Salmonella Pullorum*)

¹ http://www.oie.int/eng/maladies/en_classification2007.htm

14. Turkey rhinotracheitis (avian metapneumovirus)

The following disease agents are endemic in Australia and thus were not considered further:

- Avian chlamydiosis (*Chlamydophila psittaci*)
- Avian infectious bronchitis
- Avian infectious laryngotracheitis
- Avian mycoplasmosis (*Mycoplasma gallisepticum*)
- Fowl cholera (avian pasteurellosis)
- Marek's disease

The remaining 8 avian disease agents:

- Avian mycoplasmosis (*Mycoplasma synoviae*)
- Duck virus hepatitis
- Fowl typhoid (*Salmonella Gallinarum*)
- HPAI and LPNAI in poultry as per Chapter 2.7.12. of the Terrestrial Animal Health Code
- IBD (Gumboro disease)
- ND
- Pullorum disease (*Salmonella Pullorum*)
- Turkey rhinotracheitis (avian metapneumovirus)

were not considered any further for the following reasons:

- Penguins at KTUW have been managed as a closed, discrete population in a controlled environment for 12 years;
- None of these disease agents is present in New Zealand except for *M. synoviae*, and it is proposed that the penguins be tested for IBD, AI and ND prior to export;
- The disease agents have not been reported in the KTUW colony or in any penguin species; and
- It is proposed that the penguins will be transported to Australia under AQIS requirements and housed in a purpose built facility separate from the outside environment in the MAQ, resulting in negligible likelihood of exposure to susceptible Australian species.

2.5 Non-OIE listed avian disease agents (recorded in penguins)

The following non-OIE listed diseases have been recorded in penguins:

1. Penguin herpesvirus-like infection
2. Penguin pox

3. Puffinosis-like virus
4. West Nile Virus¹
5. Other mosquito-borne viral encephalitides (arboviruses)
6. Avian reovirus*
7. *Mycobacterium avium* (avian tuberculosis)*
8. Pododermatitis or Bumblefoot (*Staphylococcus spp.*)*
9. *Salmonella* Enteritidis
10. *Salmonella* Typhimurium
11. Aspergillosis*
12. Haemoparasites
13. Intestinal (endo-) parasites
14. Coccidia (*Eimeria spp.*)*
15. Ectoparasites
16. Lyme Disease (*Borrelia burgdorferi*)*

Many of these diseases are vector borne, primarily by mosquitoes. Importantly, the temperature (between 0°C and 5°C) at KTUW and of the proposed facility at the MAQ, makes mosquito survival impossible. Consequently, the other mosquito-borne viral encephalitides (arboviruses) will not be considered any further in this policy review.

Biosecurity Australia concluded that penguin herpes-like infection, penguin pox, puffinosis-like virus, West Nile Virus, *Salmonella* Enteritidis, *Salmonella* Typhimurium and Lyme disease would not be retained for further risk assessment because:

- Penguins at KTUW have been managed as a closed, discrete population in a controlled environment for 12 years;
- Staff husbandry practices are designed to prevent the introduction of disease;
- The disease agents have not been reported in the KTUW colony; and
- The penguins will be transported to Australia under any AQIS requirements and housed in a purpose built facility separate from the outside environment in the MAQ, resulting in negligible likelihood of exposure to susceptible Australian species.

2.5.1 Haemoparasites

There are a variety of vector borne (mosquitos, ticks, mites and flies) blood parasites that infect penguins. Four genera of protozoan parasites (Plasmodium, Leucocytozoon, Babesia and Trypanosoma) have been recorded from five species of penguin (Rockhopper penguin, Fiordland penguin, Yellow-eyed penguin, Little or Blue penguin and African penguin) in their

¹ Kunjin virus is classified as a strain of WNV and is present in Australia, although Australia does not have disease caused by WNV similar to the situation in USA.

* denotes endemic to Australia and consequently, will not be considered further in this policy review. These diseases have never been reported in the KTUW penguin colony.

natural habitats (Jones and Shellam, 1999). These reports only occurred in South Africa, Australia, New Zealand and Gough Island.

These haemoparasites will not be considered further in this policy review for the following reasons:

- Penguins at KTUW have been managed as a closed, discrete population in a controlled environment for 12 years;
- Disease has not been reported in the KTUW colony;
- The low temperature range of the KTUW facility means the vectors are unable to survive; and
- It is proposed that the penguins will be transported to Australia under any AQIS requirements and housed in a purpose built facility separate from the outside environment in the MAQ, resulting in negligible likelihood of exposure to susceptible Australian species.

2.5.2 Intestinal and external parasites

Two groups of internal or endoparasites have been described in penguins (Kerry, Riddle and Clarke, 1999):

- Nematodes (roundworms that live in the gastro-intestinal tracts) in many penguin species, and
- Cestodes (tapeworms that live in the intestines) require intermediate hosts (fish or crustaceans) to complete their life cycles. Tapeworms have been observed in Antarctic penguins with no evidence of associated disease.

Three groups of ectoparasites have been described in penguins (Kerry, Riddle and Clarke, 1999):

- Ticks of the genus *Ixodes* are widely distributed around the sub-Antarctic and the Antarctic Peninsula and affect penguins. The ticks require a sheltered well-drained habitat and densely nesting hosts, and are found most commonly in tussocky areas. Heavy infestations may kill chicks and debilitate adult birds.
- Fleas have only been found on penguins in sub-Antarctic regions since they spend large parts of their life cycle off the host and thus need sheltered, dry habitats such as caves for their survival.
- Biting lice have been found on most sub-Antarctic and Antarctic penguin species, and live and breed on their hosts. They eat feathers and skin debris, but do not suck blood.

The endo- and ectoparasites of penguins will not be considered further in this policy review for the following reasons:

- Penguins at KTUW have been managed as a closed, discrete population in a controlled environment for 12 years;
- Disease has not been reported in the KTUW colony;

- Most ectoparasites would not tolerate the low temperatures of both the KTUW and Melbourne displays; and
- It is proposed that the penguins will be transported to Australia under any AQIS requirements and housed in a purpose built facility separate from the outside environment in the MAQ, resulting in negligible likelihood of exposure to susceptible Australian species.

2.6 Other avian disease agents considered relevant to penguins

The third group of diseases are ones that are either not OIE listed or have never been described in penguins: Duck virus enteritis, avian adenovirus, avian leukosis, avian paramyxovirus (types unspecified), infectious coryza and avian spirochaetosis. This list was based upon the recent *Draft Generic Import Risk Analysis Report for Chicken Meat* (Biosecurity Australia, 2006) and other internal Biosecurity Australia policy documents.

Biosecurity Australia concluded that these diseases would not be retained for further risk assessment as the likelihood of introducing these diseases into Australia via the importation of the penguins from KTUW in New Zealand is considered negligible for the following reasons:

- Penguins in KTUW have been managed as a closed population in a controlled environment for 12 years;
- These diseases have not been reported in the KTUW colony;
- It is proposed that the penguins will be transported to Australia under any AQIS requirements and housed in a purpose built facility separate from the outside environment in the MAQ, resulting in negligible likelihood of exposure to susceptible Australian species.

2.7 Conclusion

The importation of penguins from KTUW, New Zealand to the MAQ, Australia presents a negligible disease risk for the following reasons:

- New Zealand is considered to be free of all major diseases that could be introduced in penguins.
- The source flock of penguins has been managed as a closed population in a controlled environment in New Zealand for twelve years (effectively pre-export quarantine).
- The historical health record of the penguin colony with no recorded infectious diseases or parasites.
- The source flock resides in an environment that is rigorously controlled to provide appropriate conditions for the husbandry of these birds and which preclude many pathogens and parasites from surviving.
- It is proposed that the penguins will be transported from New Zealand to Australia using proven methods developed by KTUW and meeting any AQIS requirements.

- The penguins will be kept as a distinct population in a purpose built facility separate from the outside environment in the MAQ, resulting in negligible likelihood of exposure to susceptible Australian species.

Because of the unique nature of this importation it is considered there is negligible risk with the importation of penguins from New Zealand.

As confirmation of the disease free status of the KTUW penguin colony, screening of cloacal swabs and virus isolation will be undertaken on the penguins identified for export to Australia for the diseases listed below. Negative results will be required as part of the import permit.

- HPAI and LPNAI in poultry as per Chapter 2.7.12. of the Terrestrial Animal Health Code;
- IBD; and
- ND.

It is proposed that the penguins undergo a minimum period of thirty-five days post arrival quarantine at a facility approved by AQIS.

2.8 References

Biosecurity Australia. (2006). *Draft Generic Import Risk Analysis Report for Chicken Meat*, Parts A – D, June 2006, <http://www.daffa.gov.au/ba/ira/current-animal/chicken-meat>. [accessed May 2007].

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3 Proposed Quarantine Measures

PROPOSED QUARANTINE MEASURES FOR THE IMPORTATION OF KING (*Aptenodytes patagonicus*) AND GENTOO (*Pygoscelis papua*) PENGUINS FROM NEW ZEALAND

Conditions of Administration

Importation under these conditions is restricted to King (*Aptenodytes patagonicus*) and Gentoo (*Pygoscelis papua*) penguins from Kelly Tarlton's Antarctic Exhibit and Underwater World (KTUW) in Auckland, New Zealand to Melbourne Aquarium in Victoria, Australia.

All consignments must be accompanied by a valid Import Permit issued by the Australian Quarantine and Inspection Service (AQIS), or by means to allow the identification of the Import Permit, and the veterinary certificate as required by these conditions.

Permission to import will also be required from the Australian Government Department of Environment and Water Resources. It is the importer's responsibility to identify and to ensure compliance with the requirements of other regulatory and advisory bodies prior to and after importation.

Other conditions of administration, including details of import permit requirements and transport arrangements, are available from AQIS. The contact details are:

Live Animal Imports

AQIS
GPO Box 858
Canberra ACT 2601.

Fax: +61 2 6272 3110
E-mail: animalimp@aqis.gov.au
Phone: +61 2 6272 4454

The importer or agent must lodge a Quarantine Entry for each consignment. The inspecting AQIS officer must be advised of the entry number prior to inspection.

The importer, as listed on the Import Permit, or nominated agent, must be accessible to AQIS officers and accept responsibility for ensuring that all import conditions are met including AQIS inspection.

Consignments must be addressed and sent to AQIS at the port of arrival.

The importer or agent must make an appointment for AQIS inspection of the bird(s) and documentation. The importer or agent may be required to be present at this inspection. The consignment will be held by AQIS until completion of inspection.

The importer must notify the AQIS office in the State of import in writing at least three (3) working days prior to arrival. Notification must include:

- . contact number for the importer
- . AQIS permit number

- . flight number
- . airway bill number
- . date and estimated time of arrival
- . list of penguin(s) being transported
- . nature and identification of means of transport
- . address to which the penguin(s) will be consigned.

Consignments that do not meet the AQIS import conditions will either remain in quarantine control or be re-exported or destroyed without recompense.

The veterinary certificate

1. An original veterinary certificate that conforms to the OIE Terrestrial Animal Health Code (Code) *Model International Veterinary Certificates* must accompany each consignment and must:
 - . be written in English
 - . provide the identification for each penguin (microchip number/site) including description, breed, sex and age
 - . provide evidence that the penguin(s) were tested for avian influenza, Newcastle disease and infectious bursal disease virus with negative results within 21 days prior to export
 - . include the name and address of the importer and exporter and the AQIS Import Permit number.
2. An Official Veterinarian* of the Government Veterinary Administration must:
 - . sign, date and stamp each page of the veterinary certificate and all documents (eg. laboratory reports) with the stamp of the government veterinary administration
 - . record his/her name, signature and contact details on the veterinary certificate.

[*Note: Official Veterinarian means a veterinarian authorised by the Veterinary Administration of the country to perform certain designated official tasks associated with animal health and/or public health and inspections of commodities and, when appropriate, to certify in conformity with the Certification Procedures of Section 1.2.2 of the Code.]
3. AQIS will only accept copies of documents where each page bears the original signature, date and stamp of the Official Veterinarian.

Conditions

1. Pre-export quarantine:
 - . the penguin(s) must have been kept continuously since hatching at KTUW

- . KTUW must be maintained under the surveillance of the New Zealand Government Veterinary Authority
 - . the penguin(s) must come from the established penguin colony at KTUW and there should have been no recent introductions into the colony
 - . all matters relating to the health and surveillance of the penguin(s) must be under the control and supervision of a government veterinary officer who shall provide the prescribed veterinary certification
 - . the penguin(s) for export must be tested for avian influenza, Newcastle disease and infectious bursal disease virus using cloacal swabs and virus isolation within 21 days of export. Any failure of tests or any detection of disease may cause any or all of the birds in the consignment to be detained in quarantine for further testing or may cause cancellation of the entire consignment
 - . a statement written in English from the veterinarian responsible for the colony is to be prepared 48 hours prior to the penguin(s) leaving the facility. The statement must attest to the penguin(s)' health and freedom from parasites and infectious or contagious disease, and confirm that the penguin(s) is/are fit to travel.
2. Transport:
- . within New Zealand, all transport of the penguin(s) for export must be undertaken in cleaned and disinfected containers and vehicles by the most direct practical route. During transport, the penguin(s) must be kept isolated from all other birds
 - . the penguin(s) must be consigned from New Zealand to Australia by the most direct route approved by AQIS
 - . the penguin(s) may only be accompanied by other bird(s) not of this consignment if prior written approval is granted by AQIS
 - . the penguin(s) will require prior AQIS approval for transhipment
 - . the design of the containers used to transport the penguin(s) must comply with the World Organisation for Animal Health (OIE) recommendations and International Air Transport Association (IATA) Live Animal Regulations
 - . treated wood shavings, sterilised peat and soft board may be used as bedding during transport. The use of hay or straw is not permitted.
3. Operation of post arrival quarantine (PAQ) facility:
- . the PAQ premises must be approved by AQIS prior to the commencement of PAQ for each consignment of penguins
 - . the PAQ premises where the penguins will be held must meet the criteria for a Quarantine Containment Level 3 facility, as described in the Australian/New Zealand Standard AS/NZS 2243.3:2002

- . a prominent sign must be displayed near all entrances to the PAQ premises, showing that the facility, section of a building or room is a quarantine area and that unauthorised entry is prohibited
 - . entry to the PAQ premises must be prevented unless specifically authorised by the supervising official veterinarian. Visitors necessary to the operation of the facility may be permitted entry provided they adhere to access procedures and are accompanied at all times. All visitor entries must be recorded. Procedures must be adopted to prevent unauthorised access to the quarantine facility
 - . the premises must be cleaned and disinfected prior to the introduction of the imported penguins into the facility
 - . all equipment used in feeding, handling and treatment of the penguins in quarantine must be new, or cleaned and disinfected, before use and must be used only in the premises for the duration of the quarantine
 - . personnel attending the penguins must wear outer clothing and footwear used exclusively in the premises during the period of quarantine, and wash their hands before and after handling the penguins
 - . biological waste shall be appropriately disposed of in accordance with the containment level for the facility. Waste water from staff will be split from the waste generated from the bird areas, and will go direct to trade waste. The penguin waste will be collected in holding tubs for chlorination before discharge.
4. Post arrival quarantine:
- . all penguin(s) imported into Australia from New Zealand must undergo a minimum period of thirty-five (35) days PAQ at a PAQ facility approved by AQIS
 - . the quarantine period must be supervised by an AQIS veterinarian
 - . the penguin(s) cannot be removed from the PAQ facility without prior written permission from AQIS
 - . on arrival at the port of entry, an AQIS officer will inspect the penguin(s) and issue an order into quarantine
 - . the penguin(s) must be transported directly from the port of entry to the PAQ approved premises by the most direct appropriate route
 - . during the period of isolation, the penguin(s) must not come in contact with other birds, or people who have contact with other birds
 - . a detailed health record must be kept for each penguin during PAQ. The health record must be available to AQIS

- . a health report from the veterinarian of the PAQ facility shall be provided to AQIS immediately prior to the end of the PAQ period
- . the owner/manager must notify AQIS within 24 hours of any death or illness in the penguin(s) and any escapes or movement breaches during the 35 days PAQ period
- . if there is suspicion of infectious or contagious disease in the penguin(s) under quarantine, AQIS shall be notified and the penguin(s) shall remain in quarantine. AQIS, in consultation with the laboratory, may require the penguin(s) to be tested for any diseases
- . AQIS shall require all penguins that die during the PAQ period to be submitted to the laboratory for disease investigation.

NOTE: In the event of any imported penguin(s) showing evidence of disease or producing a positive result to any of the tests undertaken after arrival into Australia, AQIS shall be notified and any or all of the penguins may be either detained in quarantine for further testing, re-exported or destroyed.

5. Post quarantine:

- . at the end of the PAQ, the penguin(s) will be released from quarantine under Victoria's State and Zoo Licence restrictions for life.

6. Review:

- . these conditions of importation may be reviewed if there are any changes in the import policy or the avian health status of New Zealand or at any time at the discretion of AQIS.

4 Appendix 1

4.1 Summary of the health records of penguins at KTUW

The information contained here-in was obtained from documentation supplied by KTUW's Penguin Department.

4.1.1 Facilities constructed

- 1994: High secure avian transitional facility at Auckland International Airport approved by MAF NZ for the import of live birds into New Zealand.
- 1994: Construction of Antarctic Exhibit at Kelly Tarlton's Underwater World in Auckland.

4.1.2 Number of birds originally imported

- Import 1: 20 King penguins (*Aptenodytes patagonicus*) imported from Seaworld, San Antonio, USA arrived in New Zealand on 19 September 1994. Three died in quarantine, one due to a torn jugular, the other two to a negative reaction to medication.
- Import 2: 29 Gentoos (*Pygoscelis papua*) imported from Edinburgh Zoo, Scotland. Arrived in NZ on 2 December 1995. No losses during quarantine.

4.1.3 Medical files

- The main mechanical injuries received by the penguins are generally toenail injuries (breakages, ripped off, etc), sore legs/feet, flipper injuries and punctures/scratches from other birds and aggression.
- Penguins tend to get some gastrointestinal problems which have mostly been clostridial and usually treated with antibiotics.
- KTUW has undertaken to provide full details of all medical files to Biosecurity Australia if required.

4.1.4 Breeding records at KTUW

○ Gentoo Penguins (*Pygoscelis papua*)

| Year | Eggs Laid | Live Chicks Hatched | Chicks Fledged | Full Term DIS | Fertile Died at Hatch | Opened fertile | Opened infertile | Smash infertile | Smash fertile | Unknown fertility |
|---------------|-----------------|---------------------|----------------|---------------|-----------------------|-----------------|------------------|-----------------|---------------|-------------------|
| 1997 | 25 | 4 | 4 | 0 | 0 | 7 | 0 | 1 | 3 | 10 |
| 1998 | 27 | 11 | 11 | 0 | 0 | 6 | 1 | 0 | 0 | 9 |
| 1999 | 29 | 12 ¹ | 11 | 0 | 0 | 1 | 3 | 1 | 4 | 8 |
| 2000 | 31 | 8 ² | 7 | 3 | 0 | 5 ³ | 5 | 5 | 4 | 4 |
| 2001 | 37 | 16 ⁴ | 15 | 9 | 0 | 12 ⁵ | 2 | 1 | 4 | 2 |
| 2002 | 36 | 18 ⁶ | 15 | 2 | 0 | 2 | 5 | 3 | 3 | 3 |
| 2003 | 37 | 21 ⁷ | 17 | 1 | 0 | 7 ⁸ | 1 | 2 | 1 | 4 |
| 2004 | 35 | 22 ⁹ | 15 | 3 | 1 | 4 | 3 | 1 | 2 | 2 |
| 2005 | 36 | 21 ¹⁰ | 20 | 1 | 2 | 1 | 4 | 0 | 1 | 6 |
| 2006 | 0 ¹¹ | - | - | - | - | - | - | - | - | - |
| Totals | 293 | 133 | 115 | 19 | 3 | 33 | 24 | 14 | 22 | 48 |
| Totals as % | | 45% | n/a | 6% | 1% | 11% | 8% | 5% | 8% | 16% |

○ King Penguins (*Aptenodytes patagonicus*)

| Year | Eggs Laid | Live Chicks Hatched | Chicks Fledged | Full Term DIS | Opened fertile | Opened infertile | Smashed infertile | Smashed fertile | Unknown fertility |
|------|-----------------|---------------------|----------------|---------------|----------------|------------------|-------------------|-----------------|-------------------|
| 1997 | 7 | 3 | 3 | | | 1 | 1 | | 2 |
| 1998 | 5 | 4 | 4 | | | | | | 1 |
| 1999 | 7 | 3 | 3 | 1 | | 1 | 1 | | 1 |
| 2000 | 6 | 1 | 1 | | | 3 | | | 2 |
| 2001 | 9 | 4 | 4 | | | 1 | 1 | 1 | 2 |
| 2002 | 9 | 1 | 1 | | | 4 | 2 | 1 | 1 |
| 2003 | 9 | 3 | 3 | 1 | | 1 | | 2 | 2 |
| 2004 | 10 | 2 | 2 | | | 4 | 2 | 2 | |
| 2005 | 10 | 7 ¹ | 6 | | | 3 | | | |
| 2006 | 11 | 5 | 5 | | 1 | 3 | 1 | | 1 |
| 2007 | 13 ² | 3 ³ | 1 | | 1 | 4 | | | 4 |

¹ One weak chick died shortly after hatching.

² Lost one at 9 days old due to either suffocating or choking.

³ With 3 chicks full-term dead in shell (DIS).

⁴ Lost 1 chick at 10 days old due to an unknown cause.

⁵ With 9 full term DIS.

⁶ Lost 3 chicks - cause of death unknown, deaths of chicks at around 10 days old.

⁷ Lost 4 chicks (3 of the 4 were accidental deaths (by parents) within the first 24 hours, the 4th chick was of an unknown cause, weak from hatching and died at 6 days.

⁸ 1 Chick full term DIS.

⁹ Lost 7 chicks at various stages of growth.

¹⁰ Lost 1 chick at 6 weeks.

¹¹ The Gentoos laid eggs but were removed before were viable – as soon as they were laid (management decision).

| | | | | | | | | | |
|---------------|-----------|-----------|-----------|----------|----------|-----------|----------|----------|-----------|
| Totals | 96 | 37 | 33 | 2 | 2 | 25 | 8 | 6 | 16 |
| Total as % | | 39% | n/a | 2% | 2% | 26% | 8% | 6% | 17% |

4.1.5 Adult mortalities

- Gentoo Penguins – there have been five adult Gentoo deaths between 1995 and April 2007 (Band numbers G166, G142, G991, G018 and G148). G166 died on 9 July 1996 through accidental causes, his head got caught in a pool pump inlet and he drowned, and G148 died of a torn jugular during MAF NZ blood sampling during post arrival quarantine in 1995).
- King Penguins – there have been two adult King deaths between 1994 and April 2007. Band numbers K82 and K121 died in the post arrival quarantine facility.

4.1.6 Numbers of penguins exported

| Year | Destination | Kings | Gentoos |
|------|---------------|-----------|-----------|
| 2000 | China | 6 | 16 |
| 2001 | China | 2 | 5 |
| 2002 | Spain | 0 | 12 |
| 2003 | China | 0 | 15 |
| 2004 | China | 0 | 17 |
| 2005 | Taiwan | 3 | 15 |
| 2006 | China | 0 | 10 |
| 2007 | Japan | 0 | 9 |
| | Totals | 11 | 99 |

4.1.7 Health testing for export

Testing that was performed (with negative results) to meet requirements for the 2006 China and Hong Kong exports were for:

- Avian influenza – H5 and H7 antigen; using the haemagglutination inhibition (HI) test (at a serum dilution of 1:8) and the PCR.
- Newcastle disease, using the haemagglutination inhibition (HI) test (at a serum dilution of 1:8).
- Chlamydiosis; using the complement fixation test (CFT).

¹⁵ Lost 1 chick at 7 days.

¹⁶ As of 19th April 2007 one still is being incubated.

¹⁷ Lost 2 chicks at 5 and 2 days – 1 was an accident by aggression between parents and other birds and the other was a weak chick), leaving 1 surviving chick.

4.1.8 Summary of Husbandry and Operational Management of the Live Penguin Colony at KTUW

- The penguin department runs as a MAF NZ approved containment facility (MAF Biosecurity Authority Standard number 154.03.04.) within KTUW, which is located on Auckland's waterfront remote from any commercial avian businesses and natural congregations of wild bird populations.
- The penguins are kept in a wholly isolated, positive air pressure, and air conditioned environment.
- Inlet air is filter through IPSCO MF95 filters (EU9).
- There is no contact with outside birds or animals.
- There are separate washing and drying facilities for the equipment and clothing used by staff within the enclosure.
- All the equipment that is used within the exhibit remains in the area and does not leave, including fleeces (staff jackets), waterproof pants, gumboots, gloves, also includes cleaning equipment.
- Footbaths are used at each entry point to sanitize shoes that come in from the outside; these are changed regularly throughout the day.
- Air quality testing is done by an independent laboratory every three months to ensure the facilities bacteria and fungi levels stay in check.
- With these husbandry practices in place, the penguins effectively remain in a quarantined environment

5 Appendix 2

5.1 Details of proposed transport from KTUW to Melbourne Aquarium

| Activity |
|---|
| 1. Book refrigerated truck from Halls Refrigerated Transport in Auckland – truck to not have transported wildlife prior to shipment for a minimum of 10 days. |
| 2. Prepare crates for transport at KTUW. |
| a. Wash and spray with Virkon. |
| b. Lay ice packs in the base. |
| c. Provide a covering layer of “kitty litter” absorbent material. |
| 3. Isolate selected birds for transport (vet inspection area). |
| 4. Pack birds one per crate. |
| a. Cable tie doors closed. |
| b. Label each crate with bird band number. |
| 5. Truck arrives. |
| a. Clean / spray back of the transport truck with Virkon. |
| 6. Truck temperature taken down prior to loading to allow for when door is open run at 0 to 0.5°C. |
| 7. Load crates onto the truck. |
| 8. Drive to Auckland International Airport - no air intake permitted to back of truck required for the 40 minute journey. Light source provided in truck. |
| 9. Unload into Owens Coolstore warehouse – no other wildlife or biological samples to be present in the facility on the day of transport. |
| 10. Transfer crates onto aircraft pallet and strap down. |
| a. Load penguins onto aircraft. |
| b. No other animals on aircraft. |
| c. If animals have been transported on the aircraft in recent days it is cleaned with Virkon. |
| d. Air craft hold temperature set as close to 0 degrees C as possible |
| e. Light source provided for transport. |
| 11. Arrive Melbourne Airport. |
| a. MAQ staff to apply Virkon to a refrigerated truck in preparation for the arrival of the penguins. |
| b. Unload from aircraft and transfer to refrigerated truck at Tullamarine Airport and drive to Melbourne Aquarium. |
| 12. Carry birds into MAQ penguin exhibit isolation room for unpacking. |