

Balancing Consumer Demand with Efficient, Clean Egg Production

**Exploring how Australian Egg producers reconnect
with and work to better meet the needs of Australian
consumers**

A report for



Chris Monnier

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Scholar Contact Details

Chris Monnier

Make Eggs

Phone: 0490372343

Email: monniercj@gmail.com

In submitting this report, the Scholar has agreed to Nuffield Australia publishing this material in its edited form.

NUFFIELD AUSTRALIA Contact Details

Nuffield Australia

Telephone: (02) 9463 9229

Mobile: 0431 438 684

Email: enquiries@nuffield.com.au

Address: PO Box 1021, NORTH SYDNEY NSW 2059

Executive Summary

The Australian public depends on egg and general agricultural producers for a quality food production available all year round and across all parts of Australia. Whilst eggs only make up a small proportion of Australia's protein requirements, they are currently among the lowest cost protein source to produce and therefore for consumers to purchase. There is however, a growing concern that a large percentage of the Australian population have extremely limited knowledge of egg and broader animal-based food production.

In discussions with consumers, the author noted general concerns around antibiotic, vaccines and chemical additives to feed as well as an understanding of the husbandry and management practices across different farming methods. More broadly, concerns exist around genetic modification, land management and environmental impact across general animal-based food production. This report aims to explore some of these concepts and understand how industry can best engage and work with consumers to reach common ground through mutual understanding.

The author does not wish to promote or favour any egg production system over another, but endeavours to report true and honest findings in a balanced manner with a view of giving consumers the information required to make more educated purchase decisions around egg production methods.

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Foreword

This report was written and researched to gain an understanding of the perception that there is a growing information disconnect between Australian egg producers and consumers. and aims to explore how this can be overcome to align consumer requirements with sustainable and safe farming practices and explore what needs to be done to close the information gap.

Being one of the lowest priced forms of protein available to Australian families, eggs are an extremely important component to Australia's food supply and understanding each other will ensure that consumer's requirements are met, and producers can confidently invest in production methods that will remain relevant and meet consumer needs for years to come.

The author travelled to 12 different countries throughout the research period and aimed to gain information on what overseas producers have done to meet the needs of their consumers and although the demographics, climates and social and circumstances are different in each country- customer connection remains the key to effective and sustainable egg production.

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Abbreviations

FSANZ: Food Standards Australia and New Zealand

FSIS: Food Safety and Inspection Service

UK: United Kingdom

U.S. United States of America

WHO: World Health Organisation

Objectives

This report aims to explore the following:

- The current status of production methods within the Australian egg industry.
- Trends in overseas egg production.
- The opportunities and challenges that face the industry currently both domestically and globally.
- Connection with our customers, have we lost it and- if so, how do we get it back?
- Future recommendations for Australian producers.

Chapter 1: The Australian Egg Industry- an overview

The Australian egg industry is robust and geared to produce quality eggs for Australian families into the future, but it does face some challenges. Egg production (as well as most varieties of animal-based protein production) has been deeply affected by urbanisation and a lack of consumer understanding, which over many years has led to a gradual erosion of social licence to farm among consumers.

Years of industry rationalisation have reduced commercial producer numbers from approximately 2000 in 1990 to 337 in 2017. According to Australian egg farmer Theo Verstedden; this has predominantly been driven by encroachment of urbanisation onto land that has traditionally been used for egg production. In his view many producers are reaching retirement age without solid succession planning and several producers have exited due to financial viability concerns.

In 2017, Australian national layer flock was around 17 million and produced approximately 15 million eggs per day.

In recent years Australian producers have faced a great deal of uncertainty around the production methods that they should invest in for future production.

Production Methods used in Australia.

Australia currently commercially produces eggs employing four methods:

1. **Cage Production:** Hens caged in environmentally controlled sheds, housed in cages with minimum space of 550 square centimetres per bird. These cages systems are highly automated with manure and egg removal, feeding and water systems making cage the lowest cost of the production methods. Cage production represents approximately 58% of Australia's eggs.
 - Advantages- The cage system is the cleanest production method, with birds not being able to access to manure and only having access a controlled diet and fresh water. Having a limited number of birds in a cage means that hierarchical and cannibalistic behaviour is limited to a small colony and therefore for the most part

controlled. Cage systems are also the least affected by infectious disease, predators and climatic conditions.

- Disadvantages- The bird has limited movement and public perception is for the most part negative.
- Market trends. Cage egg consumption is reducing in Australia mostly because of the public perception that birds have very limited movement. Australian producers have also made very limited investment in new cage production systems for the past 5 years due to regulatory uncertainty for this production system.



Figure 1: The author shown in a typical cage system at Versteden’s Egg farm in Drouin.

2. **Barn Laid-Hens** in barn systems are free to move about in a barn with a maximum stocking density of 12 birds per square metre. They do not have access to any outdoor area. Barn production is commonly known at retail level as “Cage Free”. Barn production represents 11.4% of Australia’s Eggs.

- Advantages- Birds move freely about in the barn system, so public perception is a lot better than cage production. Birds eat a controlled diet and have constant access to fresh water. Barn birds are also very well protected from disease and predators.
- Disadvantages- Hierarchical and cannibalistic behaviour can take place and management must be vigilant. Some natural behaviours such as “spooking” at noises can lead to mortality caused by smothering. A lack of training at the start

of a flock or during rearing, or poor management can lead to birds not being trained to lay eggs in a nest box and cause the birds to lay a large number of eggs on the floor leading to cracked and or dirty eggs.

- Market trends. Barn egg consumption is increasing very slowly in Australia mostly because consumers at retail level have very limited understanding of this production method. Australian producers have invested quite heavily in this system but there can be at times a slight lag between consumption trends and production and at times leads to some pricing instability. Barn eggs are price pointed between cage and free range and sales and prices of these are often compressed when free range eggs go into oversupply and are heavily promoted and discounted.

3. **Free Range:** Hens are free to move between indoor and outdoor areas during daylight hours and are confined indoors outside daylight hours. The stocking density in the indoor area is the same as barn but outdoors enough land must be provided to allow for no more than 10,000 hens per hectare. Free range production represents 30.5% of Australia's Eggs.

- Advantages- Public perception of free-range farming is very good and consumers pay a premium price for free range eggs.
- Disadvantages-Hierarchical and cannibalistic behaviour can take place and management must be vigilant both indoors and outdoors. Whilst manure is removed for the most part, inside the barn, outside the birds have free access to it which can lead to some issues with parasites and worms. Some natural behaviours such as "spooking" at noises can lead to mortality caused by smothering. A lack of training at the start of a flock or during rearing, or poor management can lead to birds not being trained to lay eggs. Biosecurity is a major concern in the free range system, with wildlife such as wild birds and rodents able to spread diseases the birds through interaction, so generally higher vaccination levels and use of antibiotics is more prevalent in free range production leading to higher production costs. Predators such as foxes and predatory birds commonly catch birds when outside on the range so producers must remain vigilant.
- Market trends. Free range egg consumption is increasing very quickly in Australia mostly because consumers believe that birds have a better quality of life. In May

2018 it was mandated that all eggs sold under E.S.A (Egg Standards Australia) must have the stocking density of the outside ranges marked clearly on the carton. Australian producers have invested heavily in free range production and due to the volatile nature of free range production, demand and supply very rarely line up and shortages and oversupply often put pricing pressure on this production method.

4. **Pastured:** Often referred to as free range- hens are housed in mobile houses that are regularly moved to ensure fresh pasture. The theory behind this is that the birds are always free to move about. Maremma dogs are often employed to guard the birds from predators. Pastured Free range production represents 5% of Australia's Egg production.
 - Advantages- Public perception of pastured free range is very good and a segment of consumers do pay premium prices for eggs produced employing this method. Lower stocking densities can assist with controlling hierarchical and cannibalistic behaviour. The market for eggs produced this way is growing.
 - Disadvantages-Biosecurity is a major concern in the free range system, with wildlife such as wild birds and rodents able to spread diseases the birds through interaction, so generally higher vaccination levels and use of antibiotics occurs. Predators such as foxes and predatory birds commonly catch birds when outside on the range so producers must remain vigilant. Businesses build based on this production method are very difficult to scale-up and require a lot of labour and almost a 24 hour a day management commitment so there can be a higher exit rate from this method compared to the others.
 - Market trends. Similar to free range with the main exception being that the supplier base is made up of a lot of small producers and whilst demand for this type of egg is very strong, supply can be at times very inconsistent.

Australian customer segmentation

In Australia, between 45% and 55% of table egg production is sold into the two major retailers Coles and Woolworths and the remainder is sold into independent retailers and the foodservice trade often referred to as the box market.

Most major Australian producers hedge supply across both the major retailers and the box market due to supply and price volatility across the two segments. It is important to note that pricing is affected by supply movements significantly more than consumption movements throughout the year with the exception of the Easter and Easter period.

The Australian egg market is largely dominated by a small number of retailers which does limit choice and give the retailer significant input into production methods, often leading producers in a direction that they may not necessarily see as being the most effective, efficient or environmentally friendly. Egg producers will always do their best to supply what the customer is seeking.

In the past the major retailers have been the major conduit to market for cage free, and free range customers given that the box market has traditionally been very price sensitive (therefore more partial toward low cost cage eggs) but in recent years many major businesses have chosen to advertise that they will only use cage free eggs. These include McDonalds, Hungry Jacks, Subway, Simplot, Grill'd, Ikea and many more. This move has broadened the customer base for producers of cage free eggs and allowed many to invest in cage free facilities with a higher level of certainty than they have had in the past.

The two major retailers, Coles and Woolworths have made several moves to remove cage eggs from the shelves, but have reversed or softened their position when they have lost market share to competing smaller or independent retailers based most often on the consumption trends of lower socio-economic consumers.

It is also important to note that Australia was reported to have some three million people living in poverty with 731,000 of those being children with poverty being measured as living below half of the reported level of disposable household income of \$400 per week. *Australian Council of Social Science.

The author would make the observation that these consumers rely heavily on cage egg production to provide low cost protein. In 2018 the average Australian sales prices for a dozen eggs are:

- Cage. \$3.35
- Barn. \$4.57
- Free range. \$4.93

- Pastured free range. \$7.43

Source: Aztek supermarket Sales Data.

The above demonstrates the importance of a variety of production methods and price points in Australian egg production. Whilst the commoditized nature of egg production will cause prices to move around, cage eggs are a key of cheap source of protein to Australians who purchase based on price. Higher cost production methods can then fit in with customer's specific animal welfare beliefs.

Chapter 2. Customer Connection

Has it been lost and if so, how can it be regained?

The information gap between Australian egg producers and consumers (and for the most part, farmers in general) has been widening for a long time. This has been caused by the urbanization of the population and a general reduction of interaction between farmers and consumers as well as reduced education in schools around food production and farming.

A brief history

Poultry were first introduced into Australia on the first fleet in 1788 for meat and egg production. From the introduction until the mid 1900s egg production was done on a very small scale with a lot of very small companies located near their markets into which they sold. During this period the sheer number of producers indexed against the population ensured that there was generally some level of interaction between producers and consumers. In the 1960s layer cages were introduced to reduce cost of production by reducing land requirements and increasing the general scale and use of mechanisation of production. This allowed producers to farm as many as 15,000 birds. In 1970, Australia had a population of 12.5 million people and 3,200 commercial egg producers this made egg, this made producers .002% of the population and with a 15,000-bird farm requiring six staff this made people working around egg production total 19,200 or .015% of the Australian population.

During this time, egg producers operated under state government quotas under egg marketing boards that had been set up in 1927 to accommodate the large number of producers who often found it difficult to negotiate with customers. The boards were mainly made up of egg producers and enabled prices to be set within the parameters of Government price control regulations. These boards were legally obliged to purchase all of the producer's eggs and the producer was not allowed to sell any eggs without the permission of the board. According to Australian Egg farmer Theo Verstedden, this was a relatively simple but lucrative time for egg producers and really required them mainly to simply focus on egg production efficiencies and logistics, with very limited concern around market supply and pricing, as this was all set by the board.

As far back as the 1970's, independent supermarkets were geared to compete with the major retailers that were then known as Coles New World (Now Coles) and Safeway (Now Woolworths). During this time, the trend was for fresh produce to be sourced locally and supplied directly into

store with very limited use of distribution centres. Eggs were mostly delivered directly into supermarkets on shelf ready trolleys.

In the early 1970s, with the cage systems becoming more prevalent (often at the insistence of the egg boards due to hygiene concerns) supply began to outstrip demand creating issues with price control prompting the introduction of hen quotas. This meant that the state-based egg boards controlled the number of hens that a producer could own and any that wanted to increase flock numbers or any new producers wanting to enter the industry would have to purchase a licence for each layer hen. This system helped control the supply of eggs but increases in technology, scientific knowledge and genetic improvements put strain on this method. Throughout the 1980s, the regulation system was becoming more difficult with over and short supply positions as well as rogue operators working outside the system and limited resources for compliance management. In the late 1980s and early 1990s, New South Wales, South Australia, and Victoria moved to remove the boards and move to a fully deregulated system. The remainder of the states followed in the late 1990s. This forced producers to operate in a truly competitive market whereby the least cost efficient were forced out of business or needed to market their product as boutique or specialty to attract a premium price.

As time progressed, advances in technology, limited succession and market pressure reduced the number of commercial egg producers to 298 in 2017. At this point Australia's population was approximately 24,000,000 and with an average staffing rate of 1.5 staff members per 100,000 birds so 240 farm staff members to service the national flock of 16 million birds. This made egg producers 0.001% of the Australian population and people working in the egg industry 0.0016 percent of the population. The progression in technology to reduce production cost drastically reduced the number of people working in the egg industry. The 10 fold reduction in the proportion of people working in the egg industry has impacted the interaction between the parties leading to poorer understanding and communication.

As time progressed, Coles and Woolworths were able to build more efficiencies into their business model through utilization of purchasing power and the creation of distribution centres as well as aggressive advertising campaigns to gain more market share. For the most part, independent retailers either moved out of retail or sold their businesses to the major retailers. This trend has continued to the point where Coles and Woolworths sell around 50% of the eggs produced nationally. This reduction in the customer concentration over time required egg

producers make some changes to create synergies with the retailers. Most notably the shift from direct into store deliveries to distribution centres that service a large number of stores. This step alone removed any need to the egg producer to come into contact with the customer or even retailer at any point with all service transactions being done through a head office. In order adequately to service the major retailers, most egg producers were required increase scale and increase both flock numbers and cold chain logistic capabilities.

This brief history outlines the events that have shaped the Australian egg industry into what is today and demonstrates the reduced interaction between producers and customers which has unfortunately reduced general public understanding of egg production and as with most forms of animal-based farming leading to an overall general erosion of social licence.

Over the years, several animal activist and interest groups have worked (most commonly on social media) to exploit the gap between egg producers and consumers with the use of extremely confronting pictures and internet clips that seek to paint a very bad picture of particular methods of egg production. According to Australian egg producer Andrew Prostegna most examples of these are either really bad producers and processes that are not endorsed by the Australian Egg industry or very old pictures of outdated methods or even pictures from other countries.

These groups also engaged and continue to engage in criminal behaviour such as breaking into farms, taking footage (that is at times manipulated to make footage more confronting), pictures and damaging equipment and posing a major threat to biosecurity.

Unfortunately, this footage and these messages have been widely distributed, aided by the use of social media and Australian producers have not had the means to justify their position or fair right of reply.

This information, combined with the natural tendency of Australian egg producers to want to just produce eggs and not get overly involved with overall producer brand management or consumer engagement has created a level of mistrust and a lack of understanding among consumers.

Egg producers are not alone in the loss of consumer connection- it has occurred across pretty much every form of animal based protein production and whilst a good proportion of the instances of interest groups using information and images against industry have involved practices not endorsed by the industries involved- there are practices such as beak tipping in egg farming, sow stall feeding in pork production and mulesing in wool production that are done for

a husbandry reason and are often frowned upon by consumers who perhaps don't understand the ramifications of not doing them.

According to Australian egg producer Andrew Prostregna *"We as animal based food producers need to tell consumers why we do these practices and what problems are caused by not doing them and let them make a decision based on facts not the opinions of others demonstrating one single point of view."*

Andrew has had great success in showing school and university students through his farm in Dandenong, Victoria, with a view to providing them with a better understanding of the reasons and science behind and the differences between the different egg production methods. *"We are regularly shocked at how limited these students understandings are when they come in, and take pride in what we are able to teach them before they leave"*. According to Andrew, this practice being done more across the country could help to dispel some misinformation that students have about egg and broader food production.

Chapter 3. Trends in Overseas Production Methods

What can be learned from what other countries have done?

In recent times most economically, developed countries of the world have made a shift toward less intensive egg production methods with some countries even going so far as to ban and or introduce a phase out period for cage egg production. This has had mixed results and has invariably led to consumers in those countries being made to pay higher costs for eggs and in some example import opportunities being opened up from countries that continue to use cage eggs at a substantial price advantage.

Several countries with larger populations such as China, India, Russia and Mexico have continued to produce almost exclusively in cage systems which has and opened up substantial export markets for the lower cost cage produced product into less welfare sensitive and more price sensitive markets.

Statistics and trends from the World's ten largest egg producers, 2017

	Total Flock - million hens	Total Egg products '1000 T	Cage	Barn	Free Range	consumption per capita p.a	US\$/doz Farm Gate	US\$/doz retail	Sales Margin
India	206	4356	100%	0%	0%	63	\$ 0.64	\$ 0.74	14%
Mexico	152.5	2571	100%	0%	0%	352	\$ 1.22	\$ 1.63	25%
Russia	136	2500	100%	0%	0%	285	\$ 1.09	\$ 1.64	34%
Iran	57	925	100%	0%	0%	185	\$ 0.62	\$ 1.04	40%
Turkey	83	1180	99.50%	0%	0.50%	194	\$ 1.21	\$ 1.85	35%
Japan	133.5	2502	94.20%	4%	0.08%	329	\$ 1.59	\$ 2.60	39%
America	305	5290	94%	3%	3%	261	\$ 1.00	\$ 2.02	50%
China	1200	25000	90%	1%	9%	225	\$ 1.16	\$ 1.33	13%
France	44.3	899	68%	7%	25%	216	N/A	N/A	N/A
Australia	19.3	298	65%	7%	28%	214	\$ 1.71	\$ 3.09	45%
Germany	44.5	778	11%	64%	25%	230	N/A	N/A	N/A

****Note Pricing data is not available for E.U. Countries due to sales across borders.***

- *Source 2015, 2016, 2017 International Egg Commissions report.
- *World Health Organisation (WHO) for animal health.
- *All sell prices are in USD as opposed to regional currency for comparison purposes.

Production method percentages and sell margins for the world's 10 largest Egg producers- with Australia added for perspective.



Figure 2: A traditional cage set up in Jackson Mississippi. Each shed contains 100,000 layer hens and this picture is one of a cell of sheds on the site. American egg production is done on a huge scale by Australia standards (Source: Author)

Observations from other countries

Canada: Canada is one of the few countries in the world to still manage egg supply by use of a managed or quota-based system. In conversation with the author, Nathan and Wendy Burns of Burns Poultry Farm Prince Edward Island farm mentioned that the system worked well to provide smaller producers with a clear plan on returns and sell prices but has kept the scale and innovation of Canadian egg farms fairly small by world standards. According to Wendy, *“Our scale and cost of production would certainly make it impossible to compete if our government were to allow imports of eggs from America or Europe, so a controlled market can certainly be a double-edged sword”*.

England: England has the unique issue of customers and retailers pushing for free range and barn eggs only, but is geographically very close to France, Italy and a number of countries that farm cage eggs and very low barriers to import cage eggs. This according to British egg producer James Corbett, it has put a great deal of pricing pressure on British producers to compete with imported

cage eggs. British producers have implemented the British Lion compliance system to provide customers with a level of assurance that their eggs have been farmed to a standard they expect including cage free and or free range and are not imported eggs produced to a lower standard.

Some contrast with Australia

Australia is a comparatively small producer against the top ten producers listed above but there are some differences, most notably the ratios of production systems and pricing.

Australia has a layer flock of 19.3 million producing 298,000 tonnes of egg products a year. Australia produces its eggs using 65% cage, 7% barn and 28% free range and its consumption is 214 per capita per annum. The average farm gate price is \$1.71 US per dozen with retail \$3.09 U.S. Converted to Australian dollars (at an exchange rate of .75c) is farm gate price of \$2.27 and retail of \$4.10.

Australia has made a very significant transition to less intensive systems by comparison to the countries listed in the I.E.C data (other than Germany) which has led to proportionately higher prices at both farm gate and retail. Whilst perception is that better welfare outcomes have been achieved, the danger around import laws being relaxed will allow significantly lower cost egg intensively farmed products to be brought into Australia and putting the viability of Australian producers in serious risk. Australia has one of the highest margins between farm gate and retail price. Even taking this into consideration, Australia does have an expensive retailing model given the limited number of retailers and market competition.

Australia also has very large distances to logistically service which does affect the overall cost to get eggs to market. Australia is very geographically isolated, this combined with quite strict import and export laws, around fresh food has really protected local producers from countries that produce products a lot cheaper than Australian producers ever could. A comparison would be the farm gate price in either India or China \$.64 US and 1.16 US respectively. When compared to Australia's farm gate price of \$1.71 these amounts seem extremely low. The differences are based on input costs of land, labour scale, and comparisons of production systems such as stocking density. Another notable addition is that Australian producers supplying the major retailers must implement Egg Standards Australia (E.S.A) in 2018- which does increase some standards and further increase the cost of egg production across all production systems.

In 2017, Australia exported 739 tonnes (\$2.3 million Australian dollars) of egg products with the largest share (341 tonnes) being fresh shell eggs sent to the Republic of Korea to aid with supply

following an outbreak of Avian Influenza in February 2017 resulted in the loss of some 30 million layer hens. The remainder was egg pulp and powder that was exported to some smaller islands such as Vanuatu and New Caledonia that are not able to supply their own markets.

By contrast, Australia imported 2,529 tonnes (\$13.5 million Australian dollars) of egg pulp and egg powder purely due to the lower cost of production from countries such as Canada (which operates in a regulated market) and The Netherlands (which has a great deal of scale advantage).

Chapter 4: Challenges and Opportunities

How can producers meet the challenges and take advantage of the opportunities?

Challenges

Biosecurity

Biosecurity has proven to be the biggest challenge facing producers transitioning away from traditional cage systems. According to Will Webb of Cal-Maine Foods, *“Biosecurity is the biggest operational challenge facing egg producers across the world and with the effect of Avian Influenza HN51 and its ability to transmit to humans - everything has changed”*. More about this in Chapter 5.

Traditional health challenges have been present for egg farmers with most leading to a loss in production and generally an increase in premature mortality in a flock of birds. Some examples of the diseases generally faced have been:

- **Newcastle’s disease** (Or NDV) is an infection that can occur in wild birds and commercial layer flocks and traditional symptoms include acute respiratory problems, diarrhoea, and depressed mood. It reduces egg production and can increase mortality in a flock.
- **Marek's Disease.** Marek’s disease is disease from the herpes family that is very contagious among young flocks. Its symptoms include, vision impairment, changes in the eye colour, progressive paralysis of legs and wings, changes in skin texture and general lameness of the bird. Most commercial flocks are vaccinated for Marek’s disease. Instances of Marek’s disease will reduce egg production and increase mortality in a flock.
- **Infectious Laryngotracheitis.** (I.L.T) I.L.T is a herpes based with symptoms that resemble an upper respiratory infection with gasping and mucus discharge from eyes and nostrils, and a significant drop in egg production and a huge increase in mortality being the predominant symptoms. Severe cases of I.L.T can cause mortality of up to 70% in a flock.

There are many other diseases that egg producers have had to manage and up until 1993 these challenges were the farmer’s problem to deal with and didn’t pose any threat to the human population therefore only really affected consumers when eggs became short due to disease challenges.

- **Avian Influenza (HN51).** HN51 Highly pathogenic Avian Influenza or Bird Flu was first discovered 1993 in Guangdong province, in a wild goose. This was not seen as a huge threat until in May 1997 the disease was detected in humans with an outbreak infecting 18 people and killing six. Subsequent outbreaks took place in Hong Kong, China, the most notable being in the U.S. in 2014-2015 with a reported 48,091,293 birds affected and needing to be destroyed. This included Layer hens, broilers, turkeys, ducks, and geese. After this case, there have been a further 165 cases and 48 human deaths reported to the WHO.

According to Will Webb of Cal Maine Foods, egg producers across the U.S. have invested heavily in biosecurity and aggressively moved away from pastured (free range) production because of the risk of not only the HN51 Avian Influenza virus, but the risk of a variety of diseases that can be transmitted when layer flocks are allowed to interact with wild birds and move around outside.

Avian influenza viruses A(H5N1) have caused a large number of typically severe human infections since the first human case was reported in 1997. However, there is a lack of comprehensive epidemiological analysis of global human cases of H5N1 from 1997-2015. Moreover, few studies have examined in detail the changing epidemiology of human H5N1 cases in Egypt, especially given the most recent outbreaks since November 2014 which have the highest number of cases ever reported globally over a similar period. Data on individual cases were collated from different sources using a systematic approach to describe the global epidemiology of 907 human H5N1 cases between May 1997 and April 2015. The number of affected countries rose between 2003 and 2008, with expansion from East and Southeast Asia, then to West Asia and Africa. Most cases (67.2%) occurred from December to March, and the overall case fatality risk was 53.5% (483/903) which varied across geographical regions. Although the incidence in Egypt has increased dramatically since November 2014, compared to the cases beforehand there were no significant differences in the fatality risk, history of exposure to poultry, history of human case contact, and time from onset to hospitalization in the recent cases.

Regulatory and economic uncertainty

Australian producers have faced regulatory uncertainty for a number of years, mainly around the future of cage egg production. This has been compounded by the announcements of many retailers and foodservice companies not to include cage eggs in any future offerings. In response to this, Australian producers have been investing mostly in free range and to a lesser extent in

cage free due to the relatively limited market for it. The building of new cage systems has all but ceased in Australia over the past ten years. The expected depreciation period of the equipment in any production system is around 20 years so producers are investing only in low intensity systems as the belief is that they will still make a return on the system but if cage production is banned, with a short phase out period they will not.

According to Phillip Szepe of Kinross Farms, Australian producers are willing to invest in free range and cage free systems but are concerned around the certainty of the markets for these eggs into the future. Phillip believes the following describes purchase habits of consumers in Australia:

- Probably less than 5% have an understanding of the production systems.
- 50% are price buyers, and really don't care.
- 40% buy free range or cage free on the perception that these are more welfare friendly- but would be unable to describe the respective systems and/or pros and cons.

Based on this information, it is important to wonder whether Australian producers are moving in the correct direction to meet the purchasing decisions and beliefs of consumers in the longer term.

Food Safety

Sources: Food Safety and Inspection Service (FSIS), 'USDA Risk Assessments of Salmonella Typhenterium in Shell Eggs and Salmonella spp. in Egg Products'. Food Standards Australia and New Zealand (FSANZ) report, 'Public health and safety of eggs and egg products in Australia'.

Australians enjoy a very high standard level of food safety in general, and eggs are no exception. There are however, a small number of Salmonella cases each year in Australia associated with the consumption of eggs or egg products with the most common being Salmonella Typhenterium.

Salmonella Typhenterium is a pathogen that is present in most animal products but, can survive well in eggs due to the iron in the albumen of eggs. Most common symptoms include diarrhea, vomiting and flu-like symptoms but Salmonella Typhenterium is known to be fatal in the elderly or people with weakened or compromised immune systems.

According to FSANZ report into public health and safety of eggs and egg products, reported outbreaks associated with eggs in Australia indicated that most cases could be attributed to the consumption of uncooked or lightly cooked foods containing contaminated raw egg, for example

sauces and desserts. A common risk factor in these outbreaks was the use of visually dirty (soiled) eggs.

Other factors that may have contributed to outbreaks included cross-contamination during food preparation (i.e. transfer of Salmonella from the surface of the egg to other surfaces and/or foods) and storage of the food containing raw egg at temperatures that would permit growth of Salmonella (greater than 7°C).

The use of cracked eggs may increase the likelihood of foodborne disease as there is increased potential for microorganisms such as Salmonella to gain access to the egg contents.

The integrity of the membranes and albumen inside the egg is affected by time and temperature. Once the integrity has been compromised, Salmonella (if present in the egg contents) can gain access to the yolk, where it can grow very rapidly in temperatures are greater than 7°C. Cage egg production allows for the highest controls of food safety and mitigation of risk of any system.

Risks along the supply chain

Numerous factors during primary production have the potential to introduce Salmonella into a laying flock including feed, water, pests (e.g. rodents and insects), the environment, personnel, new laying stock (day-old chicks or replacement pullets) and equipment. The main pathways by which eggs become contaminated with Salmonella are:

- Faecal contamination of the egg as it exits the bird; the vent of the bird is the common opening for waste material and eggs, and as a result contamination of the surface of egg with faeces can take place as it is laid.
- Contamination of the egg from the environment. The egg surface can also become contaminated by contact with faeces or faecally contaminated material found in the immediate environment where the egg is laid. Birds infected with Salmonella can shed large numbers of this bacterium in their faeces, and these organisms may thrive and breed in the environment. Cage systems allow for the most thorough faecal removal therefore the lowest risk of all of the systems.

Opportunities

Biosecurity

Biosecurity is a major concern for Australian producers, but it is also an opportunity. Will Webb of Cal Maine Foods mentioned how Cal Maine re-evaluated not only its biosecurity system but all its procedures in 2015 when avian influenza broke out in the U.S. resulting in the loss of around 40 million birds. *“We were able to tighten up our systems to the point that none of our farms were affected. This increased our position with our customers as we were able to continue to supply them where other producers couldn’t”.*

Unfortunately, Australia is in the flight path of a lot of migratory birds so the risk of diseases including Avian Influenza increases as we transition more of our national flock to free range so good biosecurity practice could be the difference between success and failure for egg producers not only in Australia but across the whole world.

Regulatory and Economic Uncertainty

“During times of regulatory uncertainty, the best thing to see is opportunity” Dolph Baker, Cal Maine Foods, U.S.

There is a public consultation process in Australia with public and producer responses submitted in February 2018 and feedback due late in 2018. The objective of the consultation is to gauge the public’s opinions of the guidelines and practices currently employed by Australian poultry producers of all types including egg producers.

As mentioned earlier in this report, the future of cage egg production is currently the subject of some debate with some interest groups campaigning for its ban across Australia.

With price being a deciding factor around the purchasing decisions of large portion of Australian egg consumers and increases in living costs combined with relatively stagnant wage growth, putting pressure on the disposable household income of Australian families, is reducing the production of the lowest cost egg product available really the right thing for producers to do? The author is not promoting or pushing any position on any egg production system- but is raising the point that consumers buying signals need to play a part in the decisions around the future of any production system and, as the price is a deciding factor then surely consultation must take place before removing the lowest cost production system.

The decision around the future of cage production will be ongoing depending on the shifting positions of State and Federal Governments in Australia. it is important for producers to diversify

across different production systems and stay educated on the position of all tiers of government as well as consumer sentiment in order to make investment choices.

According to Australian egg producer Michael Verstedden, *“Australian producers will continue to read the purchase signals of customers and do our best to interpret and cater to them as we always have. Our business produces across the three major production methods cage, cage free and free range and will move in the direction that best suits our customers and the markets that we sell into.”*

Improving systems to increase compliance and trust with consumers

The United Kingdom (UK) launched an extremely successful program in 1998 to manage across a variety of products, known as British Lion. According to British egg producer James Corbett *“The British Lion system has increased consumer trust and transparency across a wide variety of animal based food production systems and has provided British consumers with a level of comfort that the products they are purchasing have been produced in line with animal welfare and food safety standards that they have come to expect”*.

Since its inception over 130 billion eggs have been sold under this system and now 90% of the eggs sold in the UK are compliant. The British Lion System does not vary a great deal from egg standards Australia, but the reason for its success are that a small royalty or levy is collected from the packing house or grading floor, which is used to fund inspectors who randomly audit both farmers and grading floors, and act upon reports from any party with concerns around either product validation, food safety or animal cruelty. It is important to note that in line with Euroean Union standards, British Lion does not accredit any cage farm production facilities.

British Lion inspectors have the power to impose penalties or delist a company as a British Lion member upon validation of any breaches of its practices and have actively carried this out. The British Lion brand has grown to carry a great deal of equity in the purchase decisions of the British public and without it, producers have very limited options to market products.

In Australia, compliance standards are set extremely high and a system similar to what British Lion have done could do a great deal to increase customer trust.

Agri tourism and open farming systems.

Agri tourism, public viewing and interactive farming systems have been employed very successfully in several countries and most notably in The Netherlands. An example of this can be seen at Tomesen’s farm in the Netherlands. Roy Tomesen, Director of the third-generation egg

farm, introduced and viewing platform in 2012 for consumers to view the Cage Free production system. According to Roy, “Consumers feel more comfortable being able to view the birds in their natural environment and because the viewing platform is completely segregated from the birds, biosecurity is not put at risk”.



Figure 3: The Author at The Tomesen Farm in the Netherlands. This farm has been set up with a viewing platform and room to enable consumers to view the cage free production shed in use.

A producer, an industry body or an agricultural education business could set up a visitor-friendly egg production farm that demonstrates different egg production systems similar to this.

Conclusion

Australian egg producers are currently well positioned to meet the needs of consumers into the future. Yet, this position can be greatly improved by working to further improve the consumer's understanding of the different production methods and then, using information gained from educated consumer purchase decisions to make more informed investment decisions. There are times where it would seem that producers' willingness to provide consumers what they are seeking is allowing interest groups to speak for the broader population and potentially limit the availability of eggs to Australian families.

The debate around animal-based protein production is happening across the developed world and there is a clear parallel that can be drawn between the financial development and position of a country and the general amount of activity around this debate.

As the world population increases toward seven billion people, the need for intensively produced and environmentally friendly food is growing so it is important that producers, consumers and governments work closely together to ensure that all parties' objectives are met and that all parties are able to understand the environmental, ethical and economic implications of their purchase decisions.

In order to make educated investment decisions, it is important that Australian egg producers engage with and understand the needs of consumers, It is however, equally important that consumers beyond the ones purchasing purely on price are provided adequate and accurate information to ensure that their purchase decisions accurately reflect their beliefs.

Recommendations

1. Increased level transparency with consumers

This can only be developed through mutual understanding which can only really be achieved through engagement and education. Whilst producers commonly and justifiably cite biosecurity as a reason to not grant access to farms, a great deal of understanding could be gained by the egg industry developing some type of site that could be used as an education/agri tourism facility. In the Netherlands, this model has been quite successful with the Rondel system set up by Vencomatic for the egg industry. This system has been set up with education and transparency in mind and aims to educate and demonstrate its system of egg production method to consumers. This model would be very beneficial across all of the production methods utilized in Australia to demonstrate the positives and negatives of each method.

2. Increased level of trust with consumers

Australia runs very high food production and traceability standards, but unfortunately often lacks the resources to properly enforce them and so it is often left up to industry to self-govern. Invariably there are often examples in the media of eggs being passed off as coming from another production system (mostly cage production into free range or organic due to large differences in production costs). This not only looks bad on the entire industry but badly damages egg farmer's image in the eyes of consumers given that they believe they are paying a premium for something they believe in. A rigorous, audited and compulsory system such as the British Lion would help greatly for all producers with severe penalties for those failing to comply or acting fraudulently.

3. Australian producers continue to develop and maintain good relationships with government

As Australia's producers move to a higher compliance and less intensive model effectively creating a very high-priced item by world standards, it is important that government's remain stringent on laws around egg importation into Australia. As apparent in the summary of China summary shown earlier in this report- China's egg producers have significantly lower costs due to lower land, scale, labour, compliance and feed costs and with proximity could very easily move a very low-cost product into Australia and not only reduce the viability of some Australian producers, but also put Australian biosecurity at significant risk. Whilst some effort has been made by a small number of producers to put together Egg Farmers Australia (EFA) to lobby

government, the industry remains largely divided on a particular production method to promote as an industry preference. EFA and Egg producers in general need to continue to work closely with government at all levels to ensure that they have a voice and some input into any regulatory amendments.

4. Increase consumer awareness of barn/cage free eggs as an alternative to free range

The cage free category represents only a small percentage of Australia's egg consumption. Cage free production gives the birds freedom to move around the barn, but not to go outside and be exposed to the biosecurity and predatory risks that are faced by free range birds. The cost of production is slightly higher than in the cage system as feed conversion is not as efficient as the bird uses more energy, mortality can be slightly higher, generally caused by slightly higher instances of hierarchical behaviour due to the bird's colony group being a lot larger. The concept of cage free production is generally a lot more broadly accepted among the public than cage, and generally once the biosecurity risks are understood- often even more than free range.

There is a great opportunity to grow the barn category through increased consumer awareness campaigns and allow producers to invest more heavily in this area to mitigate the biosecurity risk of moving too much of the national flock to free range and removing affordability of eggs from the diet of a great deal of Australian families.

Cage free production is safer with lower risks associated than free range and is a great deal more broadly accepted than cage, so is the most conservative production method for producers to invest in. It is however, extremely important on the back of this that consumers are made aware of this system in order to create demand for eggs produced in a cage free or barn systems and provide a return on investment for producers.

5. Continued and increased use of social and general media to communicate with and educate consumers about food production and farming

The author was involved in the production of a documentary in 2015 called "*Farmlife Australia, The truth about Eggs*" which aired on Foxtel nationally that was produced to give a very basic insight into egg farming from the perspective of a farmer. The production was basic, but the feedback was resoundingly positive and the general consensus was that the Australian public was keen to learn more about the advantages and disadvantages of each egg production method. The documentary was produced on an extremely small budget and had a television audience around 250,000. This project could very easily be done again on a larger scale with a view to

reaching a larger proportion of the Australian public with a view to provide some information from the perspective of a farmer. This type of project is just one example of something that industry bodies such as Australian Eggs, Egg Farmers Australia or and producer could do to increase connection with consumers.



Figure 4: David Schaunich, Chris Monnier, Brian Ahmed and James Kellaway filming Farm Life Australia, The Truth about Eggs in 2016.

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Plain English Compendium Summary

Project Title:	Balancing Consumer Demand with Efficient, Clean Egg Production. Exploring how Australian Egg producers reconnect with and works to better meet the needs of Australian consumers.
Nuffield Australia Project No.:	1710
Scholar:	Chris Monnier
Organisation:	
Phone:	0490372343
Email:	monniercj@gmail.com
Objectives	This report aims to explore: <ul style="list-style-type: none">• The current situation facing the Australian Egg Industry.• Trends in overseas egg production.• The opportunities and challenges that face the industry currently.• Connection with our customers, how did we lose it and how do we get it back?• Future recommendations for Australian producers
Background	The report aims to gain knowledge on how other countries have managed the transition to lower intensity farming and what effect it has had on consumer costs and actual bird welfare.
Research	Interviews with producers and policy makers in Australia, U.S, Canada, Netherlands, UK, Brazil, Singapore, Chile, Italy, New Zealand.
Outcomes	Gained knowledge around international shifts toward less intensive egg production methods and what Australian producers can learn from them. Australian egg producers are currently well positioned to meet the needs of consumers into the future. Yet, this position can be greatly improved by working to further improve the consumer's understanding of the different production methods and then, using information gained from educated consumer purchase decisions to make more informed investment decisions.
Implications	Australian egg producers must be aware of the economic and social conditions of its egg consumers and make sure that it stays abreast of the needs of them. We must understand and push for sustainable production methods and understand the risks and benefits of each of them and make sure that consumers have a real understanding.
Publications	Presented at Australian Eggs Conference 2017- Sydney Presented at Nuffield Conference September 2018- Melbourne