An overview of Australia's poultry industry in 1989

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Introduction

The modern intensive poultry industry which has developed in Australia since the 1950s comprises two separate production sectors: poultry meat and eggs. In the context of this paper, considerations on poultry meat will be restricted to broiler chicken meat as this is 90% or more of the poultry meat consumed in Australia each year.

The Australian poultry industry currently produces and distributes some 280 million broiler chickens and 190 million dozen eggs per annum, almost all of which is consumed within Australia. While representing only in the order of 2% of the world's total poultry production, Australia's industry is a microcosm of the technologically advanced poultry industry within a developed country. This is evident from the sophisticated practices employed in housing, nutrition, breeding, management and disease control practices by both sectors of industry.

Further, while advances in technology (for example, production and processing) made by overseas poultry industries have quite rapidly been adopted in Australia, because of isolation geographically and from importations of either poultry breeding stocks (to date) or biologicals such as vaccines, the Australian poultry industry has developed a robust local infrastructure of industry-scientific interaction. This includes annual financial contributions by Government-industry Research Councils (Chicken Meat and Egg Industry) to support avian health research in Australia.

National Importance of the Poultry Industry

The gross value of production (GVP) of the poultry industry ranks in the middle third of Australia's animal industries (Table 1). The poultry meat sector with a GVP of \$636.5M comprises some 60% of the total GVP of \$922.8M for the poultry industry. Neither sector has developed significant export markets.

Consumption of eggs has remained fairly steady over the last decade at approximately 180 eggs per person each year. In contrast consumption of chicken meat has nearly doubled since 1973 (Table 2). The 22.4 kg of chicken meat consumed per head of population in 1988/89 represents 23% of the current annual total meat intake of Australians, a rise from 19.1% in 1980. Chicken is the second most popular choice of meat, and by 1993, poultry meat is projected to be some 27% of the meat in our diet. It is noteworthy that the predicted trend for poultry to exceed beef in dietary meat intake is now occurring in the USA.

An important component in the increasing consumption of poultry meat and continuing popularity of eggs, in the face of periodic health concerns such as dietary cholesterol, has been their price-competitiveness with other foods. For example, over the period 1966-86 the retail price of eggs rose 160% but the prices of other foods from animal sources, such as steak and milk, all rose more than 350%. The retail price of chicken meat was 332c/kg in 1986, is now 300-320c/kg and the ABARE projects that the price (in \$ 1989 terms) in 1993 will be 280c/kg. The major gains made in marketing poultry products strongly reflects both the predictability of supply and the increases in efficiency of production achieved (Table 3). Predictability of production and supply is predicated on reliable prevention and control of infectious diseases.

Current Disease Status and Control

Biggs (1982) indicated that in the USA poultry industry, economic losses from disease were some 20% of GVP and in the order of 3 times higher than were the losses from frank mortality.

Economic losses directly related to infectious disease in the Australian broiler industry were most recently surveyed by Brewster (1987), and are summarised in Table 4. The loss figure of almost \$30 million, when added to the costs of suboptimal production, site disease control measures and veterinary servicing costs, would represent 10 to 15% of the annual GVP of \$640 million.

Other conclusions which follow from Table 4 are:

- Without even the present degree of control of infectious disease, the Australian poultry industry could not operate effectively. Hence, the potential for devastation of this industry is dangerously high if a significant uncontrollable endemic or exotic disease occurs.
- The very large component (70%) of economic losses that are now attributed to bacterial, multifactorial "complexes" of unknown aetiology, for example Big Liver and Spleen Disease, leg disorders and runting stunting syndrome. While these may initially be viral infections: disease sequelae are complicated by interactions with *Mycoplasma* spp, bacterial infections and management/environment.
- The current priorities for control of pathogens in poultry meat production (Table 4) are infectious bursal disease and infectious bronchitis viruses, followed by the viruses of fowlpox, Marek's disease and egg-drop syndrome. For egg layers, several infectious disease concerns are shared with broilers in areas such as bronchitis — respiratory disease and Marek's disease but the seriousness of avian encephalomyelitis and leukosis reflects the longer production cycle for layers (65w+) compared with broilers (6-7w).

Field infectious poultry diseases are of 3 practical categories:

Primary Pathogens

On entry into susceptible flocks, these infections will progress to frank disease, with deaths and production losses. Preventive vaccination with live attenuated vaccines is widely used, for example, to control infectious laryngotracheitis, avian encephalomyelitis, fowlpox and Marek's disease viruses.

Pasteurella multocida (fowl cholera) is a serious bacterial pathogen for which preventive vaccination and site quarantine and hygiene, especially vermin control, is required. Eradication can be undertaken successfully for those pathogens for which the major means of transmission is via the egg if shedder hens can economically be detected and removed before lay. This has been achieved in Australia for pullorum disease and is in progress for avian leukosis. In recent years inactivated vaccines for haemagglutinating avian adenovirus have virtually eradicated the egg-drop syndrome from nucleus poultry breeding stocks in Australia.

Combined (Multifactorial) Infections

Synergistic combinations of infections can exacerbate the deleterious effects of a primary infection. Common examples include *Mycoplasma gallisepticum* infection by intercurrent infectious bronchitis virus, colibacillosis and staphylococcal infections. The widespread immunodepressive pathogens of

infectious bursal disease virus and chicken anaemia (parvovirus-like) agent may also be involved. Management practices and environmental stresses such as low or high temperatures, high relative humidity, excessive dust and ammonia gas, high stocking density, re-using contaminated litter, and nutritional deficiencies or sub-lethal feed toxicities can all contribute to disease development.

TABLE 1
Gross values of production of some Australian livestock industries in 1987/1988

Industry	Value of Production
Pig	\$505.5M
Poultry — eggs	286.3M
— meat	636.5M
Dairy	922.8M
Beef	1462.6M
	2965.4M

Source 1987/88 ABARE:ABARE

TABLE 2
Poultry meat consumption in Australia

Item	1972/73	1979/80	1988/89	ABARE Projections 1992/1993
Chicken	11.3*	18.5	22.4	25.8
Poultry	13.1	20.3	24.4	28.1
Meat		19.1%	23.0%	27.0%
Market Share				

* Consumption in kg/head of population

TABLE 3
Production gains made by poultry industry sectors

1979	1989
Broilers 2.0 kg/52d/2:1 FCR	2.0kg/45d/1.8:1
Layers 256 Hen Day Prodn	303 HDP (+ 14%)
(1971) 16.4 doz. eggs/hen	20.8 doz (+ 27%)

Controlling such diseases will be based on diagnosis and epidemiology and will require a range of approaches. These include site hygiene and quarantine together with preventive vaccination for the major primary pathogens such as bronchitis and bursal disease viruses, and management measures to reduce or eliminate environmental stress. Medication with antibiotics against mycoplasmal or bacterial pathogens may also be undertaken.

Emerging Diseases

During the last decade, several **new syndromes** have emerged as serious disease entities throughout the world's poultry industries.

These include egg drop syndrome, caused by a haemagglutinating avian adenovirus, probably of duck origin; chicken anaemia, caused by a parvovirus-like agent, widespread in Australian flocks and immunodepressive in young chickens; runting-stunting syndrome, six viruses associated to date and likely to be a togavirus-infection-environment complex disease; swollen head syndrome, coronavirus-associated with facial cellulitis caused by *E. coli* and big liver spleen disease (cause infectious, but unknown).

Of perhaps greater significance has been the emergence overseas of patho-serotypes which are **variants of recognised pathogens**. Grounds exist for believing that the selection pressure exerted by immunity to the vaccines then in use in overseas poultry industries has tended to foster the development of some of these variants. New homologous attenuated vaccines

have been needed to control these variant strains. Examples include:- a new type 1 infectious bursal disease virus, new immunotypes of infectious bronchitis virus, strains of Marek's disease viruses of high virulence, pigeon paramyxovirus type 1 and virulent strains of avian influenza, for example, Penn/83 H5 N2.

While the Australian industry has not experienced problems with variants on the scale that has occurred in the much larger poultry populations of the USA and Europe, a timely warning should be taken from the overseas experiences. Of particular importance in control for Australia will be early detection of the emergence of variants. To this end, restriction endonuclease maps and monoclonal antibody panels which can detect markers that are unique to Australian strains of these pathogens should be developed and maintained in readiness.

As a national and industry resource for diagnosis, control, research and vaccine production, the value in disease control preparedness of a microbiologically-secure reserve of accredited, specified pathogen-free (SPF) chickens has already been proven many times for Australia during the last decade. Further, new infectious diseases challenges to the Australian poultry industry are inevitable and fostering national centres of expertise would be a prudent investment by both industry and Government.

Industry Prospects for Growth

While the egg industry may well retain its present levels of production until at least into the early 1990's, the numbers of producers will continue to decrease by around 10% per year with corresponding increases in hen numbers on remaining production sites. With further Government egg-industry deregulation and animal welfare pressures, more free-range egg production sites will appear. Disease problems on such sites will tend to shift from primarily viral to parasitological and husbandry-associated, for example cannibalism and predators. Prospects for the export of Australian eggs will decline as other ASEAN nations extend their burgeoning intensive poultry industries.

Prospects for continuing local growth in the chicken meat sector appear strong. ABARE projections are for Australia's annual production to increase in the next 5 years by 60%, from 280 to some 490 million broilers per annum. Some export

TABLE 4
Costs of disease to Australian chicken meat sector 1986

Viral Agents	\$000's		Total*
	Broilers	Breeders	
Avian			
encephalomyelitis	3	47	50
Fowlpox	418	244	662
Infectious bronchitis	1,072	39	1,111
Infectious			
laryngotracheitis	—	30	30
Mareks	16	150	166
Leukosis	—	9	9
Infectious bursal disease	1,218	289	1,507
Egg drop syndrome (EDS76)	—	162	162
Viral TOTAL	2,727	970	3,697
Bacterial			
Mycoplasma, <i>E. coli</i> et al	8,168	902	9,070
Protozoan —			
Coccidiosis	4,401	257	4,658
Others — Unknown or Complex Aetiology	10,314	1,673	11,987
	25,610	3,802	29.4MILL.

* Figures include vaccination, medication, mortality but exclude site quarantine and hygiene, laboratory support and veterinary costs

† Percentage of total loss figure of \$29.4 millions

Source: RK Brewster (1987), 7th Aust Poultry Feed Convention

markets for Australia's broiler breeder stock to ASEAN countries, may be developed.

Potential Problems and Threats

These are summarised in Table 5. It is noteworthy that both sectors of industry are now supporting post-graduate training at Universities. Also, that exotic disease threats outweigh the other potential problems by several orders of magnitude. The likelihood of the risk of occurrence of exotic disease through either migratory birds from Asia or smuggling, combined with the seriousness of economic losses if introduced and not diagnosed and eradicated immediately, is worthy of extreme concern.

TABLE 5
Potential problems and disease threats to the Australian poultry industry

Problems

narrow genetic base (but importation commencing late 1989); contracting ownership base aiding disease spread; costs of feed in running operations (broilers 60%, eggs 40%); economics dictating management of health practices; animal welfare pressures; skilled graduates for industry; and declining industry/Government information, flow and co-operation in controlling endemic and exotic poultry diseases.

Disease Threat

Exotic disease introduction, especially if readily transmissible pathogenic Newcastle or Avian Influenza diseases.

TABLE 6
Chicken meat disease research priorities 1988-93

Poultry diseases which are exotic to Australia
Investigating the causes and roles of emerging poultry diseases
Studies of complex poultry diseases
Development of improved vaccines and diagnostics
Optimising the immunological competence and responsiveness of Australian poultry flocks

Source: Chicken Meat Research Council, Research and Development Plan 1988

Disease Research Priorities and Funding Trends

Priorities are summarised for both sectors of the poultry industry in Table 6. Continuing its high priority for funding of infectious diseases research, the Chicken Meat Research

Council allocated 41% of its 1988/89 funding to this area. The Egg Industry Research Council, with more market-related concerns, for example, dietary value of eggs and improving egg shell quality as higher priorities for its sector, allocated 17% of its funds for disease research.

Both sectors, however, allocated a very high priority to supporting the development of improved procedures for the control of poultry diseases exotic to Australia. These procedures include the rapid differentiation of exotic strains of Newcastle disease virus (NDV), the diagnosis of virulent avian influenza and the strategic use of the lentogenic Australian V4 strain of NDV as a vaccine. Australian poultry disease research successes currently include improved vaccines and diagnostics by applying recombinant DNA technology to infectious bursal disease vaccines, developing diagnostics to rapidly discriminate Australian vaccine and field strains of infectious bronchitis virus, and by restriction endonuclease analyses of avian adenoviruses which have enabled the recognition of a group of hypervirulent adenoviruses as the aetiological agents of field outbreaks of inclusion body hepatitis.

For 1989/90, the industry Research Councils allocated a total sum of approximately \$M2.0 representing in the order of 0.1% of the GVP's of each sector. To date neither has fully utilised Government dollar-for-dollar research subsidies which are available up to 0.5% of industry GVP. However, there is little doubt that, should the occasion arise where industry viability is threatened by infectious disease, both sectors of the Australian poultry industry will contribute heavily to resolve the situation.

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