Structure of the Australian rabbit industry

A preliminary analysis

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ABARE report prepared for the
Livestock and Pastoral Division,
Department of Primary Industries and Energy

September 1996

Foster, M. and Telford, R. 1996, *Structure of the Australian Rabbit Industry: A Preliminary Analysis*, ABARE report prepared for the Livestock and Pastoral Division, Department of Primary Industries and Energy, Canberra, September.

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ABARE project 1423

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Summary

- Wild European rabbits are classified as a pest in Australia because they cause considerable economic costs in the form of environmental damage and loss of crops and pastures. There are, however, industries in Australia based on the harvesting of wild rabbits.

- The purpose in this study is to describe the nature and structure of the Australian rabbit industry. The study covers both the industries based on the harvesting of wild rabbits and the farming of domesticated rabbits.

- The European rabbit is found in most parts of Australia, although generally it has not flourished north of the Tropic of Capricorn. High rabbit numbers are found in Australia only where control measures are uneconomic. The main areas where rabbits are a major problem for economic and conservation reasons are: the southern third of the Northern Territory and northern three-quarters of South Australia; the Nullabor Plain in Western Australia; and western New South Wales. Most of Australia's commercial wild rabbit harvesting is in these regions, which are generally arid in nature.

- Australia's population of wild rabbits is being affected by the accidental release in 1995 of the rabbit calicivirus, a disease that has very high mortality rates only in European rabbits and is highly contagious.

World rabbit industry

- Annual world production of rabbit meat is estimated be 1.25 million tonnes, around 56 per cent of which comes from farmed rabbits. Only around 6 per cent of world rabbit meat production enters world trade. Most rabbit meat is consumed in the country in which it is produced. World trade is dominated by China, which accounts for around 40 per cent of world exports.

- World prices for rabbit meat increased in the second half of the 1980s and early 1990s as the rabbit calicivirus disease markedy reduced rabbit numbers first in China and then in Europe. However, prices have returned to more usual levels in recent years as world rabbit production has recovered.

RABBITS

Australian rabbit industry

- The Australian rabbit industry is almost completely based on the harvesting of wild rabbits, although there is also a very small, emerging, farmed rabbit industry in some states. Some rabbits are sold directly to processors by shooters but usually there are field agents who perform an intermediary role between shooters and processors.

- The best cuts of the rabbit carcass are reserved for human consumption, with the head, feet, offal and other offcuts not suitable for human consumption being used for pet food.

- In Australia, the fur from the rabbit pelt is used mainly to make felt for hats; the skin stripped of fur is simply discarded. A small number of fur pelts are used for making apparel fur pieces.

- Data on the supply and disposal of rabbit products in Australia were assembled by ABARE through contacts with commercial rabbit shooters, field agents, rabbit meat processing establishments, pet food manufacturers and felt hat makers. Because the supply of rabbits fluctuates widely from season to season according to weather conditions and the incidence of disease, data were gathered for the seven years to 1994-95 to ensure an accurate representation of longer term product flows.

- Based on the period 1988-89 to 1994-95, an estimated annual average 1.365 million pairs of wild rabbits (2.73 million rabbits) were harvested in Australia.
  - Rabbit meat production for human consumption (both domestic and export) was estimated to average 2282 tonnes, dressed weight, a year.
  - Domestic consumption of rabbit meat in Australia averaged 1901 tonnes, dressed weight, a year, which is equivalent to consumption of 0.11 kilograms per person.
  - Use in pet food of rabbit meat, offal and offcuts was estimated to be 634 tonnes a year.
  - Production of rabbit pelts was estimated to average 163 tonnes a year, equivalent to 1.3 million pairs of pelts.

- The average value of production at various stages of the production and processing chain over the period 1988-89 to 1994-95 was estimated to be (in constant 1995-96 dollars):

  - Shooters, $2.47 million a year;
  - Processors of meat for the domestic market, $7.42 million a year; and
  - Processors of meat for the export market, $1.69 million a year.

- The value of exports of rabbit products (excluding rabbit felt hats) averaged $1.395 million a year in constant 1995-96 dollars over the seven years to 1994-95, all but $0.044 million of which came from meat exports.

- Average annual employment, in full time equivalents, was estimated to be 68 shooters and 70 workers at the meat processing stage.

- There is also a profitable industry in Australia based on the processing of the fur from rabbit pelts to make felt hats.
  - This industry employs around 125 persons a year to make products with an estimated average wholesale value of $10.7 million a year in constant 1995-96 dollars.

- With the apparent end to the prolonged drought in eastern Australia meaning increased rabbit numbers, the Australian industry based on the harvesting of wild rabbits had been anticipating a period of increased throughput over the next few years.

- However, the incidence of the rabbit calicivirus means that this is unlikely to occur in the short run.
  - On the supply side, the reduced rabbit numbers in affected areas which result from the disease mean higher search costs for rabbit harvesters and hence higher production costs.
  - Demand for rabbit meat may also be adversely affected as a result of any perception among consumers of disease risk to humans from the rabbit calicivirus disease.

- The occurrence of rabbit calicivirus disease could mean higher prices and increased imports of rabbit pelts in Australia. The effect of higher pelt prices on the profitability of the Australian felt hat making industry is assessed to be only slight because the cost of pelts is only a small part of the value of a finished felt hat.

- The occurrence of rabbit calicivirus disease could, however, give a boost to the emerging farmed rabbit industry in Australia because the disease makes products from its chief competitor, the wild rabbit, much less competitive in price.

Conclusion

- The industry in Australia, based on the harvesting of wild rabbits, has been a small but resilient one over many years. However, with the accidental release of rabbit calicivirus disease in Australia in 1995 and the disease now endemic in the main harvesting regions, the Australian wild rabbit harvesting and meat processing industry appears to be facing a sharp contraction, at least in the short run. A nationally coordinated controlled release of RCD is planned to occur from October 1996. The long run future of the industry depends on the extent to which rabbit populations recover after the initial impact of the disease, something which is not known at this stage.

Introduction

Since its introduction to Victoria in 1859, the wild European rabbit has adapted well to Australian conditions, quickly reaching large numbers throughout much of the southern half of the continent and causing considerable economic costs in the form of environmental damage and loss of crops and pastures. Wild rabbits are proclaimed as pests in all states and territories of Australia, which means that landholders are legally obliged to control rabbit numbers on their properties.

The potential benefits to agricultural production from rabbit control could be as high as 3 per cent of the value of Australian agricultural production, or $600 million a year (ACIL 1995).

While rabbit numbers in Australia were massively reduced in the 1950s with the release of the myxoma virus, which is fatal only to rabbits, rabbits have remained a significant pest in many regions of Australia.

Despite the pest status of the rabbit, there are profitable industries in Australia based on the harvesting of wild rabbits. There is also an emerging industry based on the farming of domesticated rabbits. The purpose in this report is to detail the nature and structure of the Australian rabbit industry.

In the next section of this report, some background information on rabbit biology, rabbit diseases and the world rabbit market is briefly presented because an understanding of these is important in explaining the nature of the Australian rabbit industry.

Background

Rabbit population dynamics

Because of high fertility rates and low gestation periods, rabbit population numbers can increase very rapidly, limited only by food and water availability, predation and disease. The fecundity of the rabbit means that rabbit populations can recover very quickly following disruptions caused by drought or disease.

Apart from starvation, the most important mortality factors with rabbits in Australia are predators, myxomatosis, flooding, hypothermia and parasites (Williams, Parer, Coman, Burley and Braysher 1995). The main predators are foxes, feral cats, birds of prey and, in the more northern regions, dingoes.

Following Foran, Low and Strong (1985), rabbit population dynamics in a typical warren system in arid Australia can be described as follows. When feed conditions are good and the warrens are disease free, rabbit numbers grow strongly, limited by kills from predators. The onset of drought or the outbreak of a disease such as myxomatosis leads to a sharp decline in numbers. While the drought continues, shortages of water and feed and sporadic outbreaks of disease keep rabbit numbers at relatively low levels. When the drought breaks, there is a rapid growth in rabbit numbers. In the long run, some sort of balance between rabbit and predator numbers is established.

Rabbits are found in most areas of Australia south of the Tropic of Capricorn but have not flourished in Australia's tropical regions. In the arid tropics they have not been able to cope with short breeding seasons, high warren temperatures and poor pasture conditions (Williams et al. 1995). However, according to Williams et al. (1995, p. 25), 'high rabbit numbers are found only in those areas where management is difficult or neglected, or in some rangelands where control is not obligatory (Northern Territory) or the legislation is not enforced because control is perceived to be uneconomic'.

Williams et al. (1995) cite those areas where rabbits are a major problem for economic and conservation reasons as being: the southern third of the Northern Territory and northern three-quarters of South Australia; the Nullabor Plain in Western Australia; and western New South Wales. These areas coincide fairly well with the areas where commercial rabbit shooters operate, as identified in Ramsay (1994).

The intermediate rainfall areas (wheat–sheep zone) are the most biologically favourable for rabbits in Australia but rabbits are less of a problem there because there are more frequent outbreaks of myxomatosis and because cultivation of crops and pastures means that there is more disruption to warren systems and fewer surface harbours such as fallen trees (Williams et al. 1995).

Shooting is not considered an effective primary control measure for rabbits, though it can be useful as a 'maintenance' control (Williams et al. 1995). Commercial rabbit shooters only operate in areas where numbers are high and move on to other sites when kills per night fall below the economic level. Consequently, because of the ability of rabbit populations to recover, the long run effect of commercial shooters on rabbit numbers is probably only slight.

Myxomatosis has been a highly effective agent for the control of rabbits. Ten years after the widespread release of the myxoma virus in the early 1950s, rabbit populations in Australia were around 5 per cent of pre-myxomatosis levels in the better rainfall areas and 25 per cent in the arid zone (Myer 1962). However, rabbits have gradually developed resistance to the various strains of the myxoma virus that have been employed. Williams et al. (1995) point out that biological controls such as the myxoma virus cannot be expected to effectively control rabbit numbers on their own in the long run; biological control agents must be backed up by other controls such as poisoning and destruction of warrens and surface harbour.

The search for alternative biological control agents to myxomatosis has prompted calls for release in Australia of another rabbit specific virus, the rabbit calicivirus disease (RCD), which has been shown to have a very high mortality rate with the European rabbit and to be highly contagious (see box 1).

The rabbit calicivirus was accidentally released in South Australia in 1995 and the disease has spread to south western Queensland, New South Wales and Victoria, eastern Western Australia and the Northern Territory. In September 1996, the Minister for Primary Industries and Energy announced that Commonwealth, state and territory ministers had unanimously agreed that RCD should be decared a biological control agent, clearing the path for a nationally coordinated release commencing around October 1996 (Anderson 1996).

World rabbit market

Details on the nature of world production and trade in rabbit meat are obtained from Niedzwiadek (1994) who surveyed 106 countries (table 1).

RABBITS

Niedzwiadek estimated annual world production of rabbit meat to be 1.25 million tonnes, with around 44 per cent being produced using traditional extensive systems and the remainder coming from rabbit farms. The main producing countries are Italy (24 per cent share of total), France (12 per cent), the countries of the former Soviet Union (12 per cent), China (10 per cent) and Spain (10 per cent).

Box 1: Rabbit calicivirus disease

Rabbit calicivirus disease (RCD) is an acute fatal disease in rabbits. The disease is caused by a virus in the family of *Caliciviridae*. The disease was first reported in China in 1984 and has spread to Europe, Asia and Africa (Westbury, Lenghaus and Munro 1994).

The disease appears to affect only the European rabbit (*Oryctolagus cuniculus*). Other species of rabbit — the cottontail rabbit (*Sylvilagus floridanus*) and black tailed jack rabbit (*Lepus californicus*) — appear not to be susceptible (Gregg, House, Meyer, Berninger 1991). CSIRO tested other domestic, feral and native species and found no evidence of disease in any species other than the European rabbit (Lenghaus, Westbury, Collins, Ratnamohan and Morrissy 1994).

An important factor in the impact of the disease is that young rabbits are less susceptible to the disease (Williams et al. 1995). They may develop a lifelong immunity to RCD. The reason for this resistance is not yet known. Under trial conditions, mortality rates were 50 per cent in 4–5 week old rabbits, and 95 per cent in rabbits older than 9 weeks (Williams et al. 1995).

The virus is contained in all secretions and excretions of diseased rabbits so the disease may be spread between rabbits by direct contact or by feeding on materials contaminated by infected rabbits. The virus may also be spread by rabbit fleas and mosquitoes and, perhaps, by bush flies and birds.

The virus may survive for extended periods in the environment; its persistence in the Australian environment is not known. Williams et al. (1995) say that the virus can survive in frozen rabbit meat.

According to Cooke (1994), field studies of the impact of RCD on populations of rabbits in Europe suggest initial population reductions of at least 65 per cent and occasionally 90 per cent. Villafuerte, Calvete, Gortazar and Moreno (1994) measured mean rabbit mortality in Donana National Park, Spain, at 55 per cent. In Spain, the disease appears to break out every second year. Some European rabbit populations were observed to recover quickly to pre-infection levels but other populations seem to be held at lower equilibrium levels.

The disease can be successfully controlled by the use of commercially available vaccines.

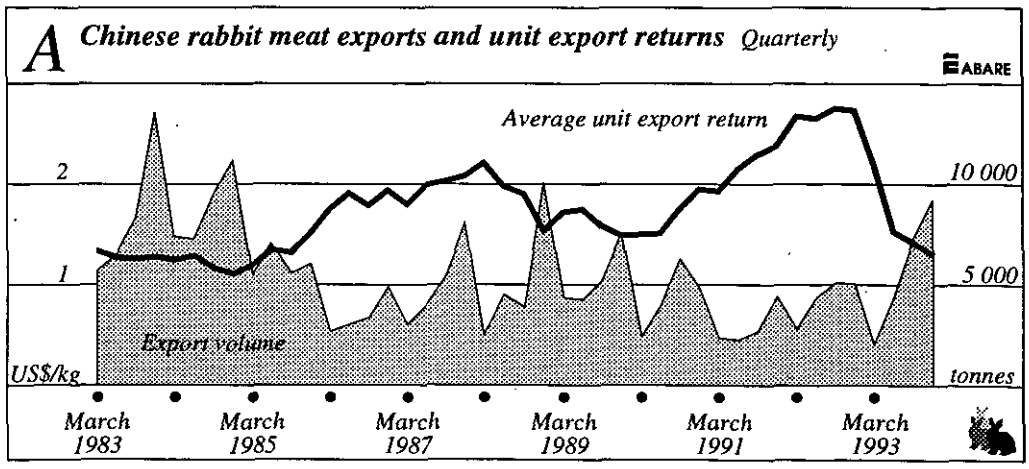
1 World production and trade in rabbit meat a

Major producers		Major exporters		Major importers	
Country	**Quantity**	**Country**	**Quantity**	**Country**	**Quantity**
	kt		kt		kt
Italy	300	China	30–40	Italy	30–40
France	150	Hungary	18	France	10
Former Soviet Union	150	Poland	5	Belgium	7
China	120	Former Czech	4	Germany	5
Spain	120	Netherlands	4	Switzerland	5
Former Czech	30	Romania	4	Canada	3
Poland	20	France	3	Netherlands	3
Portugal	20	Belgium	2	South Korea	3
Hungary	19	Other	8	UK	3
Romania	18			Other	3
Other	303				
Total	1 250		78–88		72–82

a Based on Niedzwiadek (1994).

The countries with the highest consumption per person include Italy, France, Spain, Belgium, Portugal and Malta. Annual consumption per person in this group ranges from 2.0 kilograms in Malta to 5.3 kilograms in Italy.

Only around 6 per cent of world rabbit meat production enters world trade — that is, most of the world's rabbit meat is consumed in the country in which it is produced. The world export trade in rabbit meat is dominated by China, which accounts for over 40 per cent of the total. The eastern European countries of Hungary, Poland, the former Czechoslovakia, and Romania are



the other major exporters. The largest importer of rabbit meat is Italy, which takes around 40 per cent of total world trade. Most of the other principal importers are western European countries.

Because China dominates world trade in rabbit meat, its unit export return can be considered as the representative world price. It can be seen from figure A that the volume of China's exports declined sharply in 1985 and prices increased as RCD affected its rabbit production. A further boost to rabbit meat prices occurred in the late 1980s and early 1990s as RCD spread to Europe. The average export return peaked in the September quarter 1992 but have since collapsed as world rabbit production has recovered to more normal levels.

Structure of the Australian rabbit industry

The aim in this section is to detail the nature of supply and demand for rabbit meat and rabbit pelts in Australia. The main product flows in the Australian wild rabbit industry are illustrated in figure B.

Nature of demand for rabbit products

The best cuts from the rabbit carcass are reserved mainly for human consumption. The head, feet, offal and other offcuts not suitable for human consumption are used for pet food. Carcass parts that are not suitable even for animal consumption can be used in the making of blood and bone fertiliser.

Rabbit meat is a white meat that is higher in protein and lower in fat than chicken meat. Rabbit meat competes most directly with chicken meat but substitution possibilities exist with most other meats.

B ***Main product flows in the Australian wild rabbit industry***

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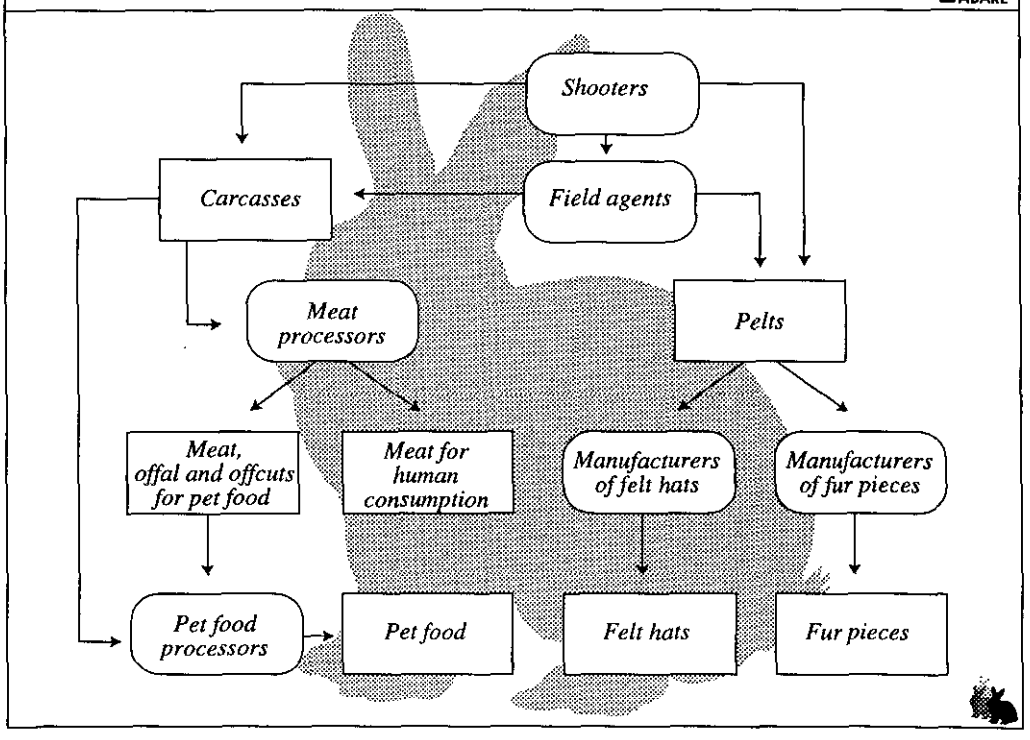

RABBITS

The arid regions of Australia produce rabbit meat which is white with white body fat. This meat is preferred by consumers to the darker meat with yellow fat that is produced in the higher rainfall areas.

Retail prices of fresh rabbit carcasses and cuts are generally lower than those of beef, chicken, lamb and pork. A large part of the Australian population generally regards wild rabbit meat as being of inferior quality to other fresh meats. A contributory factor to this view has probably been hygiene concerns related to the way in which rabbits are harvested and at least partly processed in the field. Consequently, the main consumers of fresh rabbit meat in Australia are considered to be low income earners, particularly pensioners, but there is also relatively strong demand from various ethnic and cultural sections of the population (Ramsay 1994). As well, the restaurant trade is an important source of demand for high quality rabbit meat, particularly the larger carcasses, reflecting the perception of rabbit meat as both a game meat and a fresh meat. Rabbits are an important subsistence food for Aborigines in some areas of Australia (Wilson, McNee and Platts 1992).

Rabbit meat in Australia is wholesaled to the restaurant trade, delicatessens, butchers and supermarket chains. There is a strong consumer preference for fresh rather than frozen rabbit and demand peaks in winter.

In Australia the fur from the rabbit pelt is used mainly for making felt from which hats are manufactured. Rabbit fur is strongly preferred to other furs such as kangaroo fur because of its superior feltmaking properties. It is possible to make leather from the skin part of the pelt but it appears that skins are simply discarded once the fur is removed. A relatively small number of fur pelts are used for making apparel fur pieces.

***C* Value of products from processing a typical wild rabbit, Australia a**

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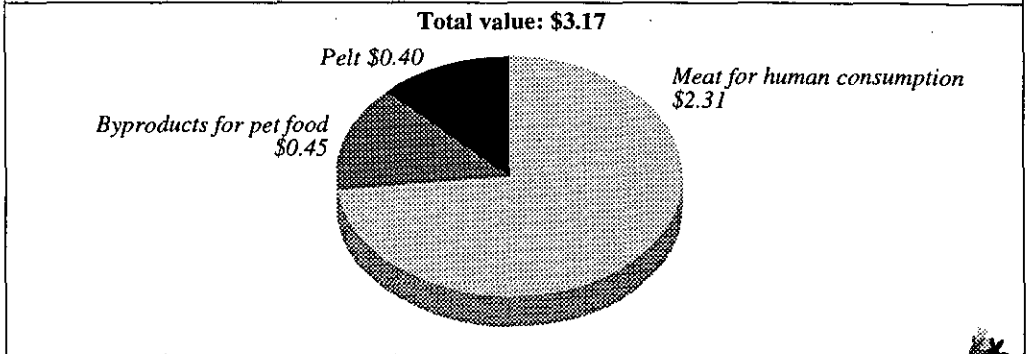

a Average, 1988-89 to 1994-95 (in constant 1995-96 dollars), based on prices received from Australian meat processors.

The values of the different products from a typical wild rabbit in Australia, calculated over the period 1988-89 to 1994-95, are shown — inflated to 1995-96 dollars — in figure C. Nearly three-quarters of the total value is derived from meat for human consumption.

Nature of supply of rabbits

Wild rabbit harvesting

Wild rabbits in Australia are shot rather than trapped. Head shots are preferred because there is less bruising of the flesh and damage to the pelt. Most of the rabbits harvested commercially are taken by full time professional shooters, though there are also part time or opportunistic shooters.

Shooters average around 100–150 rabbit pairs per night, depending on rabbit population densities. Below this figure shooters usually move to new locations (Emmanuel Hatzi, Field Agent, personal communication, May 1996). The production peak for rabbits is in spring–summer and the seasonal low is in winter.

Rabbits intended for the meat market are gutted in the field, chilled, then delivered, usually with skin, head and feet on, to the meat processors. The lungs, liver and kidney are also usually left inside the carcass, to enable inspection for evidence of disease. Sometimes the head and feet will be removed by shooters and sold separately as food for animals in zoos or wildlife parks.

Some rabbits are sold directly to processors by shooters but usually there are field agents who perform an intermediary role between shooters and processors (see box 2). The service that field agents provide is to coordinate the activities of the shooters in a way that ensures adequate supply to processors. The niche that a field agent fills in the rabbit supply process arises from having ongoing knowledge of where economic populations of rabbits are located and through having an extensive network of contacts with shooters, landholders and processors. It is usually the field agents who arrange for chiller units to be placed in locations where shooters are operating and who provide the refrigerated trucks that transport the rabbit carcasses to the meat processing works.

The most profitable commercial rabbit harvesting areas in Australia occur in the arid regions toward the centre of the continent (figure D). This production orientation reflects both the consumer preference for white rabbit meats and the high rabbit populations that occur there because of the difficulty of

Box 2: Example of the operation of a field agent

A field agent, Emmanuel Hatzi, who is located at Broken Hill in south western New South Wales takes rabbits from 20–25 specialist rabbit shooters in a normal season. As well, Mr Hatzi takes rabbits from 20–25 opportunistic rabbit shooters, usually kangaroo shooters.

In 1995 Mr Hatzi paid $2.00–2.60 per pair for large rabbits, $1.50–1.60 per pair for medium rabbits, $1.00 per pair for rabbit kittens, and $1.00–1.50 per pair for rabbits termed 'rejects'.

A premium was paid for rabbits if the shooter owned his own mobile chiller, presumably because of the storage benefits that such a facility provided. The premium was around $0.40 per pair for large rabbits.

The difference between the price Mr Hatzi paid to shooters and the price he received from processors was $0.90–1.00 per pair for large rabbits but varied according to the distance that he had to transport the rabbits.

***D** Main wild rabbit harvesting regions in Australia*

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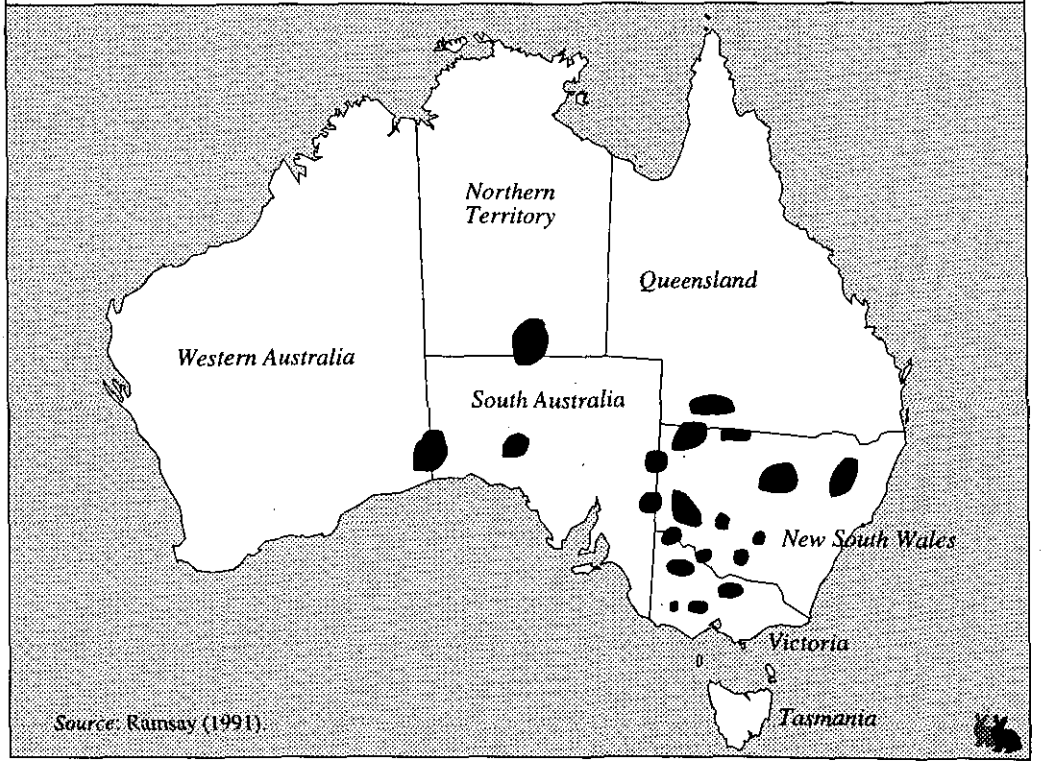


Source: Ramsay (1991)

applying effective control measures. There are also harvesting regions in higher rainfall regions in New South Wales and Victoria because they produce fur pelts with more fur.

Rabbit pelts are produced in two ways, the first of which is as a byproduct of the rabbit meat trade. These are called 'butchered' skins and are characterised by being cut lengthwise along the stomach to enable the innards to be removed. Second, there are 'sleeved' skins which are separated from the rabbit carcass by slitting the skin at a point between the thighs then pulling the skin down the body. Sleeving is mainly done where hunters are retaining the pelt but discarding the carcass. Approximately 10 per cent of rabbit skins entering the commercial trade are sleeved skins (Ramsay 1994).

Rabbit pelt prices vary mainly according to the quantity of fur on the skin. Winter skins have more fur than summer skins so they have a higher value. The number of dried skins per kilogram varies from 12–14 for winter skins to 14–18 for summer skins (Ramsay 1991). Sleeved skins are usually gathered in regions and at times when fur yields are higher than where butchered ones are gathered so they are priced higher than butchered ones (Ramsay 1991). Pelts from around 20–30 per cent of rabbits shot are discarded because they are of poor quality. These are usually from milky does and kittens.

Farmed rabbits

Until recently, commercial farming of rabbits has been prohibited throughout Australia because of the pest status of rabbits. The prohibition was first lifted in Western Australia in 1988, though strict controls on commercial rabbit farms were applied. Commercial rabbit farming was made legal in New South Wales in late 1995 but is still not permitted in South Australia and Victoria.

There are currently seven registered rabbit farms in Western Australia. In total, these farms are licensed to keep 950 breeding does (female rabbits). Annual production is estimated to be about 40 000 carcasses a year or 48 tonnes dressed weight (Peter Hoffman, Agriculture Western Australia, personal communication, March 1996). Meat from farmed rabbits in Western Australia is processed at an abattoir that also processes poultry meat.

Typically in the Australian farmed rabbit industry each doe produces eight litters a year or around forty kittens that survive to be marketed. Weaners are usually ready for slaughter at between eleven and thirteen weeks when they should weigh 1.1 to 1.4 kilograms. At present, the general accepted industry standard for rearing costs is around $2.50 per kilogram, depending on husbandry (Osborne 1996). Each doe requires up to eight hours of farm

operator labour every year. In terms of price, farmed rabbit meat has not been competitive in Australia with wild rabbit meat (Ramsay 1994).

Farmed rabbits are usually kept in individual wire cages which are ventilated and mosquito proof (because mosquitoes carry myxomatosis). With the advent of RCD, farmed rabbits derived from the European rabbit will now also have to vaccinated against this disease at a cost of around $2 per rabbit. Only breeding does may need to be vaccinated.

Rabbits are also farmed to produce fur. For example, an angora rabbit produces around one kilo of fur a year which is suitable to be woven into a wool-like yarn.

Australian supply and disposal of rabbits

To obtain data on the supply and disposal of wild rabbit products in Australia, ABARE contacted commercial rabbit shooters, field agents, rabbit meat processing establishments, pet food manufacturers, and felt hat makers. The organisations contacted are listed in the appendix. Export data were obtained from Australian Bureau of Statistics (1996). Because the supply of rabbits fluctuates widely from season to season according to weather conditions and disease, data were gathered for the seven years to 1994-95 to ensure an accurate representation of longer term product flows.

Estimates of supply and disposal at the various stages of the processing chain are presented at the Australia level in table 2.

Domestic human consumption of rabbit meat

To safeguard the health of consumers, rabbit meat destined for domestic human consumption is inspected for bacterial contamination, infection from parasites and general meat quality. Domestic inspection of meat is the responsibility of state governments, although in New South Wales and the Northern Territory the Australian Quarantine and Inspection Service (AQIS) undertakes domestic inspection on their behalf (Industry Commission 1994). The Victorian government took back responsibility for domestic meat inspection from AQIS in July 1994 and this task is now undertaken by a statutory authority, the Victorian Meat Industry Authority. In Queensland, the relevant statutory inspecting organisation is the Livestock and Meat Authority of Queensland, while in Western Australia, responsibility is shared between the Health Department of Western Australia and local government. Meat inspection arrangements in South Australia are administered by its Department of Primary Industries.

2 ***Estimated supply and disposal of wild rabbit products in Australia***

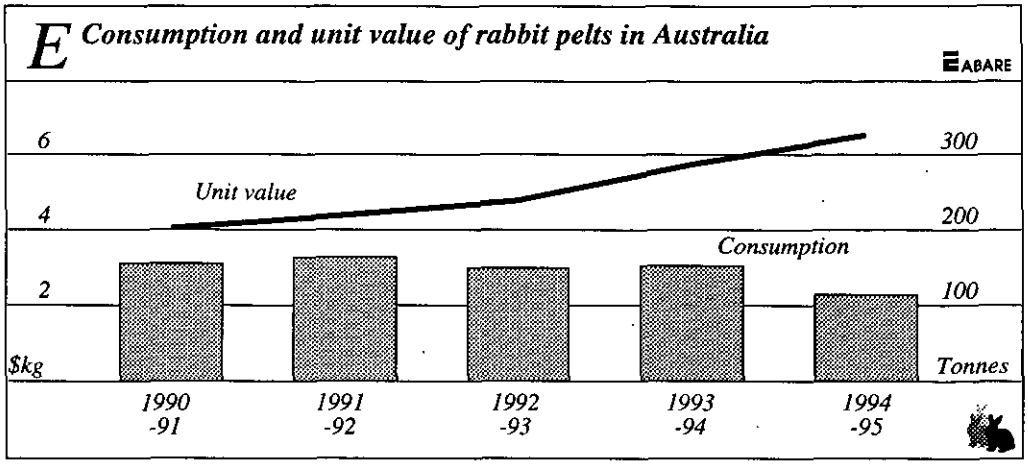
	Unit	1988 -89	1989 -90	1990 -91	1991 -92	1992 -93	1993 -94	1994 -95	Average
Production									
– quantity	'000 pair	1 181	1 581	1 829	1 151	1 372	1 143	1 295	1365
– value	$'000	2 766	3 795	4 389	2 671	3 292	2 724	2 195	3 605 a
Domestic sales									
Meat for human consumption									
– quantity	tonnes b	1 657	2 210	3 010	1 600	1 913	1 600	1 318	1901 a
– value	$'000	4 763	6 287	7 329	4 572	5 525	4 572	3 810	6 070
Meat for pet food									
– quantity	tonnes	591	724	876	572	648	572	457	634
– value	$'000	472	579	701	457	533	457	381	591 a
Pelts									
– quantity	tonnes	147	197	228	143	170	142	114	163
– value	$'000	941	1 093	1 273	876	972	869	640	1 102 a
Export sales									
Meat for human consumption									
– quantity	tonnes b	123	248	773	1081	236	167	37	381
– value	$'000	274	731	2 534	3 477	665	398	172	1 351 a
Pelts									
– quantity	tonnes	–	5	8	4	15	4	17	7
– value	$'000	7	40	37	68	49	37	37	44 a

a Values in constant 1995-96 dollars. b Dressed weight. (–) negligible.
Sources: Australian Bureau of Statistics (1996); ABARE.

Domestic consumption of rabbit meat in Australia over the seven years to 1994-95 is estimated to average around 1901 tonnes a year, dressed weight, which is equivalent to consumption per person of 0.11 kilogram a year. This compares with annual average consumption per person of chicken meat — a close competitor with rabbit meat — of 25.4 kilogram a year over the same period (ABARE 1995).

Domestic use of pelts

The great bulk of rabbit pelts produced in Australia are consumed by Akubra Hats Pty Ltd, a hat making company located at Kempsey, New South Wales. The only other significant manufacturers of rabbit felt hats in Australia are Mountcastle Pty Ltd in Brisbane and Statesman Hats in Perth. The latter two hat makers import rabbit felt rather than pelts. Another company, Crompton and Sons of Melbourne, processes rabbit pelts for export only.



The domestic felt hat industry usually imports some rabbit pelts or rabbit felt. One reason is because fur colours such as white are virtually not available in Australia.

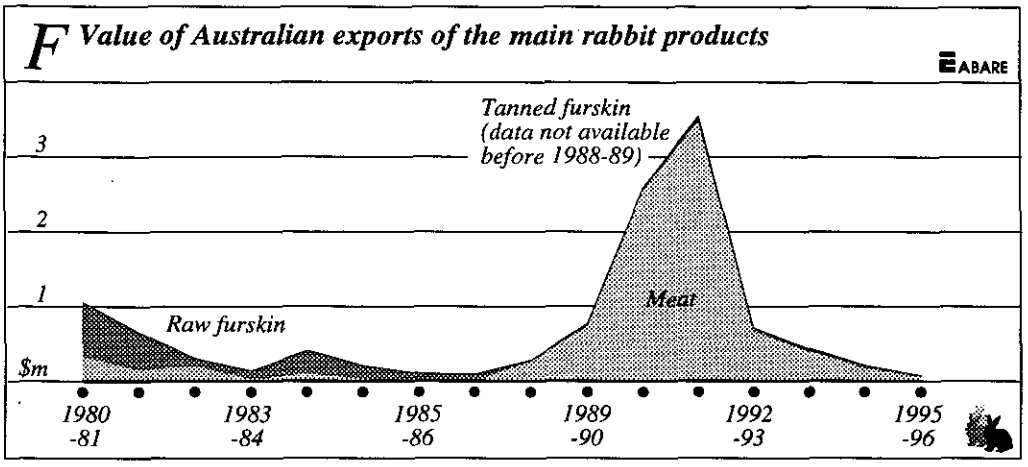
Eight to fourteen rabbit pelts are used to make a felt hat, depending on the fur yield of the pelt and the size and style of the hat (Bowen 1988). Australia's average annual consumption of Australian rabbit pelts for hat making over the five years to 1994-95 is estimated at 147 tonnes. The extended drought has necessitated larger than usual imports of pelts by the industry in recent years and drawdowns in its stocks of pelts to much lower than usual. (See later section on imports.) Reflecting the tight supply of rabbits in Australia caused by drought, prices paid by processors for rabbit pelts increased from $4.04 per kilogram in 1990-91 to $6.52 per kilogram in 1994-95 (figure E).

Domestic pet food

Over the seven year period to 1994-95, an average 634 tonnes a year of rabbit meat, offal and offcuts were consumed in the manufacture of pet food. The largest consumers of rabbit for pet foods are Uncle Ben's of Australia at Wodonga on the Victoria–New South Wales border and Friskies Pet Care at Blayney in New South Wales.

Exports

Data are available for Australian exports of rabbit meat and raw tanned furskins but it is only since 1988-89 that separate data have been available for tanned furskins. Export data are available for felt products such as hats but not specifically rabbit felt products.



The export value of Australia's rabbit meat and furskins peaked at $3.55 million in 1991-92 before declining to only $0.21 million in 1994-95 (figure F). The decline mainly reflects the effects on rabbit numbers of an extended period of severe drought in south eastern Australia over the years 1993 to 1995. Lower unit export returns were also a contributory factor.

It can also be seen from figure F that the composition of Australia's exports of rabbit products has changed markedly over the past fifteen years. Currently, rabbit meat dominates Australia's rabbit product exports in terms of value but until 1987-88 it was raw furskins that contributed the most value. Exports of rabbit furskins are currently negligible.

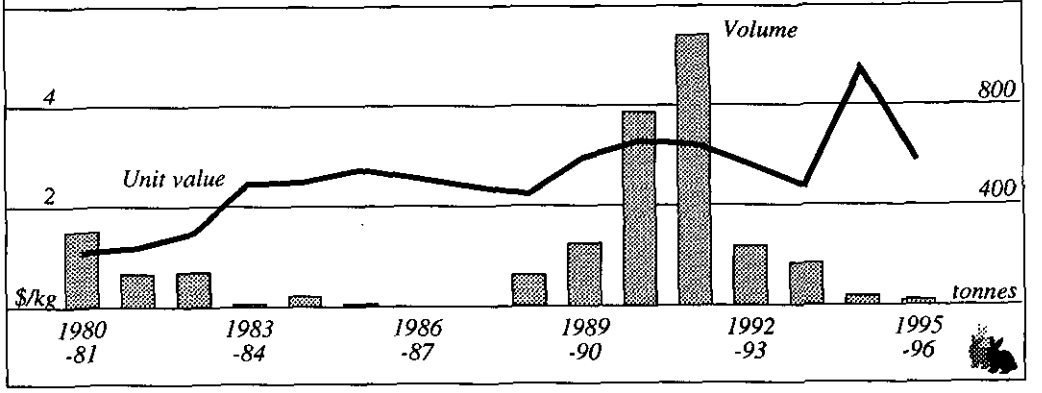
Exports of rabbit meat

The Australian Quarantine and Inspection Service (AQIS) is charged under the *Export Control Act 1982* with ensuring that the quality of all rabbit meat exports meet the standards required by the importing country. It does this through a system of inspection and certification. Currently AQIS licenses seven meat processing works to export rabbit meat; the registration of one processing plant in Western Australia lapsed in September 1995. The currently registered export processing plants are listed in table 3.

The volume and value of Australia's exports of rabbit meat are shown, by destination, in table 4. There were no exports of rabbit meat from Australia in 1986-87 or 1987-88 (figure G). According to Ramsay (1994), this resulted from a combination of low world prices for rabbit meat and increased costs associated with the more stringent requirements introduced in 1985 in Australia for establishments that exported rabbit meat.

RABBITS

G ***Volume and unit value of Australian rabbit meat exports***



However, there was a marked upturn in Australia's rabbit meat exports and unit export returns in the late 1980s and early 1990s (figure G). This was probably mainly because export demand was boosted by the adverse effect of rabbit calicivirus on world rabbit production, particularly in China and Europe.

The value of Australia's rabbit meat exports peaked at $3.48 million in 1991-92 but has since declined sharply mainly because of drought in the ensuing years.

3 ***Facilities licensed by AQIS to process rabbit meat for export***

Company name	Establishment location	Registered operations
Desert Oak Australia Pty Ltd	Mornington, Victoria	Rabbit meat and rabbit commodity; game meat and game meat commodity
Game Farm Pty Ltd	Galston, New South Wales	Rabbit meat and rabbit commodity; poultry meat and poultry meat commodity
Lenah Game Meats	Rocherlea, Tasmania	Rabbit meat and rabbit commodity; possum meat: game meat
Australian Meats Pty Ltd	Dry Creek, South Australia	Rabbit meat and rabbit commodity; game meat and game meat commodity
Outback Foods Pty Ltd	Adelaide, South Australia	Rabbit meat and rabbit commodity; game meat and game meat commodity
Tusker (Australia) Pty Ltd	Eagle Farm, Queensland	Rabbit meat and rabbit commodity; game meat and game meat products
Southern Game Meat Pty Ltd	Chullora, New South Wales	Rabbit meat and rabbit commodity; game meat and game meat products

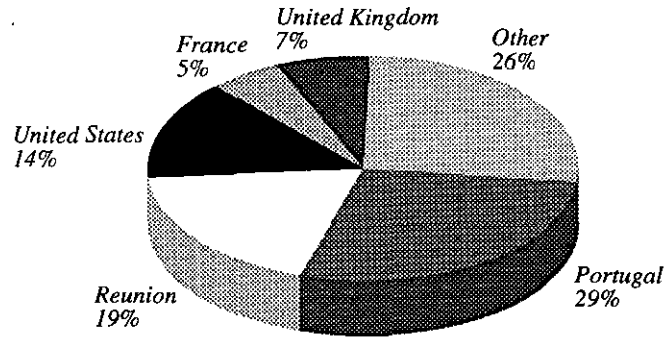
4 Volume and value of Australian exports of rabbit meat, by destination a

	Unit	1988 -89	1989 -90	1990 -91	1991 -92	1992 -93	1993 -94	1994 -95
Belgium–Luxembourg								
– volume	tonnes	0	0	0	43.9	0	0	0
– value	$'000				105.8			
France								
– volume	tonnes	0	0	15.0	110.4	12.3	1.3	0
– value	$'000			50.3	368.8	25.0	3.1	
French Antilles								
– volume	tonnes	0	0	27.1	54.0	0	0	0
– value	$'000			88.5	152.8			
Netherlands								
– volume	tonnes	0	0.2	47.0	39.8	12.9	1.2	0
– value	$'000		1.8	128.4	139.4	31.8	5.4	
Norway								
– volume	tonnes	0	27.4	11.0	0	0	0	0
– value	$'000		125.0	49.2				
Portugal								
– volume	tonnes	0	103.6	384.5	76.5	133.8	43.0	0
– value	$'000		294.8	1290.0	215.4	420.5	75.5	
Reunion								
– volume	tonnes	0	0	76.0	327.7	0	0	0
– value	$'000			245.0	1310.0			
Singapore								
– volume	tonnes	1.1	0	0.2	0.6	2.0	49.3	0.8
– value	$'000	1.7		0.6	2.4	6.7	91.4	2.9
Spain								
– volume	tonnes	0	0	30.0	31.5	15.4	0	0
– value	$'000			104.0	108.1	61.1		
Switzerland								
– volume	tonnes	0	0	23.5	0	0	0	19.9
– value	$'000			140.5				123.0
United Kingdom								
– volume	tonnes	0	0	72.0	152.7	0	0	5.0
– value	$'000			202.9	377.4			9.6
United States								
– volume	tonnes	104.3	109.1	3.0	146.3		64.0	4.3
– value	$'000	257.7	286.8	6.0	421.5		194.4	16.2
Ship/aircraft stores								
– volume	tonnes	0	0	62.8	31.5	0	0	0
– value	$'000			166.0	90.7			
Other								
– volume	tonnes	17.8	7.8	20.6	66.5	59.4	8.3	6.7
– value	$'000	14.8	22.6	62.3	184.8	120.4	27.8	20.8
Total								
– volume	tonnes	123.1	248.1	772.7	1081.2	235.7	167.0	36.6
– value	$'000	274.2	731.0	2533.7	3477.0	665.4	397.5	172.5
– unit value	$/kg	2.23	2.95	3.28	3.22	2.82	2.38	4.72

a Meat and edible meat offal of rabbits or hares, fresh, chilled or frozen.
Source: Australian Bureau of Statistics (1996).

H ***Main export destinations for Australian rabbit meat, 1988-89 to 1994-95***

ABARE



The relative importance in terms of value of the main export destinations for Australia's rabbit meat exports over the seven years to 1994-95 is illustrated in figure H. European Union countries — mostly Portugal, France, the United Kingdom, Netherlands and Spain — accounted for nearly 50 per cent of the total value. Francophone countries other than France — such as Reunion, French Antilles, Seychelles and French Guiana — accounted for a further 23 per cent, reflecting the use of rabbit in French cuisine.

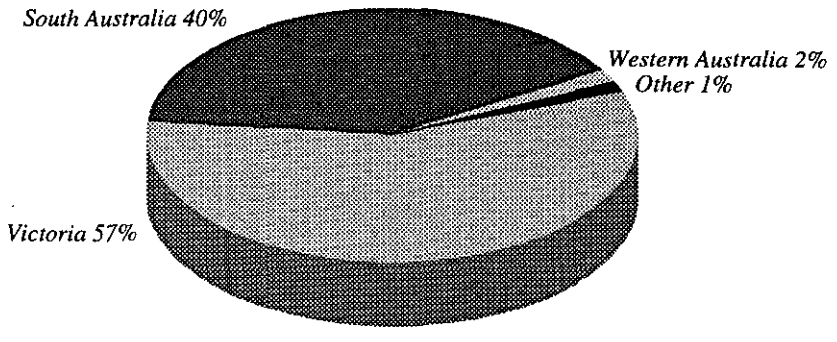
Victoria and South Australia provided 97 per cent of Australia's rabbit meat exports in the seven years to 1994-95 (figure I).

Exports of raw rabbit pelts

Australia's exports of raw rabbit pelts have steadily declined since 1980-81, due more to the resurgence of the felt hat industry in Australia than the decline

I ***State of origin of Australia's rabbit meat exports, 1988-89 to 1994-95***

ABARE



5 Volume and value of Australian exports of raw rabbit pelts, by destination a

	Unit	1988 -89	1989 -90	1990 -91	1991 -92	1992 -93	1993 -94	1994 -95
Belgium–Luxembourg								
– volume	tonnes	0	5.1	0	1.0	0.6	0	15.1
– value	$'000		25.6		7.9	5.8		26.2
Denmark								
– volume	tonnes	0	0	0	0	0.1	0	0
– value	$'000					3.5		
Germany								
– volume	tonnes	0	0	7.4	0.3	0	0	1.5
– value	$'000			30.7	1.5			11.2
Thailand								
– volume	tonnes	0	0	0	0	1.0	0	0
– value	$'000					1.4		
Soviet Union								
– volume	tonnes	0	0	0	0	12.8	0	0
– value	$'000					37.9		
Total								
– volume	tonnes	0	5.1	7.4	1.3	14.5	0	16.5
– value	$'000		25.6	30.7	9.4	48.6		37.3
– unit value	$/kg		5.04	4.18	7.03	3.36		2.26

a Raw, whole furskins of rabbit or hare.
Source: Australian Bureau of Statistics (1996).

that has occurred in this market in the rest of the world. Recent export trade has been very thin; indeed, Australia was a net importer of rabbit pelts during the recent drought. The most consistent export markets have been Belgium–Luxembourg and Germany (table 5).

The main Australian exporter of tanned and dried rabbit pelts is Crompton and Sons Pty Ltd of Melbourne. As with raw pelts, the export trade is thin (table 6). The largest export markets have been Belgium–Luxembourg and South Korea.

Imports

Australia does not import rabbit meat but does import rabbit fur pelts. These fur pelts are used mostly for felt hat making but there are also some high value pieces for the apparel fur trade. Some imports are necessary to provide fur colours such as white which are not readily available in Australia. There have been increased imports in recent years because of the drought (table 7). Most of these imports have been sourced from the United Kingdom.

6 *Volume and value of Australian exports of tanned and dried rabbit pelts, by destination* a

	Unit	1988 -89	1989 -90	1990 -91	1991 -92	1992 -93	1993 -94	1994 -95
Belgium–Luxemburg								
– volume	'000	0	0	0	2.0	0	65.0	0
– value	$'000				6.8		34.5	
Hong Kong								
– volume	'000	0	0	0	0	0	–	0
– value	$'000						2.0	
Japan								
– volume	'000	0	0	0	–	0	0	0
– value	$'000				1.8			
Malaysia								
– volume	'000	0	5.4	0	0	0	0	0
– value	$'000		13.9					
South Korea								
– volume	'000	0	0	5.0	43.5	0	0	0
– value	$'000			6.5	49.6			
Taiwan								
– volume	'000	0.3	0	0	0	0	0	0
– value	$'000	7.3						
Total								
– volume	'000	0.3	5.4	5.0	45.5	0	65.0	0
– value	$'000	7.3	13.9	6.5	58.2		36.5	
– unit value	$/skin	23.49	2.57	1.29	1.28		0.56	

a Tanned or dressed, whole furskins of rabbit or hare, not assembled. (–) negligible.
Source: Australian Bureau of Statistics (1996).

7 *Volume and value of Australian imports of rabbit and hare pelts*

	Unit	1988 -89	1989 -90	1990 -91	1991 -92	1992 -93	1993 -94	1994 -95
Raw a								
Volume	'000	0	0	0.1	0	0	458.0	45.2
Value	$'000			4.8			602.8	1054.5
Unit value	$/skin			79.18			1.32	23.30
Tanned or dried b								
Volume	'000	5.3	2.3	5.9	–	–	–	0.1
Value	$'000	8.6	11.3	6.7	0.2	–	–	0.5
Unit value	$/skin	1.62	5.01	1.15	4.77	2.33	2.70	5.85
Total								
Volume	'000	5.3	2.3	6.0	–	–	458.0	45.3
Value	$'000	8.6	11.3	11.5	0.2	–	602.8	1055.0

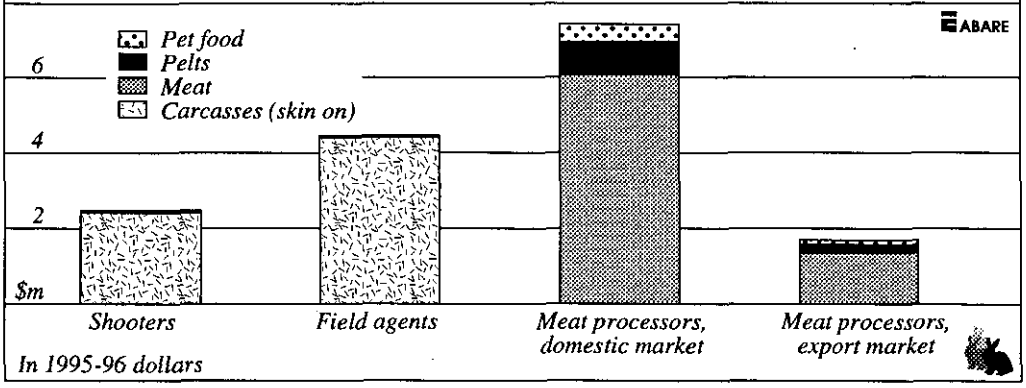
a Raw, whole furskins of rabbit or hare. b Tanned or dressed, whole furskins of rabbit or hare, not assembled. (–) negligible.
Source: Australian Bureau of Statistics (1996).

Value of production and transformation

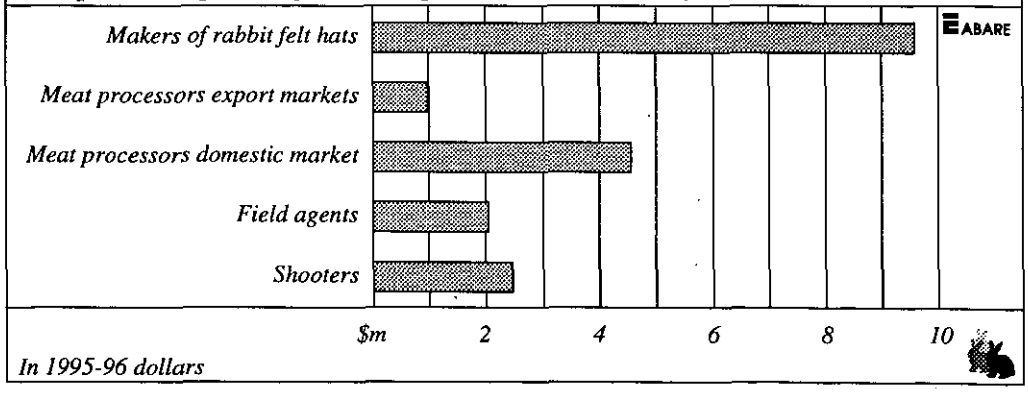
Estimates of the annual value of production at each stage of the supply and processing chain are reported in table 8 and illustrated in figure J. These estimates were based on average production and unit values (inflated to 1995-96 dollars) in the period 1988-89 to 1994-95. The separation of rabbit processors into domestic and export categories is a rather arbitrary one because there are some processors who produce for both the domestic and export markets.

Following Industry Commission (1994), the 'value of transformation' at each stage of the supply and processing chain can be calculated as the difference between the value of the rabbit products leaving the supply or processing point and the value of the rabbit products as they came into that point — see figure K and table 8. The value of transformation includes profits (or losses) and costs related to labour, depreciation, materials, government levies, inspection and any other services.

J ***Estimated value of production at each stage of the production and processing chain for rabbit products*** *Annual average, 1988-89 to 1995-96*



K ***Estimated value of transformation at each stage of the production and processing chain for rabbit products*** *Annual average, 1988-89 to 1995-96*



8 ***Estimates of value of production and employment at each stage of the production and processing chain for rabbit products*** a

Stage	Value of production	Value of transformation	Employment
	$'000	$'000	persons b
Shooters	2 470	2 470	68
Field agents	4 466	2 051	6
Meat processors			
– domestic market	7 423	4 540	56
– export market	1 689	968	14
Makers of rabbit felt hats	10 700	9 598	125

a ABARE estimates. Averages, 1988-89 to 1994-95 (in constant 1995-96 dollars). b Full time equivalents.

Employment

A comprehensive survey of the Australian rabbit processing industry has not been undertaken but estimates of persons employed at the various stages of the production and processing chain are made under various assumptions. These estimates are reported in table 8.

Assuming a full time shooter produces 20 000 pairs of rabbits a year (200 nights times 100 pairs a night), the Australian wild rabbit industry is estimated to provide full time employment, on average, for around 68 shooters.

The Industry Commission estimated that labour costs (excluding on-costs) make up around 40 per cent of the value of transformation in the meat processing sector (Industry Commission 1994). Based on this proportion and assuming average weekly earnings for this industry of around $26 000 over the period, total annual average employment in the Australian rabbit meat processing industry is estimated to be around 70 persons. This compares with the estimate of Ramsay (1991) of 68 full time and 52 part time staff.

Employment of meat processing workers alone can be estimated assuming a worker can process 750 pairs of rabbits a week (Ed Hansford, Proprietor, Outback Foods Pty Ltd, personal communication, June 1996). This labour requirement includes skinning, washing and packing. Given the estimate of average annual rabbit production reported earlier, this suggests an average requirement of around 40 process workers a year.

Future of the Australian rabbit industry

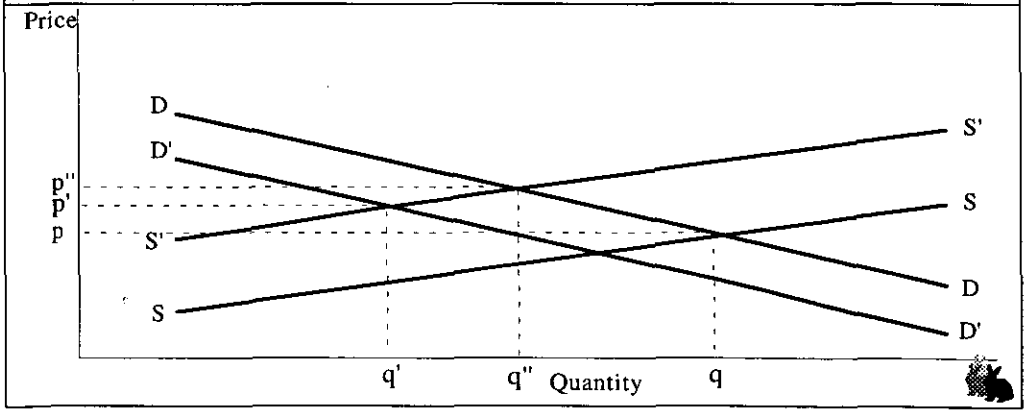
With the apparent end to the prolonged drought in eastern Australia meaning increased rabbit numbers, the Australian industry based on the harvesting of wild rabbits was anticipating increased throughput over the next few years. This expectation was held despite the decline in world prices for rabbit products to more normal levels in recent years, from the buoyant levels of the late 1980s and early 1990s. World rabbit populations have recovered from the initial impact of rabbit calicivirus disease and vaccines are readily available.

The introduction of RCD to Australia has meant that the short term production outlook is unfavourable because the disease has reduced rabbit populations in the key harvesting areas. The longer term outlook for production is less clear because the long run impact of RCD on rabbit numbers in Australia is not known; it could be that wild rabbit population numbers at least partly recover, as evidenced in Europe (see earlier discussion). It is also possible that the incidence of RCD in Australia may have an adverse effect on demand for rabbit products, particularly meat.

The effect of RCD on supply, demand and price for meat from wild rabbits in Australia can be discussed using figure L as illustration.

On the supply side, reduced wild rabbit populations from the disease means higher search costs for rabbit harvesters and, hence, lower productivity for both their labour and capital inputs. This is represented as an upward shift in

***L** Schematic representation of the impact of rabbit calicivirus disease on the wild rabbit industry in Australia*



the supply schedule in figure L from SS to S'S' — that is, at any price, wild rabbit harvesters would supply fewer rabbits. Increases in the costs of production could also arise through the requirement for more stringent inspection procedures reflecting any perceptions of disease risk associated with RCD.

On the demand side it is possible that a downward shift will occur in the demand schedule — from DD to D'D' in figure L — because of any consumer perception of disease risk to humans from RCD, even if there is no scientific evidence to support this view. As well, demand from Australia's export markets for rabbit meat could be less because some countries may refuse entry now that Australia has lost its RCD-free status. This is because of the perceived disease risk from calicivirus that the meat poses to importing countries' domestic rabbit industries. (As discussed earlier, the virus may survive in frozen meat.)

The effect on prices for wild rabbit depends on the relative shifts in the supply and demand schedules and the degree of responsiveness of supply and demand to changes in price. If consumers and importing countries were not worried about the disease risk then RCD could actually mean a higher price, p", because of reduced supplies. The extent to which prices can rise, however, will be bounded by the cost of importing rabbit meat or the supply price for domestic farmed rabbit, whichever is lowest. That is, Australian rabbit meat prices will probably not rise above import parity prices or the price at which rabbit farmers can deliver rabbit meat.

The price associated with a shift in both the demand schedule and the supply schedule is p'; the extent to which p' is lower than p" depends on the magnitude of the adverse effect of RCD – if any – on consumer demand.

RCD could raise the supply price for farmed rabbit meat because of increased vaccination costs. The existence of RCD could mean that it is economic to turn rabbits off for market at a younger age and hence lower weight because this enables vaccination costs to be avoided. Despite the adverse effects on production costs, RCD could give a boost to the farmed rabbit industry because the disease makes its main competitor, wild rabbit meat, more costly to produce and perhaps less desirable to consumers.

As discussed earlier, the bulk of the rabbit pelts in Australia are used in the manufacture of felt hats. RCD in Australia probably means higher prices for pelts and increased imports of rabbit pelts to make up for shortfalls in domestic supply. That is, Australian pelt prices could increase to import price parity, compared with the current situation which reflects export parity pricing. Not-

withstanding these higher prices, the effect of RCD on the profitability of the Australian felt hat making industry will probably only be slight because the cost of pelts is a very small part of the value of a felt hat.

It can be argued that, if the existence of RCD in Australia causes an adverse consumer reaction to rabbit meat, prices for pelts will improve in relation to rabbit meat prices. This could mean a change in the orientation of production in the Australian wild rabbit industry more toward producing pelts alone rather than production of meat with pelts as a byproduct.

Conclusions

The harvesting of wild rabbits in Australia has been a small but resilient industry despite being based on the exploitation of a pest that has been the target of eradication measures for many years.

The industry is largely based on production of meat for human consumption. In the late 1980s and early 1990s, Australian producers of rabbit meat benefited from the high world prices for rabbit meat that resulted from the outbreak of the rabbit calicivirus disease in many parts of the world, particularly in China and Europe.

The Australian wild rabbit industry has been adversely affected by drought over the past three years. But with the drought now largely broken, the industry was anticipating good production conditions over at least the next few years. With the accidental release of RCD in Australia in 1995 and a nationally coordinated controlled release of the disease planned to occur from October 1996, the Australian wild rabbit meat industry appears to be facing a sharp contraction. The harvesting and meat processing sector of this industry produces meat and byproducts estimated to be worth around $9.1 million a year — based on average wholesale prices in constant 1995-96 dollars over the period 1988-89 to 1994-95 — and employs around 144 people a year. However, the value of the rabbit industry is still small in relation to the costs that rabbits cause in Australia in the form of environmental damage and reduced agricultural production.

While release of the rabbit calicivirus in Australia could limit the Australian wild rabbit industry, it may be a boon for Australia's emerging farmed rabbit industry.

Appendix: Organisations contacted for information

The following persons were contacted in regard to providing information on the Australian rabbit industry.

Organisation	Location
Field agents	
Mr Emanuel Hatzi	Broken Hill, New South Wales
Mr Bob Clifford	Nyngan, New South Wales
Processors/ wholesalers	
Australian Meats Pty Ltd	Dry Creek, South Australia
K.R. and J.R. Pearce Pty Ltd	Adelaide, South Australia
Outback Foods Pty Ltd	Adelaide, South Australia
Preston Rabbits Pty Ltd	Hoppers Crossing, Victoria
Rabbit Packers Pty Ltd	Melbourne, Victoria
Bendigo Bunny	Bendigo, Victoria
Kennedy's Wholesale Seafood, Meat and Game	Albury, New South Wales
Bento's Game Farm	Galston, New South Wales
F.M. Jones Pty Ltd	Sydney, New South Wales
Rabbit fur processors	
Akubra Hat Company	Kempsey, New South Wales
Crompton and Sons Pty Ltd	Adelaide, South Australia
Statesman Hats	Bayswater, Western Australia
Mountcastle Pty Ltd	Brisbane, Queensland
Pet food manufacturers	
Uncle Ben's	Wodonga, Victoria

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