Kanganomics

A socio-economic assessment of the commerical kangaroo industry

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The report Kanganomics: a socio-economic assessment of the commercial kangaroo industry has been published by the Centre for Compassionate Conservation based at the University of Technology, Sydney. The Compassionate Conservation approach breaks new ground in environmental policy and management through combining a consideration of animal welfare and conservation to improve conservation outcomes. The Centre is an innovative and multi-disciplinary collaboration comprised of academics from the Institute of Sustainable Futures, Faculty of Law, School of Environment, Business School and Associate Academics. The collaborative framework enables the Centre to engage with complex issues of wildlife management from multiple perspectives and modes of expertise.

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EXECUTIVE SUMMARY

The kangaroos are iconic species. They embody the Australian spirit of uniqueness, resilience and adaptability to a harsh landscape. Kangaroos influence the health of different ecosystems by fertilising nutrient poor soils and spreading the seeds of native grasses and plants. They are also a key drawcard for international tourists visiting our shores. Despite these benefits provided by kangaroos, millions are killed to provide products such as meat for human or animal consumption, and hides and skins for the production of leather goods.

This report provides a comprehensive analysis of the economics of the commercial kangaroo industry in Australia. The research explores the value of the industry to the Australian economy; the production process; direct employment; key trading countries and export earnings as well as an assessment of domestic demand. The key questions this report is seeking to answer include:

- What are the key economic factors in the kangaroo industry?
- What is the value of the kangaroo industry and its contribution to the Australian economy?
- What impact has the loss of the Russian Federation market had on the commercial industry?
- What is the level of employment provided by the commercial industry?
- How many jobs are created by the commercial industry and what are the trends in employment?
- How have domestic markets for kangaroo products changed over the last decade?
- The amount of government funding that has been provided to the commercial kangaroo industry?

Recently, the kangaroo industry has contracted due to a variety of economic factors. These factors include the loss of a key export market for meat products; weak international demand for kangaroo skin, hides and leather; a strong Australian dollar; competition with the mining sector for labour; variability of supply from extreme climatic fluctuations and consumer concern over meat hygiene and the welfare of kangaroos targeted by the commercial kangaroo industry.

The kangaroo Industry Association of Australia (KIAA) has valued the worth of the industry at $280 (M). However it does not disclose the data sources nor the methods used to calculate the industry's worth. From publically available data the researchers have calculated the combined value of production to be approximately $88.8 (M) in 2011-12.

In 2009, the Russian Federation ceased the importation of kangaroo meat due to concerns surrounding hygiene and microbial contamination. This report will examine the relative socio-economic impact of the loss of this key market by assessing the impact upon export earnings and rural and regional employment. Exports are a key revenue-generating sector of the commercial kangaroo industry. In 2006-07, Australia exported about 72 per cent of the total supply of kangaroo meat, with a total export value of $34.3 million (M). The current value of kangaroo meat exports is approximately $21.7 M, more than half of its original value. This reduction in demand caused an excess supply of kangaroo meat that put downward pressure on the price paid to shooters for each kangaroo carcass. This resulted in shooters switching from full time to part time shooting or exiting the industry.

The commercial kangaroo industry provides direct employment in rural and regional Australia. The key industry roles are shooters, field chiller operators and meat processing plant workers. Other roles include transport and logistics, export agents and employees of state regulatory bodies. According to KIAA, the kangaroo industry employs more than 4,000 full time persons. Since the industry is so small ABS does not have a separate category for employment provided by the industry. Therefore two methods have been used to determine employment, the first is a simple count commercial licenses, and the second method uses ABS input/output tables. Both methods yield different employment figures. The number of jobs provided could be as low as 880 if only direct full time jobs are considered or closer to 2,970 jobs if shooters and field chiller operators licences are counted which consists of full and part time employment and a further estimated 920 jobs in meat processing[1]. Greater clarity of employment data is needed to accurately determine the level of employment provided by the commercial kangaroo industry.

Prior to 2008, the majority of kangaroo meat was supplied to pet-food markets. However, there has been a shift to supplying greater quantities of meat for human consumption. In 2011-12, Australians consumed approximately 7,000 tonnes (t) of kangaroo meat products. However, kangaroo meat makes a small contribution to the Australian diet with only a third of a kilogram consumed per capita per year compared to more popular meats such as poultry, with a per capita consumption of approximately 37.2 kg, or beef and veal with 34.1 kg consumed per capita per year.

The commercial kangaroo industry is regulated by both the Federal and State Governments and their agencies. The state agencies receive money from the issuing of commercial licences for each stage of production and from the sale of tags that need to be fixed to each kangaroo carcass. Since 2006, it is estimated that over $3M worth of government funding subsidies has been allocated to research and development; marketing and promotion and expanding access to new export markets for kangaroo products.

[1] The authors were unable to access employment data for meat processing plants and it is unknown if these plants process other types of game meats- Emu, wild boar etc.

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
AQIS	Australian Quarantine and Inspection Service
Code	National Code of Practice for the Humane Shooting of Kangaroos and Wallabies
DAFF	Department of Agriculture, Forestry and Fisheries
DEC	Department of Environment and Conservation Western Australia
DECC	Department of Environment and Climate Change (now NSW OEH)
DECCW	Department of Environment, Climate Change and Water (now NSW OEH)
DERM	Department of Environment and Resource Management Queensland
DEWNR	Department for Environment, Water and Natural Resources South Australia
KIAA	Kangaroo Industry Association Australia
KMP	Kangaroo Management Plan *or* Kangaroo Management Program
NSW	New South Wales
OEH	Office of Environment and Heritage New South Wales
QLD	Queensland
QPIF	Queensland Police Service and Queensland Primary Industries and Fisheries
PIRSA	Primary Industries and Regions South Australia
RIRDC	Rural Industries Research and Development Corporation
SA	South Australia
SEWPAC	Department of Sustainability, Environment, Water, Populations and Community
SFPQ	Safe Food Production Queensland
WA	Western Australia

REPORT STRUCTURE

This report is divided into six sections to provide a comprehensive analysis of the economics of the commercial kangaroo industry.

Section 1 – Provides the background and structure of the commercial kangaroo industry. It outlines the states that operate a commercial industry and the main macropod species that are targeted by the industry.

Section 2 – Details the primary kangaroo and emerging niche products, outlines the production process, volumes of supply and factors that influence supply.

Section 3– Provides a detailed analysis of domestic and international demand for kangaroo products, export earnings from the different markets and changes to the composition of markets.

Section 4 – Assesses the commercial industries contribution to the Australian economy with a focus on the direct employment provided by the industry in rural and regional areas. It will also briefly look at the trends in employment and how sensitive employment is to fluctuating international demand.

Section 5 – Outlines the level of Government support for the commercial industry

Section 6 – Conclusions and key questions

Section 1: The commercial kangaroo industry

The trade in kangaroo meat developed in the 1950's, with the majority of kangaroo meat being sold for pet food. The current structure of the industry is based on a quota system first established in the 1970's and administered by state agencies and the Federal government. The kangaroo industry has evolved over the past 30 years from one based on agricultural 'pest' control to one that views kangaroos as a resource to be utilised[2]. Over the last 10 years, more than 30 million[3] adult kangaroos were recorded as being killed for commercial purposes, with 1.61 million kangaroos commercially killed in 2012 (DSEWPAC, 2012). The commercial kangaroo industry has grown to be the largest consumptive mammalian wildlife industry in the world (Boom, 2012).

Commercial killing of kangaroos occurs in four states on the mainland: Queensland (QLD), New South Wales (NSW), South Australia (SA) and Western Australia (WA) (Figure 1). The commercial killing of wallabies takes place on both Flinders and King Islands in Tasmania (NRIA, undated). Recently there have been calls to open up the commercial industry in Victoria. Currently the commercial use of kangaroos culled annually in Victoria is banned and all kangaroo meat sold in Victoria is sourced from interstate (Campbell, 2012).

Figure 1: Map of the commercial harvest zone in mainland Australia

[2] For a more detailed account of the history of kangaroo killing in Australia see: Boom et al 2012. 'Pest' and Resource: A legal history of Australia's kangaroos. Animal Studies Journal Volume 1 Issue

[3] Approximately 30,360,816 adult kangaroos have officially been reported in the commercial statistics

Each state agency develops a Kangaroo Management Plan (KMP) that estimates the kangaroo populations in the commercial zones, and sets an annual quota (Pople and Grigg, 1999; Shim-Prydon and Camacho-Baretto, 2007). The state agencies include the NSW Office of Environment and Heritage (OEH), the Department of Environment and Resource Management (DERM) in QLD, the Department for Environment, Water and Natural Resources (DEWNR) in SA and the Department of Environment and Conservation (DEC) in WA. Four species are commercially killed on the mainland *Macropus rufus* (Red Kangaroo), *M. giganteus* (Eastern Grey Kangaroo), *M. fuliginosus* (Western Grey Kangaroo) and *M. robustus* (Wallaroo).

Figure 2: *Macropus rufus* (Red Kangaroo)

Figure 3: *M. giganteus* (Eastern Grey)

Figure 4: *M. fuliginosus* (Western Grey)

Figure 5: *M. robustus* (Wallaroo)

Quotas permit between 10 to 20[4] per cent of the estimated population for each of the four Macropod species to be harvested, or killed. The state agencies and the Australian Government Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC) are responsible for monitoring kangaroo populations. Population surveys are conducted through broad scale aerial surveys from fixed-wing aircraft or helicopter, or via small-scale terrestrial surveys (DEC, 2008). Aerial surveys are usually conducted annually or biannually, with terrestrial surveys undertaken occasionally.

There are a number of levies imposed on the processing organisations that funds research and development of the industry and the national residue survey. Processing firms pay a levy of 3 cents on each carcasses intended for animal consumption and 4 cents on carcasses intended for human consumption (Austlii, 2003). The National Residue Survey (NRS) excise levy is .5 cents per carcase intended for human consumption, processors of kangaroos for pet food and skin production are currently exempt from paying this levy[5]. A R&D levy of 6.5 cents is imposed on each macropod carcase intended for human consumption and 3 cents imposed on carcasses intended for animal consumption, this R&D levy is coordinated by the Rural Industries Research and Developmentf Corporation (RIRDC)[6] (Austlii, 1999). The R&D levy is matched by Australian Government funding up to a level of 0.5% of Gross Value Product (GVP) for targeted R&D programs.

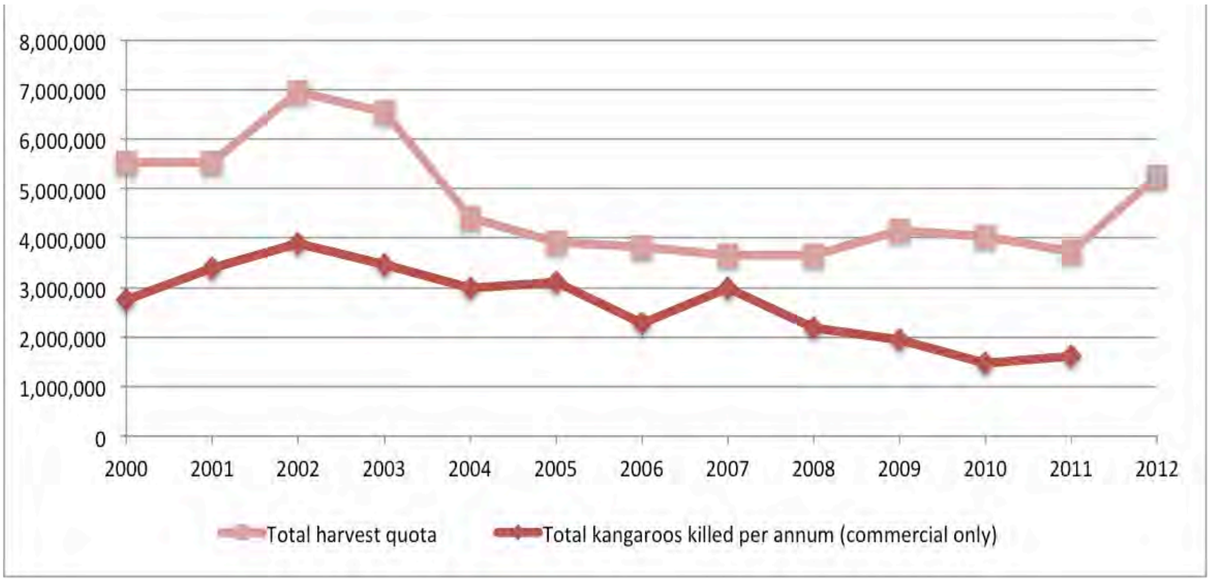
Kangaroo Management Programs are partly funded by royalty payments to each state agency based on the sale of sealed tags issued by the state agency specifying the macropod species, and the number permitted to be killed (DECCW, 2010). Kangaroo carcasses or skins are not permitted to be bought, sold, transported or held in possession unless a tag has been affixed to the skin or carcass (WA KMP 2008-2012; Thomsen and Davies, 2006). The rules surrounding tag distribution and shooter compensation across the commercially active states are summarised in Table 8 of Appendix 1. In QLD and WA shooters pay for the tags, whereas in SA and NSW the landholders pay for the tags.

The quotas allow for an annual kill of between 3.3 and 6.3 million kangaroos (DSEWPAC, 2012b). The commercial kill peaked in 2002 with approximately 3.89 million kangaroos killed. However, a downward trend caused by the loss of a key export market led to a low in 2012 of 1.61 million kills (DSEWPAC, 2012b). The loss of this key export market reduced the demand for kangaroo meat by almost half. However, the quota increased by 41 per cent from 3.73 million in 2011 to 5.24 million in 2012 (DSEWPAC, 2012b) (Fig. 6)

[4] The quota is between 10-17% in NSW and 15-20% in SA of the estimated population (SA KMP 2008-2012).

[5] Primary Industries Levies and Charges (National Residue Survey Levies) Regulations 1998- Reg 61
[6] Primary Industries Levies and Charges 1998- Schedule 27

Figure 6: Comparison of the harvest quota and the total number of kangaroos killed (2000-2012)



The numbers recorded as being killed only include carcasses received at 'chillers'. They do not include the deaths of wounded individuals from missed shots, or the deaths of dependent young who die as a consequence of their mother being killed. It is estimated that between 133,000 and 280,000 young-at-foot and between 372,000 and 783,000 pouch young are the annual 'collateral kill' of the commercial industry (Ben-Ami et al. 2011 p.18). Commercial shooters must attach a tag to each of the kangaroos that are injured (body-shot) or those killed through shots that would disqualify them from selling the carcase based on the Code of Practice for Humane Shooting of Kangaroo and Wallabies (The Code) yet they are not obliged to report the numbers that are miss-shot. This lack of data makes it difficult for the public to know how many kangaroos are injured each year in order to assess the full animal welfare cost of the commercial industry. The killing of kangaroos comes at a cost to society, these are treated in economics as an externality.

In Tasmania, the commercial kill is primarily conducted for skins but wallaby meat is also processed. The commercial species includes *M. rufogriseus* (Bennetts Wallaby – a subspecies of the Red-necked Wallaby) Figure 7 and *Thylogale billardierii* (Tasmanian Pademelon) Figure 8. Commercial killing in Tasmania does not take place every year. In 2009/10 a quota of 10,000 Bennetts Wallabies was approved on King Island yet no commercial killing occurred, and the reason cited was due to a lack of export demand for wallaby products (DSEWPAC, 2012b) (Figure 7 and 8).

Figure 7: M. rufogriseus (Bennetts Wallaby) Figure 8: Thylogale billardierii (Tasmanian Pademelon)

Summary

This section has outlined the structure of the commercial kangaroo industry based on a quota system that permits an annual kill of between 3.3 and 6.3 million kangaroos on the four mainland states and 10,000 wallabies from Tasmania.

It outlined briefly why the commercial industry was established, how it has grown and Australian states that permit commercial shooting.

There are a number of significant animal welfare issues that urgently need to be addressed including the killing of young at foot and in-pouch joeys considered collateral damage of harvests and the injured kangaroos that are miss-shot and left in the field. It is these significant animal welfare issues that have a cost to society, and there are many people who oppose the continuation of this industry.

Section 2: Supply of kangaroo products

- Kangaroo products
- Supply of kangaroo meat products and volumes
- Determinants of supply: socio-economic and biological factors
- Risks and uncertainties around supply

KANGAROO PRODUCTS

The main products derived from kangaroos are meat for human or animal consumption and skins for use as leather or fur (Figure 9). In the past, the majority of meat, approximately 70 per cent, was used as raw or processed pet meat, with the remaining meat sold domestically or exported for human consumption (Kelly, 2005). Recently, the industry has undergone a shift with 60 per cent of supply being produced for human consumption and the remainder sold to the pet food industry (Foster, 2012).

Other non-edible parts of a kangaroo are also sold in small niche markets. Testicular sacks from male kangaroos are used in the manufacture of tourist souvenirs such as purses or bottle openers. Paws are also used in the production of back scratchers (Shim- Prydon and Camacho-Baretto, 2007). Preliminary studies have been undertaken of the use of kangaroo body-parts such as cartilage, pericardium and aortic valves for use in medical research (Shim-Prydon and Camacho-Baretto, 2007).

Figure 9: Key kangaroo derived products

THE PRODUCTION PROCESS

Kangaroo shooting takes place at night, often with a solitary operator. Kangaroos are located using a strong, hand-operated spotlight usually mounted on the top of the shooter's vehicle, with an internal lever to control the light's direction. Once a kangaroo has been shot, the shooter must check for an in-pouch or at-foot joey (the colloquial name for the dependent young of kangaroos). If one is found, they must be killed according to the provisions in the *Code of practice for the humane shooting of kangaroos and wallabies*[7] (NRMMC, 2008). The adult kangaroo is then eviscerated and dressed out in the open. During the dressing process the head, feet, skin, hide, viscera, genitals, bladder and tail are removed and discarded in the field, while organs such as heart, lungs, kidneys and liver remain attached to carcasses (Figure 10). (Shim Prydon and Camacho-Barreto, 2007). The carcasses from a night's shooting are taken to the chillers or processing plant. Critics have suggested that such treatment of kangaroos is inhumane and have called for regulatory changes to improve welfare outcomes.

Figure 10: Discarded remains from field processing in Palmers Oakey, NSW (Mjadwesch, 2011)

A field chiller is a free-standing refrigerated building or typically a series of refrigerated re-furbished shipping containers. Chillers are located in rural areas where commercial killing takes place and are used to store kangaroo carcasses for a period of up to 14 days (Rural and Regional Affairs and Transport Committee, 2012c, p.12). Chillers are approved to store meat for either human or pet food markets. The chiller must be able to reduce the temperature of the carcass to seven degrees in less than 24 hours (Martens, 2001). For the skin-only trade, which predominately takes place in Queensland but also in Western Australia, shooters remove the skin from the carcass in the field and may salt and store them with the cumulative yield taken to the processors.

[7] When pouch young or young-at-foot are present they must be euthanised according to prescribed methods including decapitation or a single forceful blow to the back of the head.

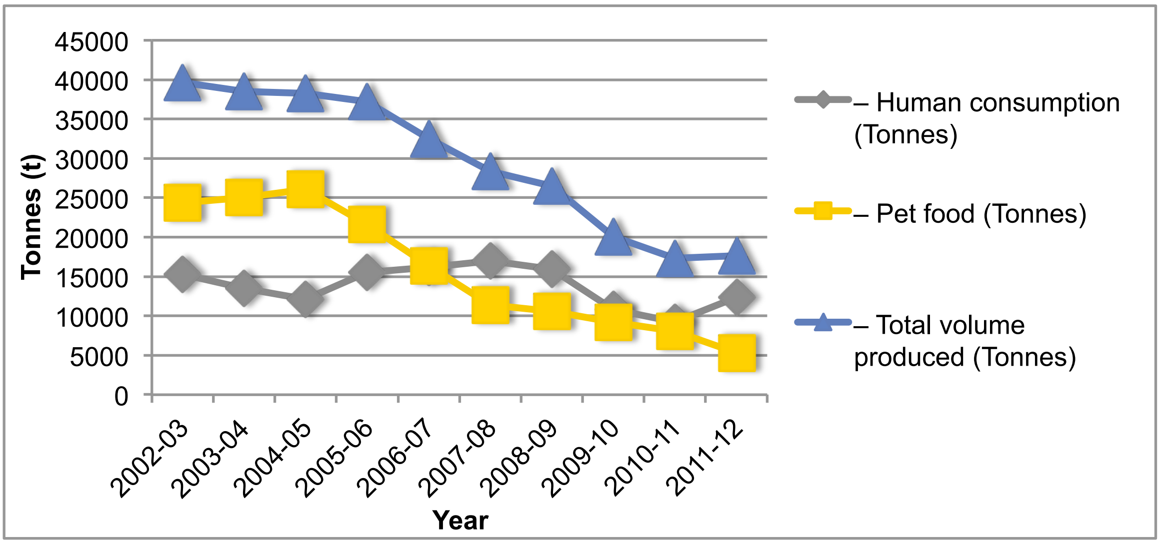
SUPPLY OF KANAGROO MEAT

This section outlines the volumes of kangaroo meat supplied, factors that determine the supply, and variability in the supply. The total number of kangaroos that are killed to supply kangaroo meat markets fluctuates from 1.7 million to 3.4 million (RIRDC, 2014). Kangaroo meat production reached its peak volume of 39.6 tonnes (t) in 2002-03 (Foster, 2012). Over the last decade, supply has contracted by just over 55 per cent to a low of 17.7 t in 2011-12 (RIRDC, 2014) (Figure 11).

Kangaroo meat supplies both human and pet food markets. In 2002-03, approximately 61 per cent of the total volume of meat produced was supplied to pet food markets with the remaining 39 per cent for human consumption (RIRDC, 2014). In 2006-07, the volume supplied to human and pet food markets was roughly equal (RIRDC, 2014). More recently the market has seen a shift away from low value pet food to high value meat for human consumption, with almost 70 per cent of the tonnage of meat produced being supplied for human consumption (RIRDC, 2014).

Meat production for both human consumption and pet food markets has reduced over the last decade. Kangaroo meat for human consumption was 15,277 t in 2002-03 falling to 9,237 t in 2010-11 (RIRDC, 2014). In the current period (2011-12) approximately 12,350 t of kangaroo meat was produced for human consumption. In 2004-05 the supply of kangaroo meat for pet foods peaked at 26,082 t, since then the volumes have fallen to 5,320 t in 2011-12 (RIRDC, 2014).

Figure 11: Volume of kangaroo meat produced for human and pet consumption (2002-2012)



Source: (ABS (2012a); SEWPAC (2012); Levies Revenue Service (2012); ABARES referred to as RIRDC, 2014)

DETERMINANTS OF SUPPLY

There are a number of socio-economic factors that impact capacity of the industry to kill kangaroos,and process and sell the resultant products such as quotas, cost of production, availability of skilled labour, and the Australian terms of trade. Other factors that influence supply include the reproductive capacity of kangaroos and those factors that may affect the growth rates of populations, (and thus affect effort in, quotas for, and sustainability of the kill) such as movement, climatic conditions, and disease.

Quotas

In order to quantify the potential supply, it is important to review the quotas as they specify the total number of kangaroos that are legally permitted to be killed each year. The quotas are determined annually relative to the previous year's (or two years) population estimate. They are calculated just below the maximum sustainable yield and are typically set at 10 to 20 per cent (depending on the species harvested and the location) of the previous year's population. Harvesting at or above the maximum sustainable yield would cause population decline. The quota for 2012 was set to permit the shooting of 5.24 million kangaroos, a 41 per cent increase from the 2011 quota (DSEWPAC, 2012b). Generally the commercial take is rarely equal to the quota, with all state Kangaroo Management Plans recently reporting an under-utilisation of quotas. The utilisation of quotas may reflect shooters' perceptions about the value of kangaroo harvest. Localised flooding in the years 2010, 2011 and early 2013, combined with a reported lack of overseas demand for kangaroo meat meant that the industry experienced its lowest killing with 1.46 million kangaroos killed for commercial purposes (DSEWPAC, 2012b).

Costs of production

Costs of production have risen significantly in the commercial kangaroo industry due to the increase in labour and transport costs as well as the need to meet more stringent hygiene requirements. Regulation and compliance demands have led to higher production costs, especially for export markets including license fees for shooters, chillers and meat processors (Bobbit et al. 2006). Freight is also a high component of production cost and impacts revenue and profit margins for exporters. Public liability insurance for shooters is expensive and may be increasingly called for in order to protect pubic safety (Foster, 2010).

Access to properties and access within a property impacts the number of kangaroos that can be killed by shooters, hence the cost of production. The industry relies heavily on vehicle movements to find and shoot kangaroos and often shooters will be limited to established tracks. In 2010 and 2011, many parts of the country experienced excessive rainfall and localised flooding which restricted access or made it more challenging to access some properties, thus inhibiting kangaroo shootings (DEWNR, 2008). The industry is sensitive to transport costs and if shooters need to travel further to find kangaroos or reach chillers, profit margins will be reduced (Bobbit et al. 2006). Shooter and chiller operator Mr Haycock of Yeoval in NSW has said that in the past, he would travel a long distance to shoot kangaroos yet has changed his behaviour realising that "there isn't the money in it now and diesel is too expensive". Since the 1990s unleaded fuel costs have risen by 56 per cent and diesel by 124.5 per cent (ABARES, 2011 p.93). Kangaroo population densities also factor into decision making about where to shoot. Densities of less than 5 kangaroos per km^2 has been modelled as the economic threshold below which it is no longer commercially feasible to harvest (Hacker et al. 2004). Given the changes in fuel costs since 2004, this number is expected to be significantly higher now.

Supply of skilled labour

The kangaroo industry is experiencing strong competition from other industries such as mining that can offer higher wages. Kangaroo shooters often face harsh working conditions involving night-time work, driving over unformed tracks, slaughtering animals and heavy lifting. In the early years of the operation of the commercial kangaroo industry labour availability in the rural and regional areas was plentiful and its price was relatively low. Today however, in these same rural areas there is employment in the mining industry and agricultural enterprises enjoying a post-drought recovery. The result is labour shortages in the kangaroo industry and a higher price of labour force.

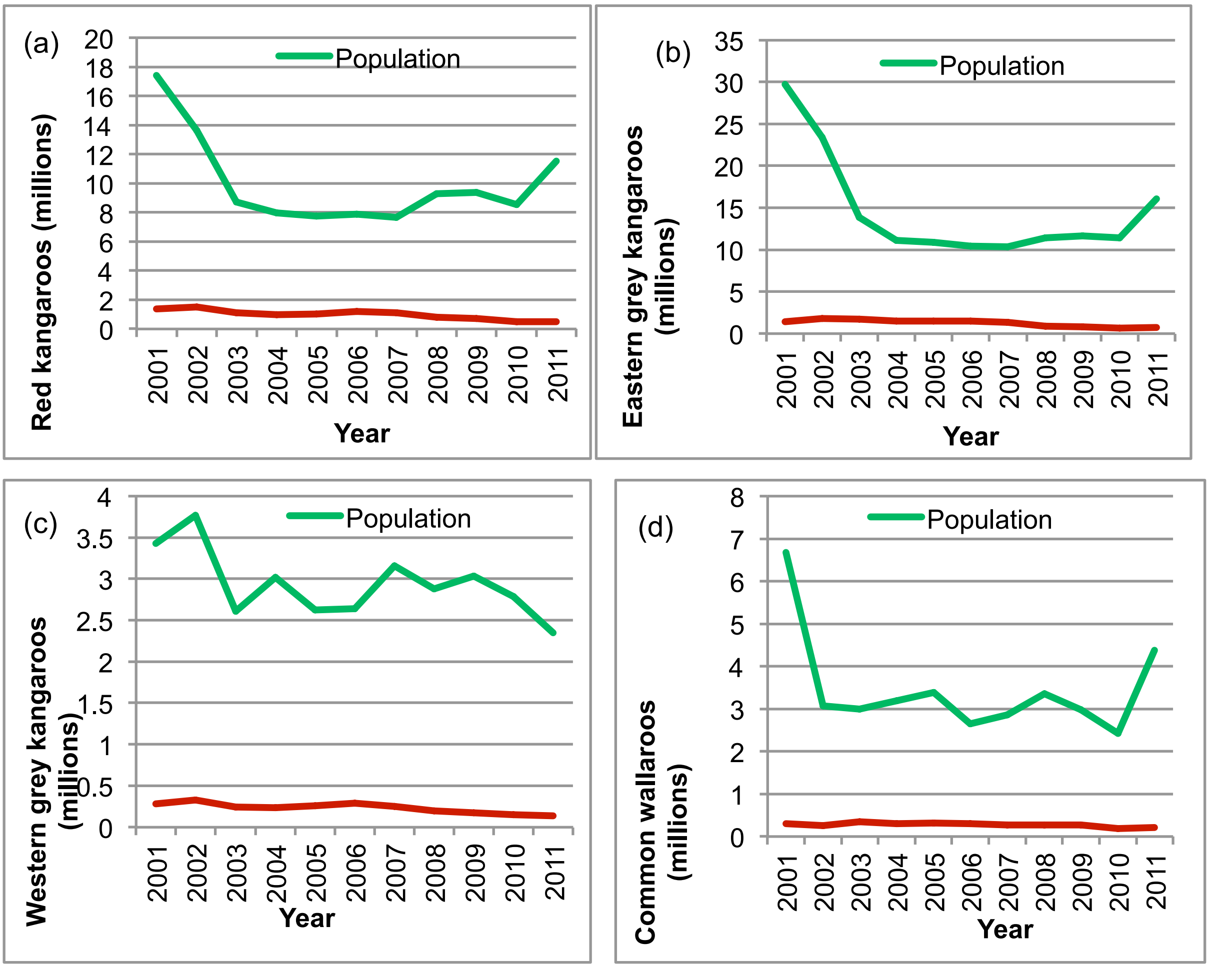
Volatilities in supply

Access to kangaroos by shooters is occasionally limited by climatic and landscape conditions. As previously mentioned, the excessive rainfall and localised flooding in 2010-2011 restricted kangaroo shooter access to some properties. However, these conditions are regional. Meat processors can manage such supply volatility by using a number of options including importing carcasses from interstate, or by stockpiling product where feasible (Environment Australia, 2003). Three kangaroo meat processors in South Australia imported carcasses from New South Wales or Queensland for processing at various times during 2011 (SA KMP review 2011). Macro Meats, a large meat processing plant located in South Australia, has reported sourcing 90 per cent of supply from Queensland and New South Wales (McBride, 2012).

Fecundity – the ability to reproduce – is increased by overlapping generations as the uterine and pouch are rarely left vacant. The potential annual fecundity for the red kangaroo is 1.36 offspring, reducing to 1.25-1.32 in the common wallaroo, 1.03 in the eastern grey kangaroo and 1.00 in the western grey kangaroo (Croft, 1989). The populations of any of the four kangaroo species will grow while immigration and reproduction exceed emigration and mortality. Populations can be highly variable due to variation in mortality and recruitment in the long term and immigration and emigration in the short term.

Similarly variability occurs in the national stock available to the kangaroo industry (Figure 12) due to continental climatic variation. Such attenuation arises because of continental climatic variation between summer and winter rainfall zones and climatic extremes of floods and droughts that are rarely pan-continental. A good run of seasons will raise reproductive success and lower mortality thereby increasing the pool of supply. For example, the population trend of western grey kangaroos (Fig. 12 (c)) with its southern and western distribution is dissimilar to the other species with southern and mainly eastern distributions (Note: common wallaroos are not part of the Western Australian industry). Thus as McCallum (1995) has emphasised there is considerable uncertainty in the future population size of the kangaroo species that could be exploited by the commercial industry. The commercial kangaroo industry operates with a quota proportional to the population and thus has a larger stock to exploit as populations increase. The ability to take this quota is impeded in flooded landscapes or other periods of extreme weather. The actual kill over the last decade illustrates the incapacity of the industry to track extreme population change with a relatively flat off-take.

Figure 12: Population variability in the four commercially killed species



High rainfall events, especially after drought, also add to the volatility and unpredictability of kangaroo population because disease often manifests (Hooper et al. 1999: Speare et al. 1989) and habitat is lost in flooded landscapes even when water recedes and the clay soils remain saturated and boggy. These events can heighten mortality in populations already stressed by the prior drought when numerical response models that relate population growth to resource availability predict a population increase (Caughley, 1987)

Summary

This section has outlined the main products that can be derived from kangaroos such as meat, skins, leather and hides as well as the more novel products that can be made from the non-edible parts of kangaroos. It has described the flow of production from shooting a wild kangaroo through to the production of products for domestic and international markets. It discusses the various socio-economic and biological factors that influence the supply of kangaroo products.

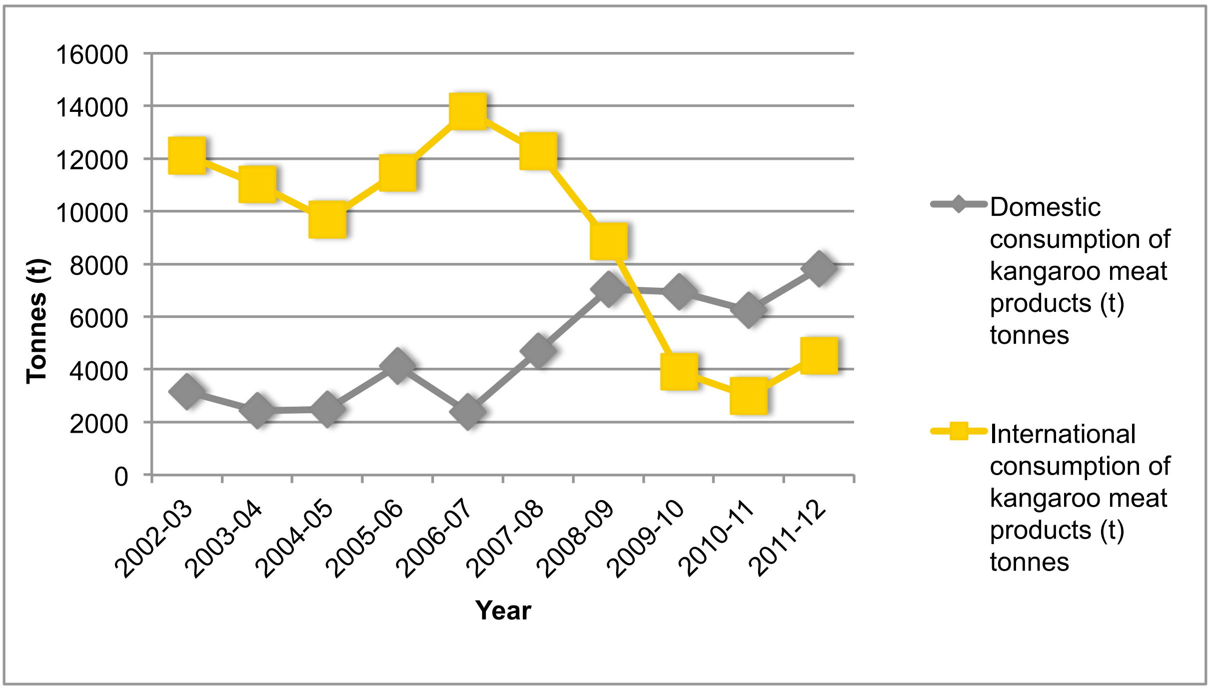
Section 3: Domestic and International demand for kangaroo products

- Domestic human consumption of kangaroo meat
- Domestic markets for pet food
- Kangaroo meat exports and the change in the composition of international markets

DOMESTIC CONSUMPTION OF KANGAROO MEAT

Over the past decade, domestic consumption, especially prime kangaroo cuts, has grown although it remains a small proportion of total meat consumption. Between 2002-2008 around 20 per cent of kangaroo meat produced was consumed domestically, an average of 3,212 t consumed annually, with the remainder exported for consumption averaging about 11.7 t per year within the same time frame (RIRDC, 2014). Since 2008, international consumption has fallen dramatically largely due to the cessation of exports to the Russian Federation. From 2008 to 2012, domestic consumption increased to an average of about 7,000 t annually, peaking at 7,826 t in 2012 (RIRDC, 2014). Despite a rise in domestic consumption of around 220 per cent over the last decade, kangaroo meat is still considered a niche market accounting for less than 0.5 per cent of total red meat consumed in Australia in 2011 (RIRDC, 2014; ABARES, 2012a). On a per capita basis, the consumption of kangaroo meat products was 0.35 kilograms (kg) last year, compared to more popular meats such as poultry, with a per capita consumption of approximately 37.2 kg, or beef and veal with 34.1 kg consumed per capita annually of (ABS, 2012a: ABARE, 2010).

Figure 13: Demand for kangaroo meat products domestically and internationally



Source: ABS, 2012a

Since 2000, kangaroo meat products have been sold in supermarkets including Woolworths, Coles and Independent Grocers Australia. Approximately 127 t of kangaroo meat products were sold by Woolworths in 2011 valued at an estimated $570,000 (Woolworths, 2012). Kangaroo products are also sold in specialty butchers, a limited number of restaurants, cafes and Food service companies.

DOMESTIC MARKETS FOR PET FOOD

The majority of kangaroo meat production for pet food is sold in domestic markets. In 2011-12 approximately 5,320 t of kangaroo meat was an input to the production of pet food, a sharp decline from 25,902 t in 2004-05 (ABS (2012a; Australian Government Department of Sustainability, Environment, Water, Population and Communities (2012); Levies Revenue Service (2012); ABARES; RIRDC, 2014). This drop primarily reflects a supply shift in the market from low value pet meat production to high-grade meat for human consumption. The price of kangaroo meat as an input for pet food has increased due to competition from the human consumption markets. Pet food producers can easily substitute kangaroo meat for other cheaper cuts of meat.

According to the Australian Standard for Hygienic Production of game meat for human consumption, offal - including the organs such as heart, lungs, kidneys and liver - is not permitted to be consumed by humans and so it is either disposed of, or sold for rendering of pet food at a value of roughly 10 cents per kilogram (Shim-Prydon and Camacho-Baretto, 2007 p.38). Kangaroo meat for pet food is mainly sold as a dry product (Shim-Prydon and Camacho-Baretto, 2007).

The price of kangaroo meat for pet food largely depends on the price of available substitutes such as chicken, a very cheap alternative. A small niche market for kangaroo meat to zoos to feed their carnivores exists, however, this is a low price, low volume market (Environment Australia, 2003).

KANGAROO MEAT EXPORTS FOR HUMAN CONSUMPTION

All kangaroo meat for export must be prepared in Australian Quarantine and Inspection Services (AQIS) registered export establishments[8]. Australia currently exports kangaroo meat products to 23 countries (ABS, 2012a). According to the Australian Bureau of Statistics (ABS) and the Department for Agriculture, Fisheries and Forestry (DAFF) approximately 13,788 t of kangaroo meat was exported at a total estimated valued of $47.2 M in the period 2006-07 Fig. 14 and 15 (RIRDC, 2014). By 2010-11 the value had reached a low of $12.2 M, which has slightly improved more recently to $20.3 M (RIRDC, 2014).

[8] For trade purposes kangaroo meat is classified as game meat.

Figure 14: Value of kangaroo meat exports for human consumption 2002-2012

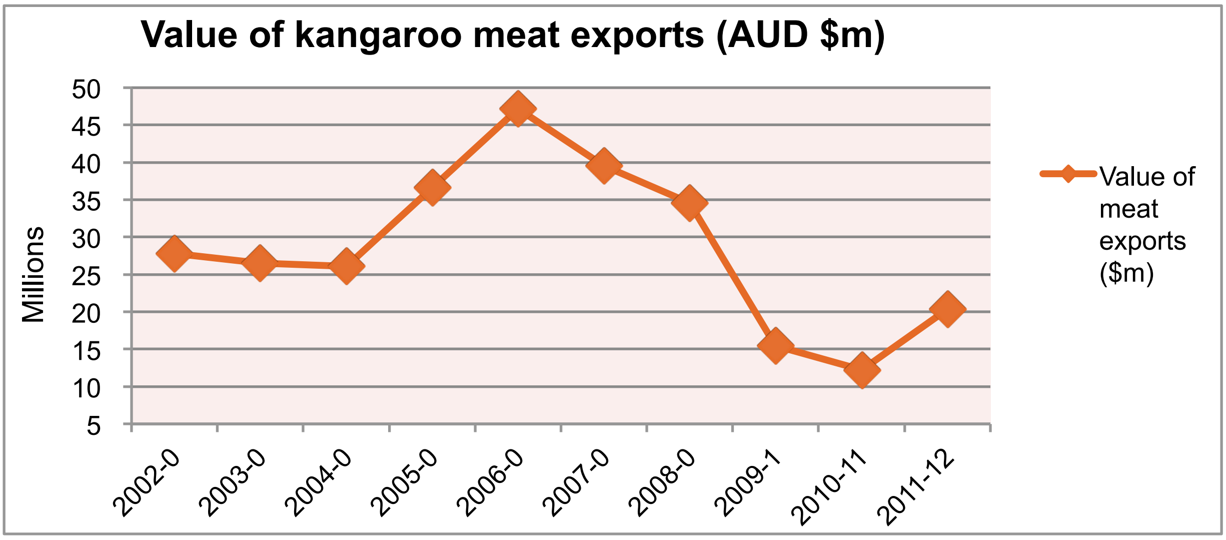
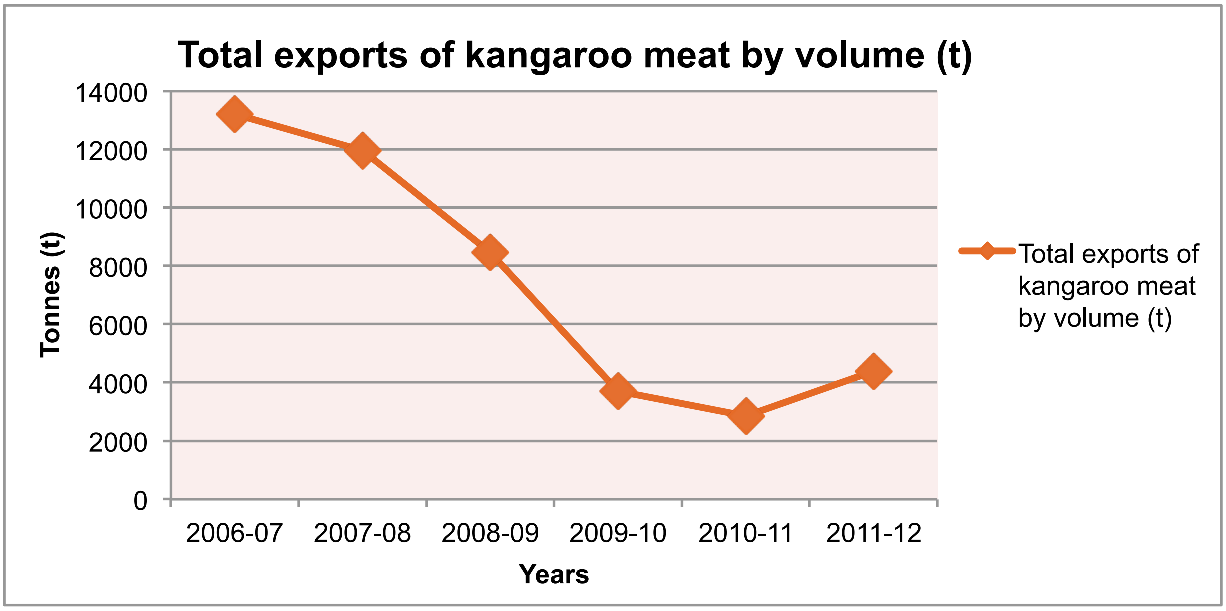


Figure 15: The volume of kangaroo meat exports for human consumption 2006-2012



FACTORS THAT INFLUENCE DEMAND

LOSS OF SIGNIFICANT MARKETS

Prior to 2008, the Russian Federation was the largest export market consuming almost 80 per cent of the total export volume of primarily low-grade meat as an input into sausage manufacturing. Kangaroo was sold to the Russian meat market as a “protein source” for filler in sausages (Foster, 2010). In 2006-07, 10.7 t of kangaroo meat, at an estimated value of $34.3 million (ABS, 2012a), was exported to the Russian Federation. In 2008, Russia reduced exports due to concerns over meat hygiene, verification and animal welfare. By 2008-09 the volume exports to Russia had effectively halved and the total value reduced to $19.7 million (ABS, 2012a).

In 2008, Rosselkhoznadzor - the Russian Federal Service for Veterinary and Phytosanitary Surveillance - undertook microbial testing on a shipment of meat that arrived into Vladivostok after having been alerted to meat hygiene results indicating the meat was contaminated with high levels of Salmonella and *E. coli*. Based on the outcomes from these independent tests, 70 per cent of kangaroo meat imports were banned in 2008 and by August 2009 Russia had put in place a total ban on the importation of kangaroo meat into the country. This included suspended importation of meat from fifteen[9] Australian red and game meat establishments due to detections of microbial contamination, heavy metal contamination and organochlorine residues (Rural and Regional Affairs & Transport Legislation Committee, 2009). By 2009-10 the value of this market had fallen to $1.25 million (ABS, 2012a). The Russian Federation outlined a number of concerns in relation to the kangaroo trade, particularly around hygiene, harvesting, verification procedures, the storage of carcasses and animal welfare (Rural and Regional Affairs Committee and Transport Legislation Committee, 2012a p.57).

A reliance on fluctuating export markets has left the commercial kangaroo industry vulnerable and has resulted in a contraction of the industry. A number of processing establishments temporarily ceased operations until demand improved (Senate Rural and Regional Affairs and Transport Legislation Committee, 2009). The Federal government has lobbied Russia to re-open the trade in kangaroo meat products. Rosselkhoznadzor specialists inspected Australian beef and game meat export establishments interested in the export of animal products to Customs Union[10] members in 2010 and 2012 (Rosselkhoznadzor News, 2012). The inspections assessed compliance with the animal health requirements and standards of the Customs Union. During the inspection samples were taken which are currently under analysis (Rosselkhoznadzor News, 2012). As of early 2013, the trade with Russia continues to be suspended.

STRONG AUSTRALIAN DOLLAR

Over the past decade, the Australian Dollar (AUD) has strengthened in value against the Euro currency, the Russian Ruble, and the US Dollar. Since 2002, when it reached a historical low of 0.489 to the USD, the AUD has increased steadily to reach above parity to the dollar in 2012. A similar trend can be witnessed with the Australian Dollar versus the Euro, with the dollar increasing steadily since 2008 to reach roughly 0.85 to the Euro in 2013 from an historical average of roughly 0.55-0.6 AUD to the Euro. The high Australian dollar makes it uneconomical for overseas markets to import Australian products especially when lower-cost alternatives are available. This is certainly true of the kangaroo industry meats, where traditional red meat products are available from countries with more favourable terms of trade. In 2012, According to Rex Devantier, the General Manager of Game Meat Processing, “the reason the industry is struggling so much is because of the high Aussie dollar, a weak Euro cross-rate, high compliance costs for kangaroo shooters and the lack of new markets” (The Australian, 2012). With the recent weakening of the Australian dollar this pressure on the industry has eased.

[9] Six Australian beef export plants were also de-listed from the Russian market (Condon, 2012).

[10] Includes Russian Federation, Belarus and Kazakhstan

CHANGE IN EXPORT MARKETS

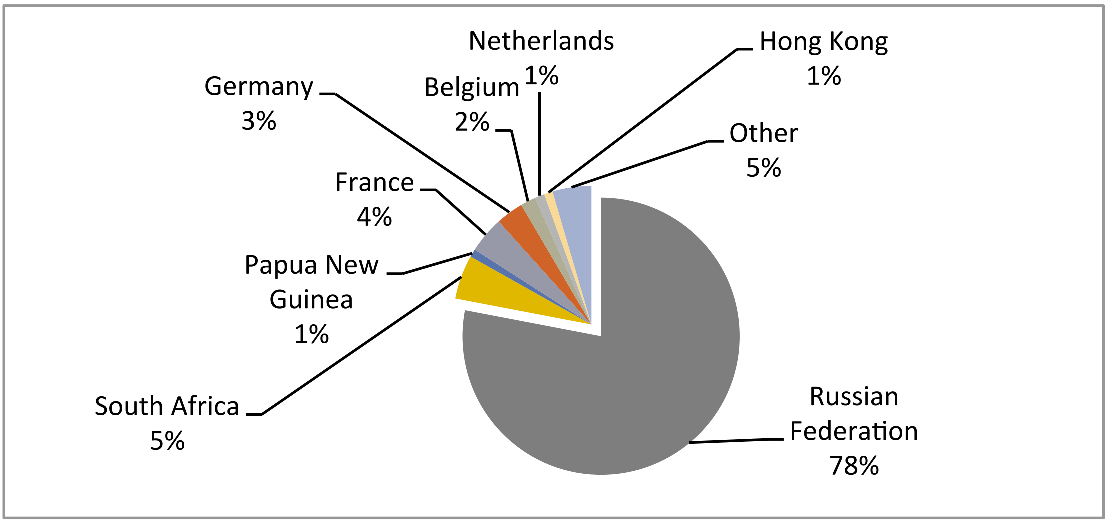
As a result of the loss of the Russian market the composition of export markets has significantly changed from 2006 to 2012 (Table 1). In 2006-07 the volume and value of kangaroo meat exports peaked with exports being sent to markets in 23 different countries (ABS, 2012a). During that time, the total volume of meat exports to the European Union was 10 per cent of total exports and valued at 1.4 M (ABS, 2012a). The Russian Federation was the largest trading partner followed by South Africa and France (ABS, 2012a). The loss of access to the key Russian market has severely impacted the commercial kangaroo industry with the value of meat export markets falling over 56 per cent from $47M to just over $20 M by 2011-2012 (ABS, 2012a; Siegel, 2011).

Table 1: Kangaroo meat exports by country

Country	2006-07		2011-12	
	Volume (t)	Value $AUD	Volume (t)	Value $AUD
Russian Federation	10,755,555	$34,314,268	0	0
France	588,457	$3,057,274	148,730	$905,790
Germany	442,221	$2,207,429	874,416	$4,440,311
South Africa	709,114	$2,067,149	1,274,937	$3,424,664
Belgium	246,599	$1,671,547	498,778	$3,435,427
Netherlands	154,624	$912,777	763,937	$5,111,770
Papua New Guinea	127,751	$396,178	614,168	$1,828,590
Hong Kong	138,966	$465,592	90,106	$159,430

Source: ABS, 2012a

Figure 16: Volume of kangaroo meat exports by destination 2006-07

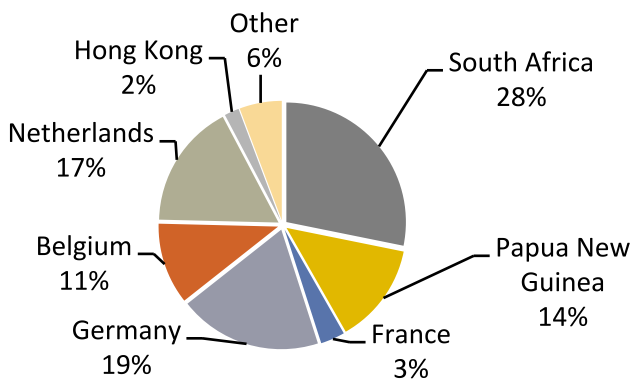


Source: ABS, 2012a category 5465.0

Currently, the key market for kangaroo meat exports is the European Union (EU). In 2011-12 approximately 2,317 t of kangaroo meat was exported to the EU at a value of $14 M (ABS, 2012a). **Figure 17** highlights the export markets for kangaroo meat in 2011-12 by volume. Comparing Figures 16 and 17, the impacts of a changing composition of export markets before and after the loss of the Russian market is clear. The EU currently consumes approximately 50 per cent of the total volume of meat exports representing an average growth of 29 per cent per year (ABS, 2012a) (**Figure 17**). The key export countries within the EU are Germany, the Netherlands, Belgium and France. Kangaroo meat is considered a game-meat in Europe and demand is growing due to outbreaks of livestock disease such as Foot in Mouth and 'Mad Cow' Disease (Bobbit et al., 2006). The majority of prime kangaroo cuts are exported to the European Union with prices varying from $5.08 per kilogram in Germany to $6.69 per kilogram in Holland (Foster, pers comms).

Other important markets include South Africa with exports rising from 5 per cent in 2006-07 to 28 percent in 2011-12, and Papua New Guinea that has increased from consuming less than 1 percent of total exports in 2006-07 to roughly 13.5 percent in 2011-12 (ABS, 2012). Presumably, these countries receive lower grade meat and the majority of export production is sold to the consumer as 'meat', not 'kangaroo' (Kelly, 2005 p.9). These markets have a low per unit value of $2.69 per kilogram in South Africa and $2.98 in Papua New Guinea (ABS, 2012).

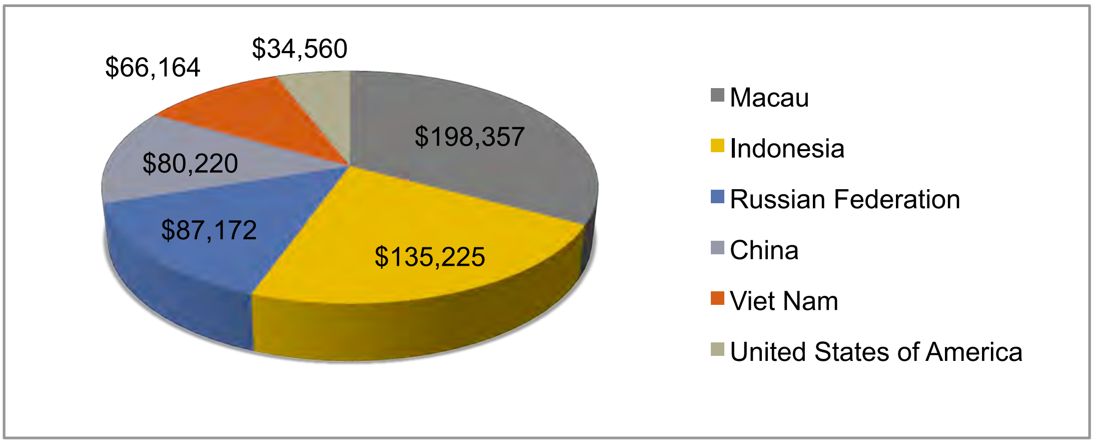
Figure 17: Volume kangaroo meat exports by destination 2011-12 (Source: ABS, 2012a)



EXPORTS OF PET MEAT PRODUCTS

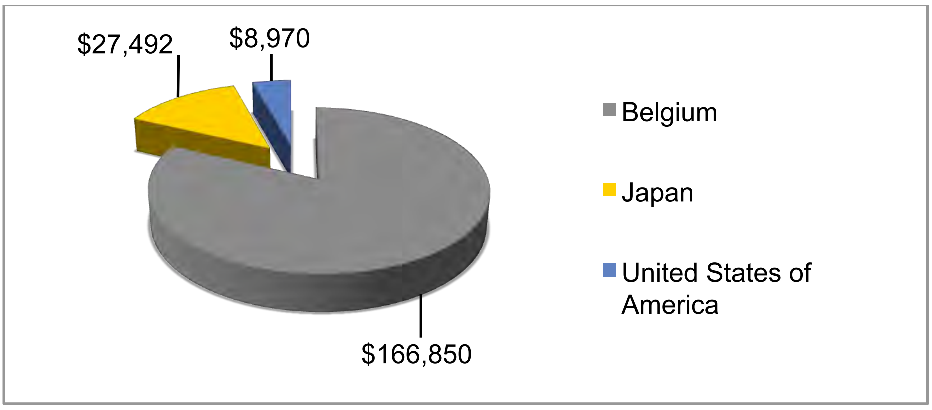
Since 2002 pet food containing kangaroo meat has been exported to Macau, Vietnam, Indonesia, China and the Russian Federation (Shim-Prydon and Camacho-Baretto, 2007: Kelly, 2005; NRIA, undated). At the time, the export market was valued at an estimated $0.6 M with Macau the largest market by value, followed by Indonesia Fig. 18 (ABS, 2012a).

Figure 18: Export markets for pet food 2003-04 by AUD value ($) Source: ABS, 2012a



Over the last decade the number of pet-food oriented export markets has declined from six countries to just three key trading partners (**Figure 19**) (ABS, 2012a). Currently, the export market for pet food containing kangaroo meat is worth approximately $0.2M. The main export market for pet food is Belgium who commenced imports in 2011, followed by Japan, and last, the United States. Previous trading partners such as Indonesia and Viet Nam have not imported pet food containing kangaroo meat since 2011 no explanation has been provided for this drop.

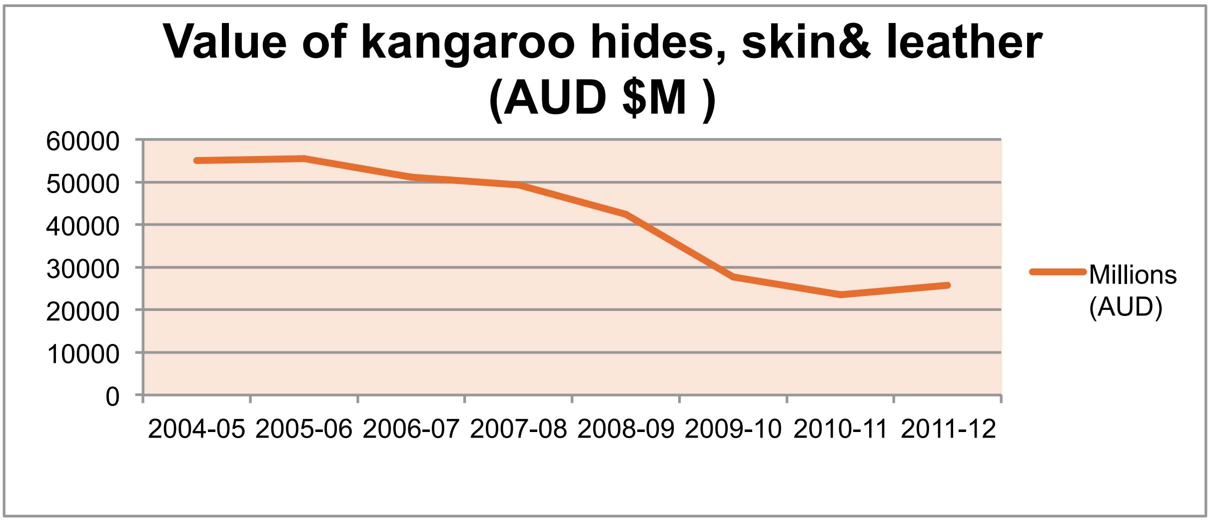
Figure 19: Value (AUD$) of export markets for pet food 2011-12 Source: ABS, 2012a



KANGAROO FURS, SKINS AND LEATHER

Kangaroo skins are either sourced as a by-product of the meat industry, or kangaroos are killed specifically for their skins. Skins can be sold in raw form, semi-processed- pickled or wet blue or as finished leather (Kelly, 2005). Kangaroo skins, furs and leather were exported to 15 countries in 2012, with the key markets in Europe and Asia. Skins are exported in different stages of treatment: raw salted, pickled (semi-processed) and finished leather. Most skins that are commercially harvested are exported for use in footwear. In 2005-06 the export value of kangaroo hides and leather was of $55.4 M, over the past 6 years the value of hides and leather has fallen significantly to $25.7 M (RIRDC, 2014). Primarily as a result of animal protection advocates raising awareness of the animal welfare concerns of the industry.

Figure 20: Total value of kangaroo hides and leather (2004-2012)



Source: ABS, 2012a; RIRDC, 2014

The key export markets for kangaroo hides in the EU are primarily Germany and Italy, contributing to $4.3M of the total EU market value of $6.48 M (ABS, 2012a). Overall, the market drivers for kangaroo leather include Hong Kong, Japan, Indonesia and Italy (Table 2) with a total value of $6.3M.

Table 2: Countries importing kangaroo hides (2011-12) (ABS 2012a)

Kangaroo hides			Kangaroo leather		
Country	**Volume (t)**	**Value ($AUD)**	**Country**	**Volume (t)**	**Value ($AUD)**
Germany	207,871	757,617	Hong Kong	77,042	2,140,545
Italy	273,535	3,582,071	Japan	28,189	654,697
Turkey	117,000	1,595,677	Indonesia	25,847	968,823
Bangladesh	60,000	170,529	Italy	16,313	610,394

Summary

This section has detailed the various external factors that resulted in a significant contraction of the kangaroo industry over the past 6 years. These factors include low prices for skin and meat, loss of key export markets, a strong Australian dollar and increasing input costs for commercial operators that have eroded the profitability of the commercial industry (DEC, 2011 p. 20).

The industry was vulnerable due to a high reliance on a few markets for manufactured meat. The loss of access to the Russian market resulted in a 57 per cent reduction in the value of meat export markets, which halved the price paid to shooters. The skins, leather and hides market also reduced in value over this period. Economies of scale have not been realised in this industry due in part to limited and inconsistent supply brought about by low margins.

The only good news for this industry has been the small but growing rise in domestic consumption of kangaroo meat. However this meat is still considered a very niche market accounting for less than 0.5 per cent of total red meat consumed in Australia in 2011.

Section 4- The commercial industry's contribution to the Australian economy

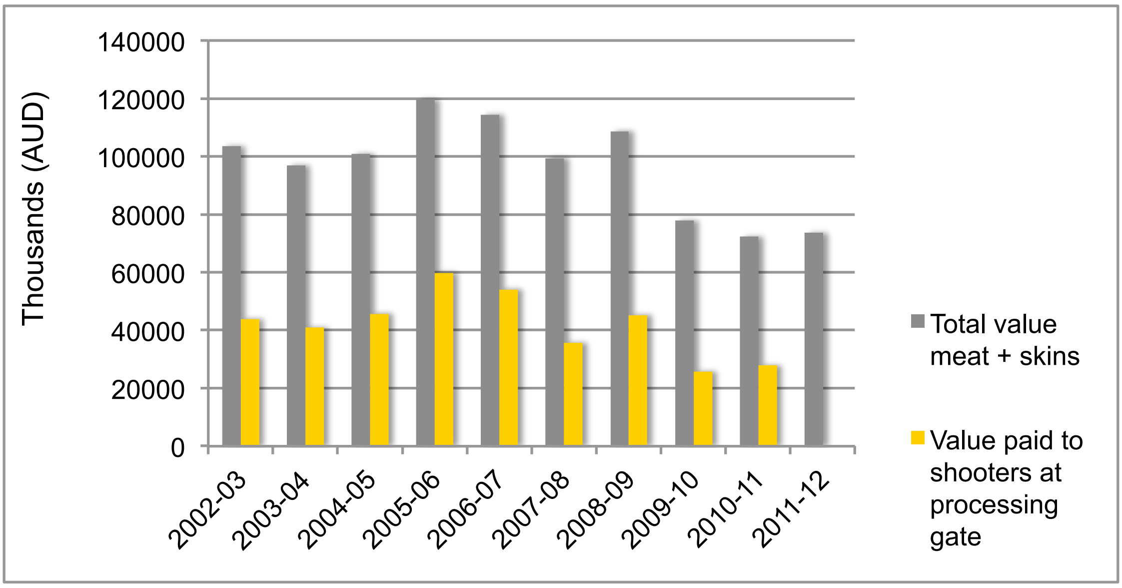
- Contribution to the Australian economy
- Employment roles and trends

CONTRIBUTION TO THE AUSTRALIAN ECONOMY

In 2005, the industry released the Kangaroo Industry Strategic plan that estimated the industry's worth at $230 M per year and as providing up to 4,000 full time jobs (Kelly, 2005 p5). In 2011, a key industry spokesperson for KIAA reported the industry's worth at $250M and reiterated the figure of 4,000 full time positions (Kelly, 2011). Unfortunately these reports do not provide references for the data nor the method used to calculate the worth of the industry. Interestingly, the industry had calculated that the worth of the commercial industry had increased by $20 M from 2005 and 2011 when the value of all kangaroo exports fell by 52.6 M or 53 per cent over the same time period (ABS, 2012a). The employment figures provided in these reports remained unchanged over this same period, despite consistent media reports of job losses from the closure of game meat processing plants (Puddy, 2012). Greater transparency is needed to assess the true worth of the commercial industry and how it contributes to the Australian economy.

There are a number of ways to calculate the value of the industry. One method is to use the Gross Value of Production (GVP), which is the measure of the total amount paid to kangaroo shooters at meat processing plant gates (Foster, 2010). In 2005-06 GVP was $59.8 M, by 2011-12 the GVP had effectively halved to $28.6 M see (Figure 21) (RIRDC, 2014). Yet this figure only calculates a portion of the total worth of the industry, what is not included is the value of domestic and export markets. In 2011-2012, the estimated value of the industry was calculated to be $88.8 million (exports $46.6 M + domestic meat consumption $35.2 M + pet food production $7M).

Figure 21: Value of production (meat and skins) vs gross value of production (2004-2011)

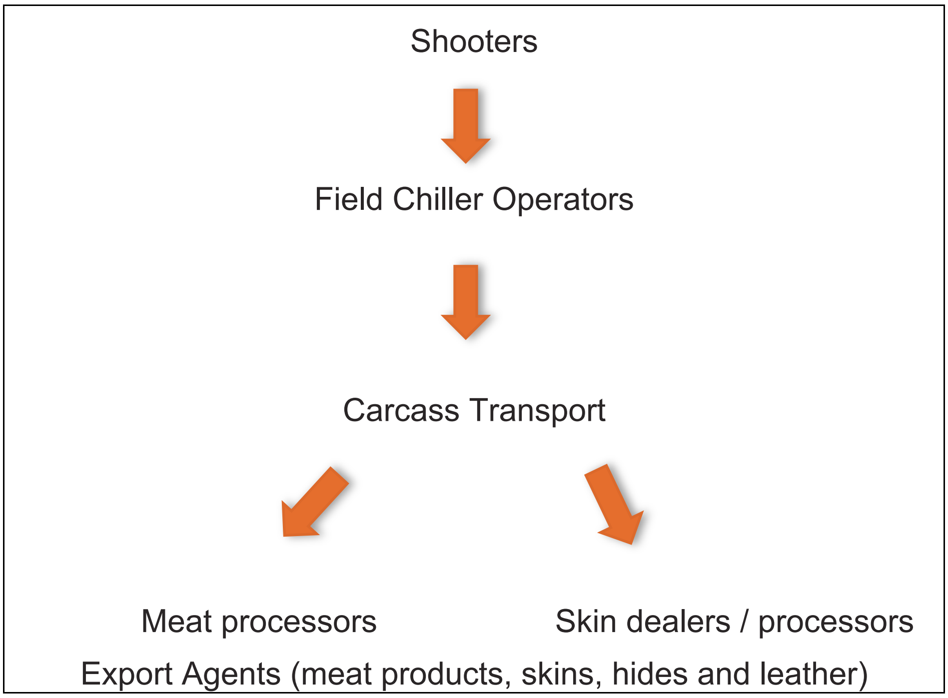


Source: Foster, 2012

EMPLOYMENT ROLES AND TRENDS IN THE COMMERICAL KANGAROO INDUSTRY

The commercial kangaroo industry provides employment in rural and regional Australia. The main employment roles are kangaroo shooting, running the field chiller and in meat and/or skin processing. Other roles include transport and logistics and persons involved in exporting kangaroo products (Figure 22). However, for this report, employment data was assessed for shooters, chiller operators and processors. The Australian Bureau of Statistics (ABS) does not have a separate category for employment in the kangaroo industry and the Australian Government Department of the Environment does not keep these statistics on the employment provided by the commercial kangaroo industry. Therefore employment was calculated using ABS input-output tables which show the linkages between different sectors of the domestic economy that can be used as a quick way to estimate the likely impact of a relatively small change in a specific industry on the demand for labour (Dennis, 2012). Using $88.8 million as the value of the industry, this suggests the industry supports around 888 workers when both direct and indirect employment is considered.

Figure 22: Employment roles in the commercial kangaroo industry



Source: Kelly, 2005 p.1

SHOOTERS

Kangaroo shooting is a unique occupation that provides employment in rural and regional Australia. Most shooters operate as an independent small business and negotiate a contract with a field chiller operator in order to store kangaroo carcasses. Shooters work at night when kangaroos are most active and often operate under harsh and dangerous conditions. Shooters can only supply to chillers that operate in the areas that they shoot, which results in a monopsony pricing of labor as a consequence of no refrigeration on the shooters trucks (Kelly, 2005). These conditions make it difficult to attract labour to this industry. Certain skills, training courses and specialised equipment are required before becoming a commercial shooter.

A shooter wishing to enter the industry faces high set up costs from obtaining relevant licenses, completing training courses, purchasing the necessary equipment and insurance cover. Shooters must obtain a Commercial Fauna Harvesters license[11] that allows them to shoot kangaroos and sell carcasses to processors, the licence is valid for 1 year and costs range from $60 in WA to $947 in SA (DEC, undated; DEWNRb undated). In some states, shooters are required to purchase tags to attach to the carcass, the cost varies between states from $0.80 per tag in Queensland to $1.13 per tag in NSW (QLD EHP, 2012; DECCW, 2010; OEH, 2012). Specialised equipment is required including a spotlight, rifle, scope, ammunition, knives, a vehicle fitted with a steel tray and rack to hang the kangaroo carcasses. These equipment costs add to the start-up costs which may vary between $30 - $36,000 (Tippet, 2008; Stayner, 2007 p.7). The equipment used to transport kangaroo carcasses such as 4WD and racks for hanging the carcasses must be licensed with the relevant state food authority and must meet the Australian Standard for Hygienic Processing of Kangaroos for Human Consumption (DECCW, 2010: DEWNR b undated). Variable costs include time, fuel and ammunition.

According to the Rural Industries Research and Development Corporation (RIRDC), in 2010 there were 3,600 accredited or licensed shooters - 2,500 in QLD, 1,000 in NSW and 100 in SA (RIRDC, 2011 pviii). Other sources report approximately 2,000 licensed kangaroo harvesters in QLD in 2011 (House of Representatives, 2012). Analysis of the number of licenses issued to shooters may provide an indication of employment trends. In 2008, 3,488 commercial licences were issued nationally and in 2011 a total of 2,489 licences were issued, which is a reduction of almost 1,000 licensed shooters (Table 3). Due to high establishment costs to enter the industry, anecdotal evidence suggests that shooters have been renewing their licence yet not actively shooting in the hope that market conditions will improve. Over the past few years there have been consistent reports of job loss and financial hardship for kangaroo shooters due to the loss of key export markets, the strong Australian Dollar and reduction in price paid to shooters per carcass weight (Ampt and Baumber, 2010; Ben-Ami,2009; Durut, 2009). Due to a lack of independent data on this industry its hard to determine the full extent of this impact, it would have a big impact on full time shooters however a high proportion of shooters shoot for an 'extra' on top of their normal job to earn extra money (Ag Force as quoted in Blore, 2011).

[11] In some states this license can be called a Commercial Fauna Harvesters or a professional kangaroo shooter’s licence that regulates firearm calibers, animal identification and animal welfare standards such as The Code. Shooters must hold a current firearms license and undergo a firearms accreditation to check the safety of firearms and assess the shooters competency.

Table 3: Number of commercial licences issued per state 2008 to 2012

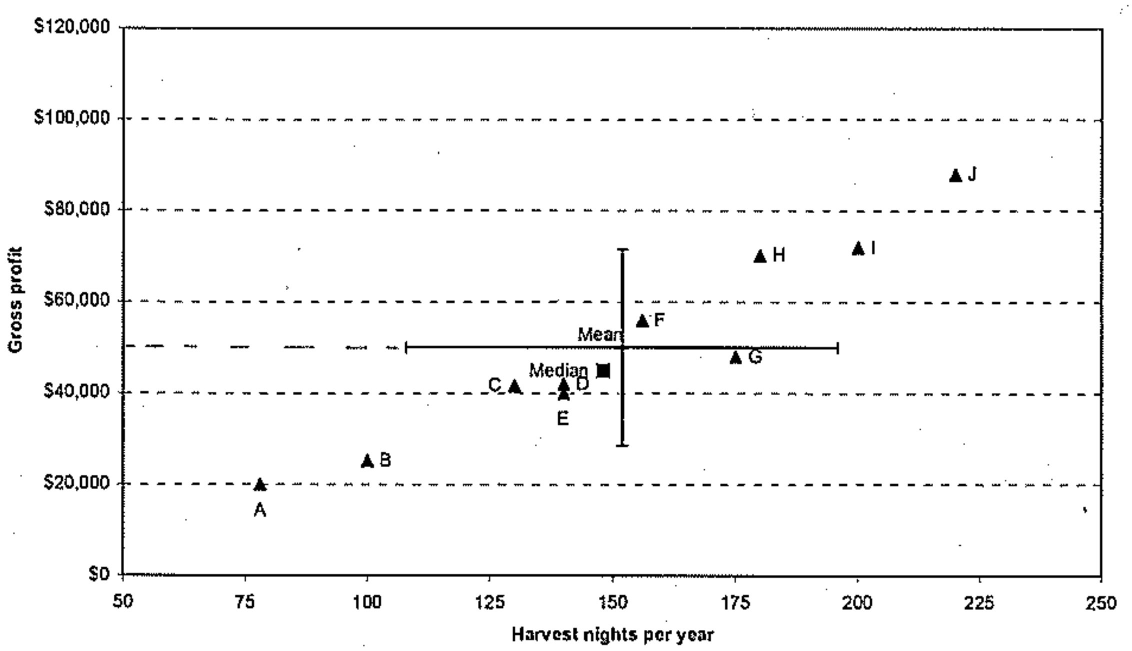
State	2008	2009	2010	2011	2012	Reference
New South Wales	880	699	626	539	492	(OEH 2012b)
Queensland	2,101	1,952	1,641	1,455		(DERM, 2008 p.5: DERM, 2009 p.7: DERM 2010 p.8: DERM 2011 p.iii)
South Australia	90	85	82	72	75	(DEWNR, 2012)
Western Australia	417	436	432	423		(DEC, 2011 p13: DEC, 2012 p13)

INCOME

Shooters are paid by meat processors on a per kilogram basis of kangaroo carcass delivered to the chiller so the commercial utilisation of kangaroos is generally biased towards larger animals as they yield a greater returns for shooters. Shooters are price takers and are limited in their ability to negotiate better cash returns, security, or other benefits (Cooney, 2009 p.8). In this current market of high competition between shooters, processors can largely dictate the terms on which they acquire products (RIRDC, 2009; Cooney, 2009). The increased supply of meat (due to the Russian Ban) has reduced kangaroo meat prices in constant dollar terms. Prior to the ban shooters in Queensland were receiving approximately $1.30 per kilogram, while post ban the value per kilogram had effectively halved to $0.65, with $0.70 quoted in NSW (Bevan, 2009: Daily Liberal, 2012). As noted above the gross value of production (GVP) has reduced by 37 per cent since 2007 which has greatly impacted on the profitability of the shooters. (Foster, 2012; Foster, 2010 p.50).

There are a limited number of studies that provide evidence of the amount of income that can be earned from working as a shooter. In 2006, Thomsen and Davies published a report that looked into financial returns for shooters operating in South Australia. The mean gross profit per annum for this sample was approximately $47,000 Figure 23 (Thomsen and Davies, 2006). Another study by Stayner calculated the gross receipts from kangaroo shooting at $24,300 (Stayner, 2007 p.6).

Figure 23: Mean gross profit for a sample of kangaroo harvesters



FIELD CHILLER OPERATORS

Field chillers can be owned by a shooter or by a licenced fauna dealer. The operator is contracted to one processor, although larger chillers may be independently owned and operated (Kelly, 2005). In 2009, processors paid chiller owner/operators about $0.15 per kilogram, of which $0.07-$0.10 is allocated to the person physically running the box (RIRDC, 2009; Cooney, 2009 p.18). Each chiller must be licensed with the relevant state food authority at a cost of over $1,500 (DERM, 2012).

In 2008, there were approximately 528 chillers operating in QLD, NSW and SA[12]. By 2011 the number reduced to 338 licensed chillers (Table 4). Many of the chillers are owner operated, and generally provide part time employment, but this is dependent on the size and location of the chiller. For the purposes of assessing employment it is assumed that on average each chiller employs 1 person (Nicole Payne pers comms)[13]. Based on licensing data the loss of employment is estimated to be a maximum of 190 positions over the period 2008 to 2011.

[12] Data from WA was excluded due to discrepancies in the data

[13] Nicole Payne is a manager of the NSW Kangaroo Management Program

Table 4: Number of chillers operating in Australia 2008-2011

State	2008	2009	2010	2011	Reference
NSW	228[14]	246	150	150[15]	OEH, 2011 p.15.
QLD	227	194	144	125	DEHP, 2012b; DERM, 2011p.5.
SA	64	63	67	63	DEWNR, 2011 p.8
WA	?	?	574	142[16]	DEC, 2010; DEC 2011 p.13.

KANGAROO MEAT PROCESSORS

Kangaroo processors or fauna dealers buy kangaroo carcasses from a shooter or field chiller operator and sell products on to retailers and consumers. To operate they must obtain a Fauna Dealer (kangaroo) Wholesalers License from the state agency. This allows the fauna dealer to import carcasses from other states where commercial killing is permitted and process meat for either domestic or export markets. Processor licences cost approximately $1,900 per year (DEWNRb undated).

Kangaroo meat processors provide employment for low-skilled workers. Due to issues of commercial confidence, accessing information on the level of employment at each plant was not possible. However, it is possible to assess the number of licenced kangaroo meat processors. The total number of licensed issued to processing plants has fallen from 68 in 2008 to 38 in 2011. This is comprised of 5 plants in SA, 19 in WA, 8 in QLD and 6 processors in NSW (PIRSA pers comm, 2013; DEC, 2012 p.13; DEHP 2013, pers comm, NSW Food Authority, 2013 pers comm). Depending on their size, the employment provided by processors ranges from 15-40 staff (Scopelianos, 2011; Lewis, 2011;Gage, 2012). However, the largest processor, Macro Meats, employs around 260 staff significantly more than any other kangaroo meat processing plant (Macro Meats, undated). If we estimated that meat processors provide on average employment to 20 staff then the total employment could be estimated as a little over 920 persons[17].

SKIN DEALERS

Kangaroo skins are sourced from meat processing plants or through skin only commercial killings. Skin dealers cannot buy skins directly from shooters and must be licensed to process skins (DECCW, 2010). In QLD and WA skin only dealers exist due to the large distances between harvest areas and chillers and high

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[14] In 2008, 90 chillers did not operate for the full year due to "industry difficulties with overseas markets" which resulted a number of chillers closing for several months during 2008 (NSW KMP 2008 p16).

[15] In 2011, 16 chillers operated only part of the year due to substantial rainfall and flooding across parts of NSW, preventing access to properties by shooters (NSW KMP, 2011).

[16] In the Department of Environment and Conservation 2011 Annual Report this figure refers to active chiller units, defined as "those chillers identified on shooter returns where there is at least one shooting day of effort during the year for each particular chiller".

[17] Calculated by multiplying 46 processing plants by 20 persons per plant

ambient temperatures that makes is difficult to reach chillers and processors within a timeframe required for meat processing. According to DERM (2011 p.14) less than three per cent of overall kills are specifically for skins. Larger meat processors have skin processing on-site. In WA, 8 licences were issued during 2011 to deal in skins, and in QLD 2 licences were issued (DEC, 2011 p13; EHP, 2012b).

In 2009, the Queensland Primary Industry and Fisheries estimated that 500 full-time jobs and 2000 part-time jobs have been affected by Russia's decision to ban the importation of kangaroo meat (Durut, 2009). From an assessment of licences, we estimate that the kangaroo industry could provide employment for 2,970 shooters and field chiller operators. It is important to note that this figure overestimates the number of job created by the industry as a high proportion of field chillers are owned operated by a shooter who has a separate license for both roles. Furthermore, the licence data does not tell whether these jobs are casual, part- time or full time and does not provide a clear indication of the actual employment in the industry and therefore the worth of industry to the Australian economy.

DETERMINING EMPLOYMENT CREATED BY THE INDUSTRY

The Australian Bureau of Statistics (ABS) does not have a separate category for employment in the kangaroo industry and the Australian Government Department of the Environment does not keep these statistics on the employment provided by the commercial kangaroo industry. The problem lies in the fact that this industry is bundled in with other industries. One way to evaluate KIAA's employment figures is to use the ABS input-output tables. These tables to show the linkages between different sectors of the domestic economy that can be used as a quick way to estimate the likely impact of a relatively small change in a specific industry on the demand for labour (Dennis, 2012). The Australian economy employs, on average 10 workers per million dollars of output when both direct and indirect employment is considered (Dennis, 2012 p.6). Using $88.8 million as the value of the industry, this suggests the industry supports around 888 workers when both direct and indirect employment is considered.

An alternative approach is to use the ABS industry categories associated with the kangaroo industry and determine the number of direct jobs created per million dollars of output. The ABS has three groups that cover the main employment roles of the kangaroo industry. The direct jobs created per million dollars of output are provided in Table 5, if we average these figures to obtain 2.87 direct jobs per million dollars of output, we calculate that the industry can support around 255[18] full time equivalent direct jobs.[19]

[18] Figure calculated by averaging the multiplier across the three ABS categories – 0401, 1101 and 1302 =2.87 *88.8

[19] If we use the industry's stated value $280 M then it could potentially be providing 803 direct jobs.

Table 5: ABS classifications for kangaroo related employment

ABS Classification	Direct jobs are created per million dollar of output
0401- Fishing, Hunting and Trapping	3.8
1101-Meat and Meat production	2.9
1302- Tanned Leather, Dressed Fur and Leather	1.9

Source: ABS 2009

Indirect employment (employment in those industries providing resources for these industries such as finance, transportation etc.) is typically around 2-3 times the size of the direct employment multiplier (meaning another 500-750 jobs). However, Dennis emphasises that using indirect multipliers leads to double counting because those jobs are counted as direct employment for those industries and it is implicitly assumed that there are no supply-side constraints[20] (ABS, 2009).

Depending on which of the two methods are used – counting commercial licenses or using ABS input/output tables the amount of jobs provided by the commercial kangaroo industry varies significantly. The number of jobs provided could be as low as 255 if only direct full time jobs are considered or closer to 2,970 jobs if shooters and field chiller operators licences are counted with a further estimated 920 jobs in meat processing employment is included[21].

The impact of the Russian ban on rural employment

The Australian and New Zealand Standard Classification of Occupations (ANZSCO) groups hunters and trappers into the unit Group 8419 'Other Farm, Forestry & Garden Workers' ABS Regional Profiles provide a broad perspective on trends in rural employment. Employment data from 4 key regions of the NSW where the commercial industry operates (Central West, Northern West, Northern and Far West[22]) shows that the employment rate rose by around 0.7 per cent between 2006 to 2010, despite the loss of the Russian market (ABS, 2012b). Data from 5 key kangaroo industry regions in QLD (North West, South West, Fitzroy, Darling Downs and the Central West regions) indicates unemployment rose by less than 0.8 per cent on average. In the Central West region, an important harvesting area includes towns such as Longreach, Blackall and Winton. In these towns the unemployment rate increased from 1.7 per cent in 2006 to 3.4 per cent in 2010 (House of Representatives, 2012: ABS, 2012b). These figures and industry records above suggest that rural

[20] The most significant limitation of economic impact analysis using multipliers is the implicit assumption that the economy has no supply–side constraints. It assumes that extra output can be produced in one area of the economy without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.

[21] The authors were unable to access employment data for meat processing plants and it is unknown if these plants process other types of game meats- Emu, wild boar etc.

[22] This data is for all employment not just specific to the kangaroo industry.

employment was affected only marginally, if at all, by the contraction of the kangaroo industry as unemployment was absorbed by non-kangaroo industries. There are, of course, many other influences on employment but this highlights that the employment supported by the industry is minor.

NON-CONSUMPTIVE USE OF KANGAROOS

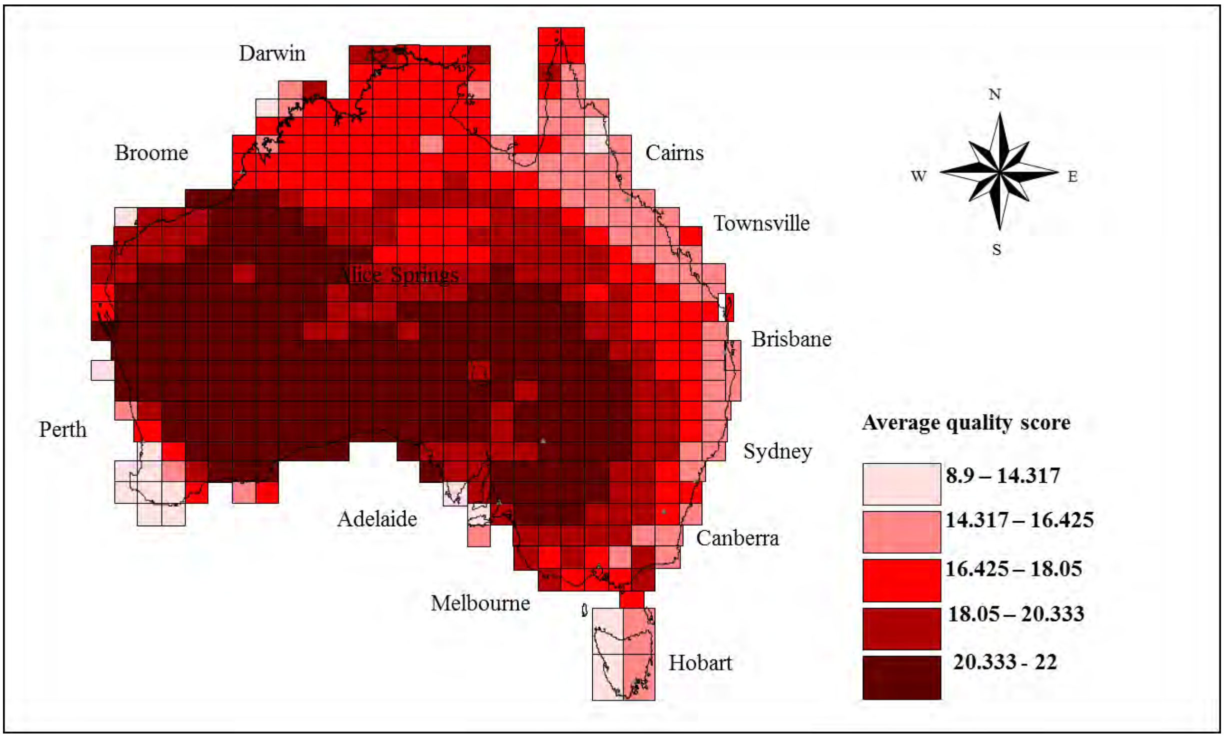
Employment opportunities are also provided by non-consumptive use of kangaroos such as through wildlife tourism. Formal analysis of the value of wildlife, especially kangaroos (Higginbottom *et al.* 2004) and koalas (Hundloe and Hamilton 1997), in tourism has been relatively recent. For international visitors, kangaroo imagery improves the perception of the safety and novelty of the trip and the extent of sightseeing opportunities (Hill et al. 2002). There are many opportunities for tourists to view kangaroos with operators specialising in wildlife tourism or the more general sector of nature-based tourism (Higginbottom et al 2001). Operators, on behalf of their clients, and independent tourists both rate seeing large mobs of kangaroos in the rangelands of the Outback as being highly appealing (Croft, 2001). The wildlife experience is supported by guide books to wildlife-watching (e.g Bennet et al, 2000) and identification guides (Menkhorst and Knight (2010)) and online resources (e.g. www.rootourism.com).

Tourism is a major contributor to the Australian economy. In 2012-13 it contributed 6% GDP, 8% of employment (Tourism Research Australia, 2014). International visitor expenditure was $27.2 billion in the year ending September 2012 and domestic travel contributed a further $68.5 billion ($50.4 overnight and $18.1 billion same day) to total $95.7 billion (Tourism Research Australia 2012a). The contribution of nature-based tourism was last analysed in 2009 (Tourism Research Australia 2009), when 67 per cent of international visitors and 19 per cent of overnight domestic travellers engaged in one or more nature-based activities.

The contribution of wildlife tourism, especially with free-living kangaroos, to tourism income and employment is somewhat more complex as Tourism Research Australia does not specifically identify a wildlife sector and includes visits to wildlife parks, zoos and aquariums as a nature-based activity. However, there is some instructive analysis of the international market (Croft and Leiper 2001; Fredline and Faulkner 2001). In summary, 18.4 per cent of international visitors were attracted to Australia to our unique native and kangaroos were rated among the most popular native animals. Hundloe and Hamilton (1997) rationalised that those visitors for whom the main attraction was native wildlife would go elsewhere if such an opportunity was lost (e.g. through extinction). It is estimated that nature based tourism makes up about 30 per cent of the total tourism spend of domestic and international tourists which equates to approximately $27.7 billion of which both wild and captive kangaroos contributes to such economic benefits.

Attraction must be tempered with opportunity and infrastructure to support tourism. Tourism value increases if an animal is large, active in the day time, occupies open habitat, is social and either abundant (a large spectacle) or rare (a novelty) (Moscardo et al. 2001). Based on these characteristics, kangaroos in the rangelands provide the best satisfaction to tourism participants (Figure 24) but the Australian rangelands, with some exceptions like Alice Springs, are weak in tourism infrastructure (Croft and Leiper 2001). Thus, there may be significant untapped potential to further increase the economic value of free-living kangaroo oriented tourism.

Figure 24: Quality of tourism experience with kangaroos in 1:100000 map



Summary

The kangaroo industry has contracted significantly over the past six years primarily due to substantial reduction ($65M) in the value of kangaroo exports. This contraction was welcomed by people that wanted to see an end to the commercial industry but feared by a small number of people who are directly employed by the industry. The total amount paid to kangaroo shooters at the meat processing plant gates has effectively halved to $27.8 M and it is estimated that at least 1,000 shooters have left the industry and at least 22 game meat production plants have closed.

In 2011-2012, the estimated value of the industry was calculated to be $88.8 million (exports $46.6 M + domestic meat consumption $35.2 M + pet food production $7M).

The ABS does not collect data specifically on employment in the kangaroo industry. Therefore we used the ABS input/output tables to estimate that the industry may only provide approximately 888 full-time equivalent jobs when both direct and indirect employment is considered.

In contrast wildlife- based tourism contributed $5.2 billion to tourism expenditure and employment and approximately 51,800 jobs when evaluated in 2009. Contingent valuation studies could be used to determine whether kangaroos contribute a greater value to the economy alive (through wildlife based tourism) than dead (through their products). This is outside the scope of this report but more research would help to answer this important question and contribute to the current debate.

SECTION 5: Government support for the commercial industry

- Role of government- supportive policies and financial support
- Information and Research
- Government efforts to find and establish new markets

ROLE OF GOVERNMENT

The Federal and state government agencies play a regulatory role in the commercial kangaroo industry, not only through the development of state specific kangaroo management plans (see section 1) but also by controlling the export of kangaroo products by granting export permits. The commercial kangaroo industry also receives financial support from state and federal governments in the form of subsidies, tax concessions, research and development funding and funding to support marketing and research and development of domestic and international markets.

Table 6: Government body roles in the commercial kangaroo industry

Organisation	Role in the industry	Classification
Australian Government Department of the Environment (Formely the Department of Sustainability, Environment, Water, Populations and Community) (DSEWPaC)	Oversees the approval of kangaroo management plans within the state kangaroo management programs	Federal Government
The Department of Agriculture, Fisheries and Forestry (DAFF)	DAFF regulates the export of kangaroo meat from Australia by granting export permits	Federal Government
Australian Quarantine and Inspection Service (AQIS)	All kangaroo products processed for export, including meat, offal, skins and leather, must undergo inspection by Australian Quarantine Inspection Service (AQIS) officials. Provides inspection, verification and certification services to the kangaroo meat export industry to ensure compliance with the *Export Control Act 1982.*	Federal Government

Organisation	Role in the industry	Classification
State Food regulators	State food authorities regulate and enforce meat hygiene standards for human and pet food in accordance with the Australian Standard for the Hygienic Processing of Kangaroos for Human Consumption. They monitor and verify the performance of processing plants and field chillers to ensure compliance with these standards.	State Government
State Agencies that deal with environmental matters	Regulate the commercial industry in accordance with relevant legislation. They issue permits and sealed tags to shooters or landholders in accordance with annual quotas for the four main harvested species.	State Government
Kangaroo Industry Development Committee	Convened by the Queensland government in response to the loss of the Russian export market. This committee is comprised of representatives from DAFF, RIRDC, KIAA, the National Meat Industry Training Program (MINTRAC) and state regulators (Mawson, 2011).	Federal & State Government agencies and Industry
TAFE	Deliver a Game Meat Hygiene and Handling course or equivalent which provides training in field processing and hygiene. The course covers killing procedures, equipment, pre-killing inspection, field dressing and post mortem inspection and takes 24 hours to complete (NSW TAFE, 2007).	

GOVERNMENT SUPPORT

The Australian Government provides assistance to the kangaroo industry through the collection of levies and the payment of Commonwealth matching funds for Research and Development (R&D) expenditure (DAFF, 2012a). A levy of 6.5 cents per carcass is imposed on processing organsations and this funding is allocated to RIRDC for Research and Development of the industry (Austlii, 2003). A breakdown of this financial support provided under the Rural Industries Research and Development Corporation (RIRDC) classifications - kangaroo and kangaroo harvest - are outlined in Table 7 (RIRDC, 2013). The last column is the sum of all the expenses paid by RIRDC to undertake research projects, advisory committee expenses, program management fees and research and development expenses (RIRDC, 2011 p.227). In 2010–11 RIRDC allocated $415,199 to research and development for the commercial kangaroo industry (RIRDC, 2011 p.227).

Table 7: Levies and matching funds dispersed for kangaroo related research

Financial Year	Revenue received by RIRDC for Kangaroo industry promotion and research			Total expenditure on research made by RIRDC ($)
	Contributions from the Commonwealth Government ($)	Other income ($)	Statutory Industry Levies ($)	
2013-14	33,216	12,481	59,910	34,579
2012-13	73,409	84,406	53,751	128,618
2011-12	77,867	79,928	56,432	206,730
2010–11	120,443	10,974	50,609	415,199
2009–10	533,485	61,239	59,710	522,190
2008–09	159,972	16,031	78,758	319,672
2007–08	87,060	28,048	85,986	186,635
2006–07	64,146	20,577	117,866	139,351
Total	1,149,598	313,684	563,022	1,952,974

Source: RIRDC Annual Reports, 2006–07 to 2013-14

The South Australian Government provided a $1.9 M grant to assist kangaroo meat processor Macro Meats to build a $7.3 million kangaroo meat-processing plant in Athol Park (Battersby, 2008: Kenny, 2009). In 2008, the Department for Environment and Heritage SA (now DEWNR) was provided $6,305 in a grant from RIRDC to fund an aerial kangaroo survey over parts of the South-East that was undertaken in 2011, with the intention of extending the commercial harvest zone into this new region (RIRDC, 2012; DEWNR, 2011 p16). This section outlined the government funding that has been provided to the industry, from publically available sources.

RESEARCH PROGRAMS - KANGAROOS

RIRDC is the key organisation that provides funding for research to progress industries in rural and regional Australia. The RIRDC currently coordinates R&D programs for the kangaroo industry, partly funded by the existing R&D levy on kangaroos processed for human consumption (Austlii, 2003). The main RIRDC programs that have related to kangaroos include the Rangelands and Wildlife Program, New Animal Products Program and Kangaroo Harvester Program. A number of projects were funded by RIRDC that directly or indirectly relate to and/or promote the commercial kangaroo industry and these are listed in the following sections.

THE RANGELAND AND WILDLIFE SYSTEMS PROGRAM

Under this program a series of projects called the Sustainable Wildlife Enterprise were developed to trial and evaluate the commercial value of free-ranging wild animals and plants. The total of $212,842 was dedicated to research to trial greater commercialisation of kangaroos by landholders. This program has since been replaced by the program *New Animal Products – Kangaroo*.

NEW ANIMAL PRODUCTS- KANGAROO

This program assesses the viability of commercialising 40 native and introduced animal species. Over the 8 years RIRDC have allocated $1.95 M to this program specifically for increasing domestic and international demand for kangaroo products and more recently improving animal welfare. Other projects have been developed to train shooters in hygiene and sanitation practices and improve national standards.

Kangaroo harvester training program

All kangaroo shooters have to undergo a training program prior to obtaining a licensed that enables them to shoot and sell kangaroo carcasses. In 2010, the Federal Minister for Sustainability, Environment, Water, Population and Communities Tony Burke announced an additional $0.4 M in government funding to up-skill workers in the commercial kangaroo industry (see other income 2009-10). RIRDC contracted SafeFood Production Queensland to run the Kangaroo Wildgame industry training initiative. A total of $185,980 Commonwealth funds were directed to this initiative in 2010–11 (RIRDC, 2011 Annual Report p.228). Training was provided to 2,736 licenced shooters in 81 different locations across Australia along with the creation of national competency standards for organisations involved in the production process (Mawson, 2011). Minister Burke said that “investing in product and skills improvement is essential for regaining access to the market in Russia as well as underpinning new markets, such as China” (DAFF, 2010). In 2011, DAFF provided $215,677 funding through a grant round to KIAA for the development of strategies and concepts for promoting and marketing kangaroo meat in both Australia and China (DAFF, 2011).

GOVERNMENT ACTION TO OPEN MARKETS FOR KANGAROO PRODUCTS

THE RUSSIAN FEDERATION

Since the complete suspension on trade to Russia since late 2009, the Federal Government has been actively negotiating with the Russian authorities, mainly Rosselkhoznadzor, to recommence the importation of kangaroo meat. The Federal Government has been working with the Kangaroo Industry Association Australia (KIAA) and the state regulatory authorities to meet the new requirements required by the Russian Federation. Specifically, attempting to address Phytosanitary issues as well as the traceability of kangaroo meat from killing through to the processing plant (House of Representatives, 2012a).

In mid 2011, there were a number of negotiations between Department of Agriculture, Forestry and Fisheries (DAFF) and the Russian Ministry of Agriculture representatives to establish a protocol (Department of Foreign Affairs and Trade Legislation Committee, 2011). During an Asia-Pacific Economic Cooperation (APEC) meeting held in November 2011 Prime Minister Gillard and the trade Minister Dr Craig Emerson both separately discussed the kangaroo meat market access with their respective Russian counterparts (Rural and Regional Affairs and Transport Legislation Committee, 2012b p.75).

More recently, the Federal Government continued its efforts to gain re-approval of 19 meat establishments - thirteen red meat and six wild game establishments (Rural and Regional Affairs and Transport Legislation Committee, 2009). Mr Greg Read- the Food Division secretary at DAFF met with representatives from the Russian Veterinary Authority in Berlin in January 2012 (Rural and Regional Affairs and Transport Legislation Committee, 2012b). Another meeting was held in June 2012 between the Australian Chief Veterinary Officer and the head of the trade market access division with delegates in Russia (Rural and Regional Affairs and Transport Legislation Committee, 2012b). The Federal Government negotiated a technical visit from Russian delegates that took place December 2012 to assess the revised hygiene systems with a view to recommencement of that trade. In late 2012, DAFF released a video about the commercial industry that has been translated into Russian and Chinese (DAFF, 2012).

OTHER POTENTIAL MARKETS FOR KANGAROO MEAT PRODUCTS

There have been many attempts made to open up export markets across Asian countries such as the Philippines and China (Rural and Regional Affairs and Transport Legislation Committee, 2009). According to RIRDC "other than China, very little demand is exhibited in Asia for kangaroo meat, probably reflecting the status of the kangaroo as a tourist attraction for our neighbors and thus not a food" (Bobbit et al. 2006, p.19). China currently has restrictions in place on the supply of kangaroo meat (Rural and Regional Affairs Committee and Transport Legislation Committee, 2012a). However, Australia has set a protocol in place with China and audits of meat export plants have been conducted by Chinese authorities (Rural and Regional Affairs Committee and Transport Legislation Committee, 2012a). China has raised animal welfare concerns regarding its kangaroo imports. In late 2012, Australian authorities initiated discussions with China to address their specific concerns with the Federal government "working through with their counterparts in China, providing information to address their particular concerns in that regard" (Rural and Regional Affairs Committee and Transport Legislation Committee, 2012a p.57). It is unknown how the 2014 free trade agreement between China and Australia will impact these negotiations.

In 2011, RIRDC funded a report "California, New York, the World and Kangaroos" that provided information to assist the commercial industry to gain greater market access in two key American markets- California and New York (Kelly, 2011). At the time of this report's publication legislators from California were considering their options regarding whether to allow the importation of kangaroo meat into their state.

Section 7: Conclusions and key questions

This report has provided a comprehensive analysis of the economics of the commercial kangaroo industry. The research has evaluated the contribution of the industry to the Australian economy; the flow of production; employment roles and trends; key trading countries and export earnings as well as an assessment of domestic markets. The objective of this report was to answer a number of key questions:

What are the key economic factors in the kangaroo industry?

This report has detailed the various internal and external factors that influence the profitability of the industry. The industry is very sensitive to external factors and this report has shown that the loss of export earnings from a significant reduction in international demand for meat products as well as skins, hides and leather combined with a strong Australian dollar has made kangaroo products less competitive on international markets. The value of kangaroo exports has fallen by more than $53 M between 2006-2012. Internally the factors that constrain the industry include variability of supply that has been influenced to a degree by extreme climatic fluctuations ranging from drought to flooding in parts of the country as well as competition with the others sectors for labour and the low margins for shooters.

What is the value of the kangaroo industry and its contribution to the Australian economy?

The kangaroo Industry Association of Australia (KIAA) has valued its total worth at $280 (M) (KIAA, 2012). Yet is has been difficult to assess this value as it has not disclosed the data sources or methods used to calculate this value. The researchers requested data from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), part of the Federal Government Department of Agriculture, Fisheries and Forestry. The data provided by ABARES was used to calculate the value of production, which is estimated to be approximately $88.8 (M) in 2011-12.

What impact has the loss of the Russian Federation market had on the commercial industry?

Given that exports are a key revenue-generating sector of the commercial kangaroo industry, the loss of the biggest international market in Russia in 2009 has had a substantial impact on the total value of the industry. During its peak the Russian market was worth $34.3M. The value of meat exports has fallen by more than half from $47.2M in 2006-07 to $20.3M in 2011-12. What is less clear is how falling international demand has impacted rural and regional employment, as ABS do not provide data specific to this industry. General employment data from four regions where kangaroo shooting in NSW takes occurs saw an increase in the rate of employment by around 0.7 per cent. In contrast in five key kangaroo industry regions in QLD the unemployment rose by less than 0.8 per cent on average with towns like Longreach, Blackall and Winton showing much higher unemployment rates. These figures and industry records above suggest that on average rural employment was affected only marginally, if at all, by the contraction of the kangaroo industry as unemployment was most likely absorbed by non-kangaroo industries.

How many jobs are created by the commercial industry and what are the trends in employment?

The commercial kangaroo industry provides both part and fulltime employment in rural and regional Australia. The key industry roles are for kangaroo shooters, field chiller operators and game meat processing plant workers. The fall in demand for kangaroo meat products in international markets caused a massive oversupply of kangaroo meat that halved the price paid to shooters for each kangaroo carcass. Kangaroo shooters adapted by either exiting the industry, or switching from full time to part time shooting. Chiller operators have temporality or perminantly closed chillers and at least 22 meat processing plants ceased their operations and the remaining plants operated at a lower capacity by reducing the workforce over this period. Since the industry is so small ABS does not have a separate category for employment provided by the industry, so two different methods have been used to determine employment. Both methods yield very different results with employment figures with ranging from around 888 direct full time jobs[23] to a maximum of 2,970 jobs if shooters and field chiller operators licences are counted consisting of part and full time employment with a further estimated 920 jobs in meat processing plants[24]. This variation in employment figures can be explained by the difference in full and part time employment and the potential for double counting as a proportion of shooters own and operate chillers on a part time basis and the high possibility that individuals renewed their annual licences in the hope that conditions in the industry would improve. Moreover, in reality they could have gained employment in other industries and would not have participated in the commercial industry over this period. Greater clarity of employment data is needed to accurately determine the level of employment provided by the commercial kangaroo industry especially when employment is used as a way to leverage more government funding to assist this ailing industry.

Have domestic markets for kangaroo products changed over the last decade?

Prior to 2008, the majority of kangaroo meat was supplied to pet food markets. The last 5 years has seen a shift to greater quantities of meat being supplied for human consumption. Last year Australians' consumed over 7, 000 (t) of kangaroo meat products which is a very minor contribution to the Australian diet with only a third of a kilogram consumed per capita per year compared to more popular meats such as poultry, with a per capita consumption of approximately 37.2 kg, or beef and veal with 34.1 kg consumed per capita per year. Regular kangaroo meat consumers are classified as people that eat kangaroo meat more than four times per year. Greater scrutiny of the claims made by the commercial to consumers is required, as independent studies have shown that kangaroo meat has a number of health risks[25] and comes at a high welfare cost to the 6 species targeted by the industry and their young.

How much financial support has been provided to the commercial kangaroo industry?

The Federal Government Department of Agriculture, Fisheries and Forestry (DAFF) has provided $0.4 M worth of financial assistance to the industry to build the capacity of kangaroo shooters to improve health and hygiene practices. Over $3.1 million dollars of funding has been allocated to promotion, marketing as well as research and development of the kangaroo industry since 2006. There have been numerous research projects that support the commercial use of kangaroos and wallabies, very few on improving animal welfare and none on the non-market value provided by kangaroos in terms of maintaining the functioning of ecosystems. It is not on public record how much money has been spent in negotiating the access to the Russian and American markets nor the funds spent on negotiating to open up new markets in China. Greater

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[23] Method 2 used data from ABS Input- output tables 2008

[24] Method 1 counted licences for shooters, field chiller operators and game meat processing plants

[25] Recent results published by Dr. Stanley Hazen, head of preventive cardiology at the Cleveland Clinic in Cleveland, Ohio found that carnitine, a nutrient found at high levels in red meat could increase the risk of existing coronary artery disease, as well as the risk of having a major cardiac event, such as heart attack or stroke, in adults who had high blood levels of trimethylamine-N-oxide (TMAO).

transparency is needed about how much financial support is provided to prop up this industry and whether it would be more efficient to redistribute towards other sections in the economy that provide more employment.

Could nature based tourism provide a viable alternative?

Employment opportunities are provided by non-consumptive use of kangaroos such as through wildlife tourism. Tourism is a major contributor to the Australian economy, contributing 2.5 per cent to GDP, and 4.5 per cent of employment in 2010-2011. Tourism Research Australia found that in 2009, 67 per cent of international visitors and 19 per cent of overnight domestic travellers engaged in one or more nature-based activities worth a total of $23.2 billion. Recent studies have shown that at least 18.4 per cent of international visitors were attracted to Australia because of our unique native animals and kangaroos rate as one of the most popular Australian wildlife. These international visitors' contribution to tourism expenditure ($4.27 billion) and employment (51,800) based on 2010-2011 figures gives an indication of the upper value of the wildlife sector.

Tourism value increases if an animal is: large, active in the day time, occupies open habitat, is social and either abundant (a large spectacle) or rare (a novelty). Based on these characteristics, kangaroos in the rangelands provide the best satisfaction to tourism participants (Figure 24) but the Australian rangelands, with some exceptions like Alice Springs, are weak in tourism infrastructure (Croft and Leiper 2001). Thus, there may be significant untapped potential to further increase the economic value of free-living kangaroo oriented tourism.

APPENDIX 1

Table 8: The commercial kangaroo management zones and allocation of tags

State	NSW	QLD	SA	WA
Zoning	Tags are based on the 14 Kangaroo Management Zones (DECCW, 2010: NSW KMP 2012-2016 p.3).	The commercial zone is divided up into three zones -Central, East and West Zones. Tags are based on these Zones.	SA four harvest regions are defined for 2012, namely the Western Pastoral, Eastern Pastoral, Western Agricultural, and Eastern Agricultural (DEWNR, 2011).	WA has 22 kangaroo management areas that run down the western side of the state (DEC, 2011 p.21).
Eligibility of shooter	Landholder applies to OEH for a Commercial Occupier's License. The landholder nominates a licensed shooter to kill kangaroos and sell the carcass to a licensed fauna dealer (DECCW, 2010).	Royalty tags are purchased from DERM each year by licensed kangaroo shooters. Individual properties are not listed on the license; however a condition of the license is that shooters obtain and carry written landholder consent prior to shooting.	Tags are issued for a specific property to Landholders who apply for a Commercial Harvesting Authority (DEWNR, undated).	Royalty tags are purchased from DEC each year by licensed kangaroo shooters.

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