

CONTRACT REVIEW

COMMERCIAL USE OF WILD ANIMALS IN AUSTRALIA

INTRODUCTION

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Wild animals have been the major source of food and fibre for most of human history. Domesticated animals usurped their role as staples only recently - and for good reasons. Domestic sheep, cattle, poultry, pigs and goats are highly productive and tractable substitutes for wild animals. But the special properties of wild animal products demand close attention and provide unique opportunities for Australian producers. Provided those products can be obtained sustainably, humanely, legally and practically, they are potentially profitable supplements and alternatives to domestic animal production. Their harvest can also make a valuable contribution to pest management.

Australia's opportunities in producing non-domestic animal products are a consequence of a diverse, widespread, introduced fauna and an abundant large native macropod fauna. Their abundance, of course, is relative - domestic sheep and cattle are much more prominent in the mammal fauna of Australia than wild animals (Table 1).

Table 1 Estimated comparative abundance and biomass of some domestic, introduced and wild animals in Australia (Based on: Cribb 1989; Grigg et al. 1985; Strahan 1983; Tisdell 1982)

Species	Number (millions)	Biomass ¹ ($\times 10^8$ kg)	DSE ² (millions)
Domestic cattle	23.5	105.6	235
Domestic sheep	165	82.5	165
Rabbits	200	3.2	22
Feral pigs	12	6.0	12
Kangaroos ³	13	5.9	8

(1) Individual biomass (kg): sheep 50; cattle 450; feral pig 50; rabbit 1.6; kangaroo 45. (2) Dry Sheep Equivalents: cattle 10; feral pig 1; rabbit 0.11; kangaroo 0.6. (3) Includes: *Macropus rufus*; *M. giganteus*; and *M. fuliginosus*.

The non-domestic animals currently used commercially fall into four categories, based on whether they are farmed, harvested from free ranging populations, and whether they are native, or introduced species (Table 2). Introduced species harvested from the wild are presently the largest group and farmed native species the smallest, with only the emu and crocodile presently in this category.

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Table 2 Native and introduced animals commercially harvested or farmed in Australia

	Harvested	Farmed
Native	Macropods (7 species) Possum Muttonbird	Emu Crocodile
Non-native	Pig Camel Rabbit/Hare Buffalo Horse	Donkey Banteng Fox/Cat Cane toad Goat Deer (5 species) Game birds (pheasant, quail, partridge)

This contract provides both an overview of current use of terrestrial non-domestic animals and an insight into two industries: farming of an Australian native species - the emu; and harvesting of wild populations of feral pigs and kangaroos. Commercial use of these species is both innovative and controversial - this series of papers provides a brief introduction to the issues and scope of the industry.

POTENTIAL AND PROBLEMS IN USING WILD ANIMAL RESOURCES

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Current management challenges

Replacing complex native ecosystems with relatively simple systems of introduced plants and animals can lead to degradation and threaten the sustainability of production systems - 30% of non arid grazing land and 52% of arid grazing land in Australia require remedial treatment (Woods 1983).

Wild animals on these lands are a resource which increases the diversity of the production system. They can be used either in intensively managed agriculture or extensively on the rangelands. Populations can be husbanded to control breeding, predation and access to food and water; or harvested with minimal management inputs.

Although there is considerable potential for increasing commercial use of harvested or farmed wild animals, it is constrained by controversy - part of the community has moral objections to using native and wild animals; some government authorities and agencies have difficulty integrating commercial use with conservation and cost-efficient pest control; and the community is culturally unfamiliar with novel game products leading to resistance on domestic and international markets. There is also a lack of basic husbandry and processing technology.

Dealing with these problems poses major challenges for government and industry. Public objections to using wild animals are often based on sentimentality rather than on real threats to species conservation. Killing individuals of either cattle or kangaroos ought to be comparable in conservation terms because

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total populations of both are approximately 25 million. Eating beef is culturally more accepted by many Australians although many traditional **Aboriginals** may have a different view and prefer kangaroo meat. Provided both animals are killed humanely, the moral and cultural issues should be equivalent for both species.

Sustainable commercial use of wildlife is entirely consistent with both the World Conservation Strategy and National Conservation Strategy.

Sustainable harvesting

For the harvest of native species to be sustainable, numbers taken should not exceed the rate at which the population can renew itself over the long term. There might be peaks and troughs which mirror rises and falls in seasons but overall the harvest should relate to the long term carrying capacity of the land. If changes in land use improve or degrade habitat value, the number of animals killed should take this into account. When the land owner has a commercial incentive to look after wild species, habitats will be conserved. For this to occur the value of the product and the costs of harvesting and transport must be economic. When no-one owns the populations nor has a vested interest in maintaining them, open access exploitation occurs as has been shown with marine resources such as many fish and whales. The situation in Europe and America is an interesting model. Deer populations are worth money to the community and are increasing rapidly because habitat has been protected and access restricted despite intensive industrial and other development.

Clearly, there is no requirement for sustainable harvesting of introduced species and overall management will incorporate pest control aspects.

Legislation

Legislation controlling the use of wild animals reflects the range of cultural and aesthetic value of wild animals and restrictions on their commercial use. Larger and more common mammals can only be legally used where they are seen to be in competition with agriculture and causing economic harm to the property owners whose land they share. There are exceptions; flying foxes and fruit bats, although in vast numbers, causing economic harm to fruit growers are not used commercially. Historical traditions also apply strongly and in Tasmania possums have been harvested for many years, a practice unacceptable on the mainland. Exemptions apply throughout Australia for **Aboriginals** to harvest and use wild animals for their own purposes.

Codes of Practice have been developed for humane hunting and handling of wild animals, and in some States, incorporated into regulations. In particular, a Code of Practice for the Shooting of Kangaroos has been promulgated to meet public concern.

Meat from field shot animals such as rabbits and game enters domestic markets only where state legislation permits it. Domestic inspection is carried out by state authorities in Qld and W.A. and by the Australian Quarantine and Inspection Service (AQIS) in other States. AQIS is also responsible for inspection and certification of exports for animals shown in Table 1.

Many introduced animals are proclaimed pests under state legislation, and landowners are required to control them and, where possible, eradicate them. The Commonwealth also controls import of exotic or new species and is responsible for the Convention on International Trade in Endangered Species.

Conservation authorities in each State and Territory develop and administer management programs for all native species. Additional control over all native animal exports is exercised by the Australian National Parks and Wildlife

Service through the Wildlife Protection (Regulation of Exports and Imports) Act 1982.

The Wildlife Protection Act has the potential to complicate the development of intensively managed wildlife "farms" as well as regulating extensive harvesting of native wildlife. Animals taken from the wild and exported are subject to the development of an approved management program in accordance with section 32 of the Act. Animals in farms such as emus could also be subject to the need for a management plan if they have been caught in the wild.

COMMERCIAL HARVESTING OF WILD ANIMALS IN AUSTRALIA

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Some of the wild animal species that are abundant in Australia are commercially harvested. Hunting of native animals is fully regulated, while exploitation of introduced animals is limited primarily by economic forces. Existing industries are small, and although the products may have special attributes, businesses face difficulties in satisfying supply and demand requirements, and in successful promotion of products. This paper indicates the variety of species harvested in the field, and touches on the main factors influencing acquisition and marketing of wild animal products.

Commercial harvesting of wild animals is not a recent development in Australia. Kangaroos and wallabies, possums, fur seals, and koalas were extensively harvested for their skins by early Australian settlers (Thompson et al. 1987). In 1927, the Queensland parliament permitted the shooting of 600,000 koalas (Rolls 1969). The first record of harvesting muttonbirds was in 1831 (Backhouse 1843 in Skira 1988), when an estimated 112,000 birds were taken. Brush possum and muttonbird are still harvested today in Tasmania, and seven species of macropods can be hunted commercially in Australia. Koalas and fur seals are now fully protected.

Species subject to harvest in Australia

Wild animals are harvested by commercial enterprises in all States (Table 3). Field shooting is the most common form of harvesting, however some animals (e.g. goats, horses, buffalo) are captured by live mustering for slaughter at abattoirs.

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Table 3 Summary of commercial use of wild animals in Australia

Species	Where harvested	Scale of harvest	Main products and use	Primary market
Native				
Kangaroos and wallabies subject to commercial killing	Qld. N.S.W. S.A. W.A. Tas.	Qld. 1988 Eastern Grey Kangaroo 1,292,196 ^a	Meat - Pet food - Human consumption Skin - Leather ² - Fur	Domestic Export ¹ Export ¹ Domestic
Mutton bird	Tas.	1988 310,336 ^b	Meat - Human consumption Feathers - Pillow Oil - Linament	Domestic Domestic Domestic
Possum	Tas.	1988 93,255 ^b	Skin - Fur	Export
Introduced				
Buffalo	N.T.	1987/88 39,385 ^c	Meat - Pet food - Human consumption Skin - Leather Livestock - Breeding	Export Export Export Export
Camel	W.A. N.T.	N.T.-1988/89 39 abattoir slaughters ^d	Meat - Pet food - Human consumption Livestock - Breeding	Domestic Domestic Domestic
Donkey	W.A. N.T.	N.T.-1988/89 70 abattoir slaughters ^d	Meat - Pet food - Human consumption	Domestic Export
Fox	S.A. Vic N.S.W. Qld.	1988/89 169,771 ^e	Skin - Fur	Export
Goat	W.A. Qld. N.S.W. S.A.	1988/89 Live export 69,797 ^f	Meat - Human consumption Skin - Leather Livestock - Breeding	Export Export Domestic
Horse	N.T. W.A. Qld. N.S.W S.A.	1988/89 Export abattoirs 41,347 ^d	Meat - Pet food - Human consumption Skin - Leather	Domestic Export Export
Pig	N.T. Qld.	1988 135,725 ^g	Meat - Human consumption	Export
Rabbit/Hare	W.A. S.A. Vic. N.T. N.S.W. Qld.	1988 approx 2,800,000 ^h	Meat - Human consumption - Pet food Skin - Fur felt	Domestic Domestic Domestic

1 Tasmania has not had an approved management plan for wallabies subject to commercial culling since 1986, and therefore products cannot be exported.

2 Most skins exported pickled.

a, Australian National Parks and Wildlife Service; b, Tasmanian Dept of Parks, Wildlife and Heritage (possum - royalties only); c, Dept Primary Industries and Fisheries; d, Australian Quarantine Inspection Service; e, Australian Bureau of Statistics (exports); f, Australian Meat & Livestock Corporation; g, O'Brien and Meek 1989 - unpubl. data; h, Ramsay and Wilson 1989 - unpubl. data.

Various legal requirements control commercial use of wild animals, however economic factors otherwise control the initial and ongoing harvests. Such factors include availability of adequate supply and suitable markets. Supply of the required quantity and quality of wild animal products can present special difficulties. In general:

1. Hunting effort increases with increased value of animal products. Although the maximum number of native animals which may be killed or captured is strictly controlled by conservation authorities the number of introduced animals killed depends on market demand. In 1986/87 the Australian Bureau of Statistics (ABS) recorded 366,522 raw fox fur skin exports with an average value of A\$23.15. When fur skin value fell to an average of A\$12.21 in 1988/89, the number taken dropped to 169,771.
2. Environmental influences such as flood and drought affect animal abundance and the ability to successfully harvest in the field. During the drought of 1982/83, a 52% average reduction in red and western grey kangaroo numbers occurred in Kinchega National Park (Bayliss 1987).

Price of products, price of substitutes, and consumer preferences are common factors affecting demand. Changes in consumer preference can result in significant fluctuations in demand for wild animal products. The markets appear to be inelastic and prone to oversupply. This is aggravated by campaigns waged by groups opposed to the use of wild animals. The fur industry exemplifies this, and is targeted by animal welfare groups, subject to oversupply from fur farms, and in competition with synthetic substitutes. As a result, suppliers of wild furs are price takers, with little control over sale prices for products.

Properties of wild animal products

Special qualities inherent in wild animal products can enhance their value.

Meat In general, game meats contain less total fat and associated visible fat than meats from domestic species such as cattle and sheep (Sinclair 1988, O'Dea 1988). Further, wild animals are not treated with pesticides, growth promotants, or medications. Buffalo meat returns 30% more per kg than beef on export markets (ABS). Properly handled, game meat can be produced to standards which meet the most stringent requirements of importing countries (Andrew 1988).

Skins and Fur Leather from wild animals often has a tensile strength comparatively greater than that of traditional livestock. Kangaroo leather is recognised as being by weight one of the strongest available (Stephens 1987). Wild furs have long been appreciated for their durability. Australian red fox furs have remained competitive with farmed furs on world markets due to the higher fur strength.

By-Products Products from some exotic and wild animals are valuable for traditional medicines in many cultures (eg. deer antler velvet in Chinese medicine). Today, wild animals are being scrutinised by pharmaceutical companies as a potential source of new compounds. For example, the brains from the Australian wild rabbit are used for extraction of thromboplastin.

Genetic Material Wild stock can bolster genetic material available to domestic livestock industries. Most Australian cashmere and mohair goats have been derived from wild goats. Australian wildlife is also free of major livestock diseases (Garner and O'Brien, 1988), which enhances the value of our livestock on international markets (eg camels, buffalo).

Wild animal products can have qualities which appeal to some consumers, and be preferred to commodities from traditional livestock. Game meats could appeal to health conscious buyers; skins and furs are often *more* durable; the exotic disease free status of wildlife places Australian exporters at a trade advantage over competitors; and by-products have potential for medicinal purposes. However Australian producers are in a competitive economic environment supplying limited markets. The challenge to industry will be to compete for increased market share, and to promote the attributes of wild animal products to the general marketplace. Animal welfare and conservation issues will continue to influence future directions for all agricultural industries including the wild animal harvesting trade.

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EMU FARMING IN AUSTRALIA

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Emus are protected indigenous (native) fauna under the Western Australian Wildlife Conservation Act. The emu is also part of the national emblem of Australia, but this need not preclude the commercial exploitation of its products.

The first commercial emu farm was established at Kalannie (Western Australia) by Swiss interests in 1970. Despite initial difficulties, some progress was made and prospects for leather production were indicated. The project was abandoned after three years. An emu farm was established at Wiluna in 1976 and handed over to the Ngangganawili Aboriginal Community in 1981. It is now the largest emu farm in Western Australia. A second commercial farm at Mt. Gibson was approved in 1985. Both farms received approval from the Conservation and Land Management Department (CALM) to capture wild emus to establish an initial flock.

Strong public interest and recognition of emu farming as technically feasible by the Western Australian Department of Agriculture resulted in Government approval for the establishment of commercial emu production in August 1987.

Regulations

A licence from CALM is required to farm emus in Western Australia. The licence imposes a number of important conditions, including: emus cannot be taken from the wild, only stock bred in captivity can be farmed; the flock held by a licensee cannot number less than 40 breeding pairs or 100 immature birds; fencing must meet specific requirements; maximum stocking densities are prescribed; and emus must be identified with tags and regular stock number returns submitted to CALM. Export of products is controlled by the Wildlife Protection Act and all products must be from animals bred in captivity.

Emu farms in Australia

There are currently 17 licensed emu farms in Western Australia with a total of 2000 adults and 3000 chicks and the Department of Agriculture has an

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experimental flock of about 200 adults and 300 chicks. So far, emu farms in Western Australia have concentrated on increasing breeding stock and few birds have been slaughtered for product.

One emu farm is in operation in Queensland where a moratorium has been placed on establishing further farms. One farm also started recently in Tasmania. Other States have not approved commercial emu farming at this stage.

Production parameters and products

Current industry practice is to house each breeding pair in a 50 x 25 m pen or allow breeders to free range at a density of not more than 16 adults/ha.

Egg production usually starts at the end of April and continues until the end of September. Females produce an average of 10 eggs in their first year of lay and more than 20 in the second year. There is wide variation in egg size, with mean weight about 550 g. Unlike most birds, the male sits on the eggs for a hatching period of 56 days. During the 1989 breeding season, farms used either natural incubation, giving a hatchability of about 65%, or artificial incubation which, currently achieves 60-65%. Optimum incubator results have been obtained from a temperature of 35.6°C, a humidity 50-55% and turning of eggs three times daily.

Breeders are fed a high fibre poultry layer type diet. Consumption varies from 350 g daily during breeding to 1500 g in spring and average *ad lib.* consumption is nearly 600 g daily.

Chicks are reared artificially after hatching. Standard chick starter ration is fed for 10 days followed by a low energy, 16% protein grower feed. Bodyweights recorded in the Department of Agriculture's experimental flock average 5 kg at 8 weeks and over 20 kg at 20 weeks. Adults are very hardy, with few losses. Most farms report 10 - 15% mortality in chicks during the 1989 breeding season. A range of products are produced (Table 4). Emu farms also have some value as a tourist attraction, particularly where they are situated on tourist routes.

Table 4 Emu products known to have some market value

Product	Estimated yield per bird	Ex-farm prices (\$)
Skins for leather	0.80 m ²	150 (/m ²)
Leg skins	2	30
Meat	13 kg	15 (/kg)
Oil	6 kg	20 (/kg)
Eggs - plain and carved	4	10-500
Feathers	0.5 kg	10 (/kg)
Claws - polished	6	12

Economics and future prospects

An emu farm of 100 breeding birds requires 20 hectares of land. Implied is a capital expenditure of about \$200,000 if land and all facilities are purchased, including emu chicks currently selling for \$250 each. Annual operating costs are estimated at \$70,000, including \$27,000 for feed (balanced *ad lib.* ration), but making no allowance for slaughtering.

Because few birds have been slaughtered, there is little data on the size of markets and factors affecting the quality of products derived and hence their value. Using current prices quoted for products in extremely short supply, annual income has been estimated at \$169,000. This income is not generated until year three after establishment.

Preliminary market studies have indicated that there is likely to be strong demand for most emu products on both local and export markets. Encouraging production improvements have stemmed from the experimental programme and the prospects for a new, viable industry are promising.

ECONOMIC BENEFITS OF UTILISING AUSTRALIAN WILD ANIMALS

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Kangaroo was a common dish on Australian tables in the nineteenth century. However, late in that century, there was a significant change in the colonial attitude to kangaroos. Australia had become a rich nation - 'sheep were plentiful and kangaroos competed with them for pasture. Australians regarded kangaroos as pests and vermin and of course no-one eats vermin. In late 1959, a market opportunity arose when interested German importers contracted to purchase kangaroo meat for the German game market. The definition of game meat is that it must be derived from an animal that has not been husbanded and has been killed in its natural surroundings in a brutal manner. This fledgling market failed because entrepreneurs paid inadequate attention to hygiene. A substantial domestic market subsequently developed for kangaroo as pet food.

In 1976, my company decided that there was no long term future in pet food kangaroo and sought to have the Australian Government provide an inspection service to prevent repetition of the earlier failure to establish an export game industry. Regulations prepared in 1980 covered all aspects of the industry, from depot coldstores (chillers) to packing and labelling in the processing factory. All animals were to undergo inspection by the Australian Quarantine Inspection Service. Two companies were in the field in a very short time - one concerned primarily with kangaroos and the other with wild pigs. Both products were aimed at traditional game markets in Europe. Wild pig was regarded as a "normal" game meat while kangaroo meat was a novelty. Like any new product, it required marketing and there were reservations.

The product trail

Kangaroos Kangaroos are shot under licence from State National Parks and Wildlife Services. Shooters hunt where they are licensed to do so and where authorised by the property owner. Only licensed Fauna Dealers can buy kangaroos. Most kangaroos are head shot, then hung, bled, eviscerated and partially dressed. The heart, lungs, liver and kidneys are retained for inspection at processing. About 60 kangaroos can be hung on a Toyota Landcruiser - the most common shooting vehicle. Regulations require carcass delivery as a hanging load to refrigerated depots within two hours of sunrise. In practice, they are invariably delivered within one hour. Processors purchase by weight with average weight 20 kg and current prices 30-35 cents per kg (\$6.00-\$7.00 per carcass).

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Wild Pig Pig shooters are not licensed by any authority and only require the permission of the property owner. Dogs may be used to flush pigs from crops and heavy vegetation. Pigs are shot, dressed and transported in a similar fashion to kangaroos. Prices vary with carcass weight. The current price range is 25c/kg for 23-30 kg carcasses to 150c/kg for the few carcasses above 80 kg .

All game carcasses can be stored in the same holding room. At appropriate intervals, carcasses are transported to licensed processing works. Transport is in an approved refrigerated vehicle and the product carried as a hanging load. If one accepts that the animal has already been gutted, subsequent processing of game meat is similar to a domestic abattoir.

Markets

Wild Pig Europe has been the major buyer and consumers there now accept Australian wild pig as legitimate game meat. Compared with domestic meats, the market is extremely small and the export price subject to dramatic variations when there is any indication of an oversupply from Australia. Until a greater range and depth of market is found, the industry will be subject to cyclical export price variation. To minimise these market fluctuations, one Australian game meat processor has concentrated on marketing retail products packaged for supermarket shelves.

Kangaroo Meat From the licensing of the first export game processing establishment in 1980, kangaroo meat sales to Europe grew steadily. The main buyer was Germany, with Norway and Sweden also buying. Acceptance in Norway and Sweden reflects the high hygiene standard of the product. Production was about 3,000 kangaroos per week in late 1982 when Greenpeace campaigned in Europe to "Save the Kangaroo" and targeted the main German importer of kangaroo meat. About the only truthful claim they made was that "kangaroo meat could not be sold anywhere in Australia as table meat - so why should Germans be expected to eat it". As kangaroo was only a small part of the importer's business, he advised that he didn't want any more meat. Since then, only 10-12 containers have been exported annually. However, Greenpeace's action served as a catalyst for industry moves to make kangaroo meat legal for human consumption throughout Australia.

The Local Market South Australia, Tasmania, Northern Territory and the Australian Capital Territory allow the sale of Australian game meats. The most common dish is kangaroo. Western Australia and New South Wales are preparing or introducing legislation to permit the sale of kangaroos as game meat. Local sales have been small to date, with annual turnover under 1000 tonnes.

CONCLUSION

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The logic of making greater use of Australia's wild animal resources is compelling. Further development of this concept is an integral part of the move towards low input, sustainable agricultural systems. It is also important for the future conservation of native species outside national parks.

Current use of non-domestic animals is a small, specialized industry with potential for growth and diversification. It provides a unique opportunity for Australia to develop humane, sustainable industries because it is based on special properties of Australia's native and introduced fauna.

Difficulties associated with efficient harvesting of wild animals require commercial concerns to have a high degree of skill and flexibility in managing field operations. Farming non-domestic species also presents specific challenges in handling, nutrition, reproduction and disease management, transport and processing. If adequately managed and marketed, wild animal resources provide opportunities for high value products on specialised markets. In many instances, commercial use of wild animals could offset the costs of pest damage and complement domestic animal production. Examples include commercial harvesting of free-ranging kangaroos, feral pigs, goats, rabbits and foxes.

Future success is critically dependent on continued development of management practices which are demonstrably sustainable and humane, and on thoughtful marketing.

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