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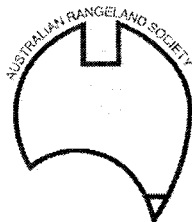
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## DEVELOPING COMPLEMENTARY LIVESTOCK INDUSTRIES

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### ABSTRACT

Although Australia's traditional animal industries are very important, contributing some ~~\$14~~ <sup>\$14.5 billion</sup> billion to the national economy, a number of species are proposed here as complementary to existing livestock. By using these species graziers can increase diversity, shield their enterprises from fluctuations in markets and provide benefits to the environment. In many cases greater use of native species such as kangaroos would allow graziers to carry fewer livestock exotic to Australia. However they should also consider making greater use of species such as camels, buffalo, rabbits and goats, and review the options of importing others such as alpacas and llamas to appropriate environments.

There is a huge international market for venison and unusual wild animal products. Adoption of game and alternative species would enable the development of uniquely Australian products that lend themselves to clever marketing. The meat is lean, contains little cholesterol and has different tastes. The leather is of the highest quality.

### INTRODUCTION

Australia has gross economic problems which are closely linked to productivity and export earnings. We are spending more at the international marketplace than we earn and so we have to keep borrowing. Increasing production and becoming more efficient are two solutions. The existing livestock industries are very important in the process, generating some \$23 billion of farm income and earning 40% of our export revenue. There are also massive multiplier effects for the economy. Local inputs by farmers amounted to some \$17.5 billion in 1988/89. Thus livestock industries are a major contributor to employment and activity in the nation's service and manufacturing industries, sustaining an estimated one million jobs in the urban centres where most Australians live.

Relying on the established animal industries however is only part of the solution to our problems and underestimates other options. Diversity and innovation are essential. There is substantial potential for using alternative animal resources, both native and exotic animal species already in the country and new species from overseas. It is the purpose of this paper to discuss some of these options for rangelands, and to address the biological and social constraints of using them, including some of the philosophical and practical problems that attend the farming of wild animals.

### MANAGEMENT OF ANIMAL RESOURCES

Management is the task of modifying and improving the environment to provide the basic requirements of preferred species, to exclude competition and where possible to manipulate the quality of the product. The commercially successful species are likely to have a high fecundity, a high rate of increase and the ability to tolerate a high degree of environmental variability, particularly variations in temperature, moisture availability, and food quality and quantity. They should also be resistant to predators, disease and parasites. In an ecological sense they are likely to be invaders and able to disperse readily and take up a fundamental niche which

is broad, that is, they are generalists. They thus have many of the attributes (1) of prospective pests and need to be watched from this perspective.

Research on cattle is being conducted to modify them and make them produce more in the Australian environment. Ironically some of the currently "undesirable" traits such as low metabolic rate and low food intake assist cattle such as the Brahman to survive in poor grazing conditions. These traits are adaptations to stress but they also stop them from taking full advantage of the abundant pasture that occurs in the wet season in tropical Australia. Fertility of Brahman cattle is also relatively poor, possibly due to conflict between productive and adaptive characters. Perhaps, however, animal production research should concentrate less on manipulating the established species, and more on the availability of the basic pasture resource, while also defining the attributes of alternative species and their suitability for the Australian environment.

#### NEW LIVESTOCK FROM OVERSEAS

Any new livestock enterprise that brings animals from overseas should take into account both the suitability of the species for the Australian environment and any threat which it might pose if it escaped. Australia consists of a huge range of bioclimates from the hot, wet tropics to the extremes of desert and snow covered mountains. Within this spatial variability, there is also substantial seasonal variability, in terms of climate and subsequent food availability. New species should be able to use the resources of these environments and in particular take advantage of those that are not being exploited or are under utilised. Most Australian pastoral industries are based on livestock which graze the pasture regions of the sub-humid zone and to a lesser extent the semi-arid zone. The northern semi-arid pasture regions are also important for cattle.

#### Policies affecting introduction of new species

An assessment of the potential pest status of any proposed introduction is made by the Vertebrate Pests Committee of the Standing Committee on Agriculture (SCA). It consists of senior officers from the States, CSIRO and the Commonwealth responsible for vertebrate pest control and research, and has the task of advising the Australian National Parks and Wildlife Service and the Australian Quarantine and Inspection Service who control the legislation regulating the import of animals. Their task is to weigh potential benefits against the costs and risks of a pest species becoming established.

#### Quarantine control

The introduction of new animals to Australia to improve production has recently been covered by the Quarantine Review Committee set up by the Minister for Primary Industry in 1987 (2). It reviewed all aspects of quarantine that are the responsibility of the Commonwealth under the then Quarantine Act 1908, other than policy in relation to human health. It covered the benefits from importing animals and weighed these against the risks. "Pests and diseases" under that Quarantine Act include not only diseases and disease causing agents, but also weeds, vectors of diseases and pest species capable of harming agriculture, forestry, fisheries and the environment. The Committee recommended changes to quarantine policy suggesting the objective should be both restricting entry and detecting unwanted pests and diseases, and facilitating the introduction of animal and plant material and products. It should therefore move from a position of blanket restriction which had applied for some time to one of an assessed risk on the basis of biological and economic evidence. The Committee also recommended that if scientific or economic information is not adequate to assess the risk, a conservative response should be adopted. The broad thrust of the report has been adopted and the difficult task of implementing it is underway.

With the adoption of the new policy it is now easier to bring new species into Australia. Quarantine facilities for large animals have been constructed on Cocos Keeling Islands in the Indian Ocean. On the mainland new quarantine facilities for other species have been built such as Torrens Island in South Australia. Disease importation risks are also reduced by using the new technologies such as washing embryos and transferring them to surrogate mothers in quarantine stations.

#### Recent imports

Entrepreneurs are already taking advantage of the new quarantine policies and technologies. For example they have brought in red deer, wapiti and fallow deer plus new breeds of cattle, sheep, goats, and new species such as alpacas and llamas. Three hundred alpacas from Chile will soon occupy the Cocos Station, and Boran and Tuli cattle are now approaching maturity at the CSIRO Division of Tropical Animal Production Research Station outside Rockhampton. It is hoped that these tropically adapted cattle breeds will contribute to increased productivity of our present stock. New breeds of fat-tailed sheep have been brought in from Cyprus. They are still in quarantine awaiting clearance from scrapie. They should lead to the opening of wider markets in the Middle East where they are preferred over merinos. Other meat-producing breeds of sheep are also presently in quarantine and will improve the quality of fat lambs for the domestic lamb market. Angora goats are also in quarantine.

#### Choosing the right species

To date many of these imports have been undertaken on an ad hoc basis, inspired by fashion or fads for new breeds. The prevailing attitude has been that the marketplace should determine whether a venture should proceed. Longer term consequences are secondary and review and analysis has a lower priority although in the case of the fat-tailed sheep a more thorough investigation was conducted by the SCA Animal Production Committee. An alternative approach would be to conduct a study using existing bioclimatic information to indicate the species that are most suited to Australian environments. The task would be to use computerised data systems to overlay the distribution of species throughout the world and likely analogous environments in Australia.

For example, alpacas and llamas are worthy of serious analysis as a more widely used species in Australia. They are said to be gentler on soils and the environment. They are Camelids, belonging to the even-toed ungulates - the Artiodactyla - but their feet do not have functional hooves. Instead their toe bones are embedded in broad cutaneous pads on which the animal walks. Their anatomy and physiology are adapted to survival in harsh desert environments and at high altitudes (3).

There is of course more to a successful livestock enterprise than simply finding the right animal for the right environment. The product has to be sold and marketing, which is all important, is briefly discussed later.

#### USING SPECIES ALREADY IN AUSTRALIA

##### Philosophical problems with use of wild animals

A growing proportion of the world's urban population regard wild animals as sacrosanct, not to be killed or interfered with in any way. The notion is that wildlife has rights and animals should be able to lead unimpeded lives. In Australia the philosophy is held most strongly with regard to large native animals and less emphatically for introduced species.

History and archeology however show people have often worshipped and revered wild animals e.g. aboriginals with species totems in Australia and cavemen hunters in Europe. Domesticated animals were also revered; cattle and horses dominate the cave paintings in France and Spain which are 35,000

years old. In Turkey 8,400 years ago, shrines were built to bulls (4). Although they were regarded as objects of worship they were also eaten. The early Egyptians also saw divinity in animals but had no inhibitions about handling, using and exploiting them. The cult of the bull continues and is practised in the Mediterranean islands where mounted bull skulls and horns on walls are common even to this day, as is the practice of eating beef.

#### Developing existing wild animal industries

##### Kangaroos

Kangaroos are the native species with the most potential for industry development. However, management objectives could be more clearly defined and logical. Existing plans are not based on sustainable yield principles because kangaroos are harvested as pests. The source of controversy over kangaroo culling can be attributed to this key issue. If the fundamental objectives were documented in concise, unambiguous terms, the kangaroo debate would largely be defused because a consistent policy and argument could be presented (5).

In determining the number of kangaroos that should be taken each year, the primary considerations are: the claims of the agriculturalists wanting relief from their perceived problem; the needs of the kangaroo industry for a stable supply of products, so that it can operate over both good and bad seasons, remain viable and be able to respond to pest control requests when needed; and the requests of the kangaroo protection organisations to minimize the numbers of kangaroos killed. Governments try to compromise between these competing interests. Although there is little biology in their procedures, extensive aerial surveys have been conducted and there is no doubt that the proportion of the population taken is well within the short-term sustainable harvest.

The current kangaroo industry is small. The value of skin exports was \$9.6 million in 1988/89 and 471 tonnes of meat were sold overseas, mostly as pet food. Its potential is significantly larger. The population on which the industry is currently based was estimated in 1987 by aerial surveys (6) as 7.5 million red kangaroos, 1.7 million western grey kangaroos and 4.7 million eastern grey kangaroos. The actual population, particularly the grey kangaroos, is in fact much higher. Areas not surveyed or harvested include most of the preferred habitat of the eastern grey kangaroo. Large numbers which live in coastal forests and adjacent pasture lands are not included. While harvesting is based on shooting, especially for pet food, it is unlikely that these areas will come into use. Increases in the value of the animals and improvements to management schemes and practices to make them less wild could however enable access in the future.

The industry also has scope for substantial expansion in terms of a reduction of wastage and more sensible use of the animals that are taken. At the moment the major demand is for skins and many millions of carcasses are left on the ground to rot. Fortunately the public is awakening to the value of the meat both as a health food with low cholesterol and fat content and as a tasty and excellent alternative to traditional meats. The merits of the meat have been recognised by the Federal Government, and hygiene standards have been set in export legislation passed in the early 1980s. However, with the exception of South Australia and Tasmania, the states have been tardy in recognising the opportunities and have been constrained by public concern about the morality of using kangaroos, or concern for the welfare of the species, or both.

There is also considerable scope for making greater use of and adding value to the skins, particularly within Australia. They are most suited to high quality leather products having very favourable strength to weight ratios. The rapidly expanding running shoe industry would be an even larger buyer. However, criticism from Greenpeace and animal liberation groups constrain the use of kangaroo leather.

If the market and demand for kangaroo products could be increased, kangaroo populations would be managed upwards, not reduced as pests. The kangaroo would be able to compete with sheep and cattle to maintain its preferred habitat. Indeed their environment would be modified to increase grass, shelter and water, to remove predators and contain their movement by fences and availability of salt licks.

#### Rabbits

The resurgence of the bush hat has increased demand for rabbit skins. One large manufacturer is buying 4.5 million wild rabbit skins per year and making 8500 hats per week. Wild rabbit fur is far superior for hat manufacture than that obtained from farmed rabbits. If city people bought hats the way they did until the early 1960s, the demand for skins would increase even further. Many of the skins come from the rabbit carcass trade. About 2.5 million wild rabbits are taken for human consumption within Australia each year and a small export industry in meat is also developing (5). Commercial harvesting occurs mainly in dry semi-arid regions. There are currently ten factories processing wild rabbits for human consumption and one has an export licence, primarily to the USA. The white flesh which comes from central Australian rabbits is preferred.

The demand for game products in Europe is strong. As the people become more affluent they want, and are prepared to pay for, exotic and unusual foods. Rabbits in particular are in demand, especially as a new viral haemorrhagic disease (VHD) has spread and killed many rabbits in rabbit farms in Europe and has had some impact on wild populations.

Although there is scope for further development of the meat export industry, investment must be weighed against the fact that governments have eradication of the rabbit as a long term goal. From the point of view of the rabbit harvester, the effect of myxomatosis on local rabbit populations can be disastrous. Governments are also considering releasing VHD. There are substantial scientific issues to be addressed and policy problems to be solved, but it is possible that VHD could become established either after intentional or illegal release in Australia.

#### Feral pigs

Pigs are more numerous in the wild than they are in captivity, maybe by a factor of 5. Their numbers appear to be increasing particularly in northern Australia and they represent a vast and relatively untapped resource. In 1988/89, 150,000 carcasses were processed for export and brought in about \$12 million in export earnings. Problems with product description in Europe and competition from wild boar from Eastern Europe have created an erratic demand, but if these issues could be solved and a good product developed, the market is large.

#### Camels

In 1988/89, 101 live camels were exported. Entrepreneurs are reported to be selling these camels to the United Arab Emirates where there is a lucrative camel racing industry. Ironically there are no wild camels in Arabia and the Australian wild population is the only one in the world. It is variously estimated at 30,000 - 60,000 animals and the recent good seasons should increase their numbers. Virtually all of them are on Aboriginal land and these communities have significant opportunities to develop a camel industry.

Camels are now on the menu at the Alice Springs Sheraton Hotel and the meat can be bought from specialty butchers for up to \$38 per kilo. The Australian muslim community is a ready market for the milk. A camel farm is being established at Mingola near Townsville, stocked by a herd of forty driven from the Simpson Desert, and there are proposals to further expand the venture with more wild stock.

### Llamas and alpacas

These species do not run wild in Australia and being highly priced are confined to farms. The industry is still in the expansion phase and not producing saleable product. In South America today llamas (*Llama lama*) and alpacas (*Lama pacos*) are also only known as domestic animals. Llamas are the most important all-purpose animal in the mountains of Peru, whereas alpacas, which are smaller and shaggier, are chiefly wool providers. They are shorn standing with slow speed machines, a mohair comb and down tube. In Australia shearing is in spring to prepare them for the summer. They live most successfully above 3,000 metres in South America (3) and in Australia need shade to protect them from summer sun. Of less relevance to Australia is the vicuna (*Vicuna vicugna*) which is a wild species that lives close to the snow line at 4,000-5,000 metres, and although it has wool and is shorn, has never been domesticated. Guanaco (*Lama guanicoe*) is also a wild species, the most successful and the largest. It lives in semi-desert and high altitude plains of the Andes.

### Buffalo

In the top end of the Northern Territory, the major livestock industry is based on water buffalo (*Bubalus bubalis*). The industry is predominantly a harvesting operation with buffalo either being shot in the field for hides and pet meat or captured for domestication or for slaughter at abattoirs. It is currently in a phase of dramatic change due to the impact of the Brucellosis and TB Eradication Campaign (BTEC) under which virtually all uncontrolled buffalo are to be shot. In 1989 the industry was valued at \$8.1 million coming from 31,000 animals of which 1,700 were exported live. During the same period, nearly 17,000 wild buffalo were shot as part of the TB eradication campaign.

Future development will be through domestication and more rigorous control.

### Goats

Cashmere, mohair, milk, meat and skins are harvested from goats. In 1986/87 the industry was worth \$27 million to the Australian economy and goat numbers on farms had expanded to some 700,000 (8).

Feral goats have been the foundation of the cashmere and mohair industries and have been introduced on to properties for these reasons and also to control weeds. They are spread throughout much of the mountain country of eastern Australia and scrubby pastoral areas in New South Wales, South Australia and Western Australia. Their numbers in the wild, of course, are unknown but estimates have been made of, roughly, 5 million.

Cashmere can be produced from feral goats, particularly those from New South Wales. It is a very fine fibre which is combed or shorn. It is produced on a seasonal basis and is not present on the animal at all times. Premium cashmere, without any guard hairs, can be worth more than \$150 per kilogram.

Mohair production from angora goats has been increasing in Australia in the last few years. The fibre is similar to wool but smoother with a lustrous appearance. It has several advantages over wool, such as the ability to accept deep shades of dye and resistance to felting. It is often used mixed with other fibres in high quality fabrics.

Unfortunately in the last few years, there have been dramatic fluctuations in the returns from goats, mainly due to a sharp fall in mohair prices in 1987 and 1988. This has reduced the demand for feral goats. In 1986/87 feral goats could be mustered and sold at market to the growing angora industry for in excess of \$15 a head. Early in 1990 they were worth less than \$5 and the wild population is expanding rapidly, although recently values have begun to climb again.

More goat meat is consumed in the world than sheep meat, so the potential export market is large, particularly for smaller goats to Mediterranean and Middle Eastern communities. Nevertheless Australian goat meat exports have inexplicably fallen in the last few years. The industry which is substantially based upon feral goats exported 6,000 tonnes of goat meat and 77,000 live animals in 1987/88, falling to under 70,000 goats in 1988/89. Total slaughterings in 1988/89 were 103,000 for the domestic market and 470,000 for export.

#### Deer

The Australian deer industry has expanded substantially in the last few years and there are now approximately 100,000 deer on about 1000 farms producing both venison and velvet. In 1986 only 2,500 animals were slaughtered (9). Most deer farmers have been concentrating on increasing their herds. The shortage of breeding stock is an obstacle to meeting the expanding export trade and this in turn affects the promotion of venison in the home market. To help alleviate the problem, deer embryos and semen are being imported, particularly from New Zealand. In the meantime a lucrative by-product is velvet antler. Deer cast their antlers annually and the new growing antler is called velvet. It has been used for centuries in traditional Asian medicines and tonics and there is a demand for it in Taiwan and the Republic of China in particular.

Deer are not native to Australia. They have established wild populations, although not as successfully as in New Zealand. There are an estimated 15,000 sambah deer in Victoria together with a small number of red deer and hog deer. In New South Wales, fallow, rusa and perhaps some sambah are established in the wild, while in Queensland red, fallow, chital and rusa have been caught and domesticated. Red and fallow deer are also found in South Australia. Tasmania has about 15,000 fallow deer, most of which are on farms, representing 70% of the farmed stock.

#### Other mammals

There are a number of other wild species that are subject to minor commercial exploitation and could be regarded as fledgling livestock industries. Many thousands more are taken for pest control. In 1988/89, 41,000 wild horses, 170,000 foxes, 93,000 possums and 310,000 mutton birds were exported (7). In addition an unknown number of hares and donkeys were taken.

#### Emus

Emus are one of the few native species to be currently farmed in a traditional sense. The Aboriginal community at Wiluna in Western Australia pioneered the industry and in 1987 commercial expansion was approved by the Western Australian government. Since then 19 licenced commercial emu farms have been established and other states are following. The farms have to be licensed by state conservation authorities and there are regulations controlling stocking densities and fencing requirements. Most farms are based on birds derived from captive bred birds so that they will be able to export their products in the future without the complications which arise from the Commonwealth Wildlife Protection Act 1982. That legislation requires the development of a state management plan for species where the farmed animals are directly linked to the status of the populations in the wild. Some of the farms also have ostriches which, although they are much more expensive to obtain, are not the subject of complex administrative regulations and procedures.

The emu industry now has an established breeding stock and it is anticipated that it will expand rapidly in the next ten years. Technical and production problems relating to nutritional requirements, incubation rearing, breeding and slaughtering methods are being addressed. The enterprises appear to be economic especially during these growth phases and due to the interest which



the farms create for tourists. In the longer term their economic success will be dependent on actual sales of meat, skin and feathers.

#### Crocodiles

Crocodiles are also being farmed. They are not dealt with in detail here as they are hardly a rangelands animal.

#### OPTIONS FOR ALTERNATIVE ANIMALS MANAGEMENT SYSTEMS

In most discussions on alternative livestock enterprises, the usual premise is that the animals under consideration should be semi-domesticated and incorporated into traditional farming procedures. This involves placing them behind wire and husbanding them in a similar manner. Examples are the goat, deer and emu industries. The alternative option of free-range harvesting does not get the analysis or credibility which it deserves.

Species such as kangaroos, or the semi-domesticated deer or emus, are not as amenable to intensive manipulation as domesticated livestock. They can be tamed, but they cannot be bunched up together with dogs, nor will they travel with drovers over hundreds of kilometres. The crucial difference with sheep, goats, and cattle is that they will move in the direction that the drover wishes to go, whereas wild animals have to be followed. Semi-domesticated animals and some wild animals can be driven into corrals but their dispersion or movement along migration routes can not be altered.

In the existing kangaroo industry, shooters are opportunistic and "follow" the kangaroos. Hunters are thus adapting their behaviour to that of prey rather than forcing their quarry to conform. The process of attempting to domesticate them for commercial production has not been undertaken although kangaroos in zoos, and elsewhere as pets have been tamed. They are not regarded as livestock species.

#### MARKETING AND RESEARCH FOR NEW LIVESTOCK INDUSTRIES

The success of a livestock industry depends on people wanting to buy the products, albeit with peaks and troughs as seen recently with wool. Meeting the demand is a big enterprise and Australia's present livestock industries are based on large populations of animals. There are more than 170 million sheep, 24 million cattle, 66 million poultry and 2.6 million pigs. Their gross value to farmers in 1988/89 was wool \$5.7 billion, lambs and mutton \$700 million, cattle \$3 billion, milk \$1.8 billion, poultry \$715 million, pigs \$560 million. The total value of livestock products in 1988/89 was \$23 billion.

The infrastructure supporting these industries is also large. They are backed by Statutory Marketing Authorities (SMA) which are set up under Commonwealth laws but operate with a high degree of autonomy allowing them to concentrate on marketing rural products. The Australian Meat and Livestock Corporation and the Australian Wool Corporation are two examples. If an industry isn't sufficiently large to have these supporting facilities competition will be difficult. A comparable umbrella marketing organisation does not exist to handle the marketing needs of products from new enterprises although support is provided by AUSTRADE and the Export Markets Development Scheme. The opportunities for marketing uniquely Australian products are substantial.

Of particular relevance to the research needs of emerging livestock industries, is the new Rural Industries Research and Development Corporation (RIRDC) which aims to meet the needs of small rural industries. It funds support for multi-industry and national interest rural research. It is the successor to the old Australian Special Rural Research Fund.

Another problem at present for these emerging industries is that there are no accurate figures available on their scope, size and importance so that their success or failure can be monitored. For example the census form used to collect information on farm productivity does not encompass the necessary information. Doing so could be a research responsibility of an industry corporation or the DPIE bureaux.

There is also a need for research to ensure that new livestock industries are based on species that are suitable for the environment in addition to the market value of its product. This approach should consider both species already within Australia as well as some of the most promising from overseas, particularly from South America. An open approach to options and a fresh assessment of potential will enable us to develop management strategies for the multiple use of our animal resources and to reduce wastage and ensure sustainable utilisation in the future.

## CONCLUSION

One advantage of new livestock enterprises is the security obtained by producers through diversification and less dependence on single markets. When several species are involved in a livestock enterprise, there are also added environmental benefits. Diversity leads to greater utilisation of pastures and in many cases a less damaging effect. Where the enterprise is based on native animals, it encourages landholders to maintain populations at higher levels than they would do otherwise. Thus commercial utilisation and development of alternative enterprises can have significant conservation benefits.

Similarly, utilisation of pest species can be a cost effective method of reducing the damage caused by unwanted animals such as rabbits and pigs. A dilemma however could arise if this commercial dependence led to calls for protection of pests if the option of entirely getting rid of them became available.

Livestock industries based on other species have substantial potential in Australia but they should complement established industries and build on the existing small industries. The market for game meat and unusual products, particularly overseas, is very strong. The industries should develop both the free-range harvesting component and the more intensive farming activities, as appropriate. They should assess the merits of managing the environment to increase numbers of free-ranging animals without necessarily seeking to confine them behind expensive fences. Proponents need advice on the best sort of fencing and cost, the selection of species and their compatibility with other more traditional grazing activities, harvesting methods, means of containing operating costs, marketing and the value of anticipated sales.

The task is for researchers to contribute to this process. The idea of making greater use of wild animal resources has been around for a long time and it has taken a while to achieve progress and changes in public attitudes. I believe however that it is an idea whose time has come.

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