

Sustainable Deer Farming

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1. Introduction

Sustainable deer *production* is not a new concept; sustainable deer *farming* is. Exploitation of deer by mankind as a source of meat and hides has occurred throughout the ages and is well recorded in history. In European and many other countries, feral deer were and still are managed in their feral environment. Hunting seasons are strictly enforced, game parks and hunting estates rigorously define hunting limits and culling policies. This type of exploitation has become an entrenched way of life for the aristocracy and wealthy in many countries. A balance has been struck and in one sense, sustainable exploitation achieved. However, with reduced available land resources, increased population and increasing pressure for recreational hunting, both hunting itself, and the product venison, become more exclusive. In North America for example, legislation and policing has become necessary to prevent over-exploitation.

Conversely, farming allows a different type of exploitation; one in which the supply of product can be sustained and even increased as demand increases. Thus, farming allows for production on a scale that "traditional" exploitation could not sustain. Worldwide there has been a range of reasons for implementation of deer farming. In some countries e.g. Germany, farming is regarded as being in conflict with tradition and demeaning to the animal. In that country only fallow deer may be farmed because the red deer is regarded as a regal beast of the forest and tradition dictates that it stays that way.

In most countries farming of deer simply supplements the availability of feral venison. However, legislative changes e.g. the 1992 European community requirement for post-mortem inspection of all game carcasses for sale, may give added emphasis to farming rather than feral deer exploitation. Thus, for legal reasons, exploitation of feral deer for commercial purposes may not be sustainable.

The New Zealand experience with deer farming presents the other extreme. Farming commenced because deer production from the feral environment could not be sustained at a level which could satisfy the market. There was unrestricted access to the raw material (deer) and feral reserves were rapidly depleted to a point where it was becoming uneconomic to continue to exploit the resource. The law mitigated against management in the feral environment - deer were defined as pests, earmarked for extinction. Farming provided the solution to an unsustainable exploitation. The magnitude of this situation is highlighted by the fact that in 1972, 4,400 tonnes of venison was exported from New Zealand. Deer farming was legalised in 1969, but it was not until 1990 that the 1972 export figure for venison was exceeded.

The question of sustainable deer farming has many facets including

- biology of the animal
- economic determinants
- ecological considerations
- health
- product quality

- market development
- welfare
- technology.

This paper discusses some aspects of sustainable deer production, based on the Oxford dictionary definition of sustainable as "to keep going continuously", focusing primarily on intensive deer farming practices.

2. Biology of the Deer

Of the 42 deer species globally, only the red deer (*Cervus elaphus*), its close relative, the Wapiti (*Cervus elaphus canadensis*), and fallow deer (*Dama dama*), are farmed in significant numbers. Sika (*Cervus nippon*), Rusa (*Cervus timorensis*), Sambar (*Cervus unicolor*) and Pere david (*Elaphurus davidinus*) are also farmed, but to a much lesser extent.

Why the small list of deer species farmed?

Firstly, intensive deer farming is a new concept worldwide. Indeed, it has been stated that deer farming is the first example of domestication of a wild species for more than 4,000 years. Intensive deer farming really is only 20 years old. The majority of the world is barely aware that deer farming is possible. While most countries have some indigenous species of deer, farm-based exploitation of that resource is a very new concept. Mankind is now only beginning to realise the advantages of utilisation of indigenous animal species which are already adapted to the climatic and vegetative environment. It is likely that in the forthcoming decades, a wide range of indigenous wildlife species, not only deer, will be farmed or exploited in some manner. It is likely that deer farming will be heralded as the forerunner of a new direction in animal exploitation.

Each deer species is unique in its biology, having evolved in distinct environments. Some are adapted to tropical environment, some to temperate or even arctic environments, some are adaptable to domestication, some are not. Some have dietary and social requirements that can be met in a farmed environment, some do not. The major features of a deer species which determines its suitability for farming are as follows:

2.1 Behaviour

It may have been fortuitous that the red deer was present at the right time and at the right place for the establishment of deer farming both in New Zealand and the United Kingdom. Of all the deer species currently farmed, red deer appear to be the most amenable in the behavioural sense. They are gregarious and adapt well to the presence of and handling by humans. Apart from handling systems, existing farming methods were adopted.

Conversely, other species such as the white tailed deer (*Odocoileus virginianus*), despite being held in captivity in many parts of the United States, have shown themselves unadaptable to yarding and handling, procedures which are required for intensive farming, without tranquillizer drugs. They panic, attempt to jump and are very prone to self inflicted injury.

However, fallow deer which were initially thought unhandleable, are now farmed widespread and handling facilities have been devised to cater for their individual behavioural characteristics. Until recently Chittal deer (*Axis axis*) were considered

unfarmable, but research is showing that they too are able to be handled given the appropriate facilities. The same is true for Sambar deer.

Roe deer (Capreolus capreolus) are solitary animals found in most parts of Europe and because of that behavioural characteristic have been considered inappropriate for farming. However, this has simply not been proven because it has not been tried.

2.2 Diet - Habitat

Some species of deer e.g. Moose (Alces alces) and Reindeer (Rangifera species) live in a habitat which is not amenable to intensive deer farming. They require a diet which is high in lignin and tend to be more a browsing species. Experience with feeding these types of animals in zoos around the world suggest that they would be very difficult to manage in intensive farming situations given their specific dietary and habitat requirements.

Research is now focusing on dietary and habitat requirements of farmed deer. Recent experiments in New Zealand have shown that red deer have distinct grazing preferences, and that growth and productivity can be enhanced by providing for these preferences.

2.3 Health

While health is largely linked to diet, some species have shown specific susceptibilities to disease. For example the Pere david deer are particularly susceptible to malignant catarrhal fever (MCF) and Wapiti deer appear to be prone to ryegrass staggers and copper deficiency. Rusa and sika deer, which are not normally exposed to the NCF virus in their natural habitat, are also prone to MCF under intensive farming systems. By comparison, fallow deer appear resistant to MCF and yersiniosis but are highly susceptible to facial eczema. No doubt our knowledge of relative susceptibility to disease will increase with more experimentation with different species in a farmed environment.

Thus, sustainable farming of deer will occur in different forms in different countries of the world depending on the native or indigenous deer species. In many situations "farming" may involve the planned exploitation of deer herds in an extensive feral environment more suited to the biology of the animal available in that area rather than in the pastoral environment which is used for farming in New Zealand and Australia.

3. Economic Determinants

Clearly, to be sustainable, the producer along with all other sectors within the industry, must be economically viable. Whether this continues to be the case will depend on a number of factors

3.1 On-Farm

Costs of establishment of deer farms is high but experience has shown that cheaper fencing alternatives are effective and that modest deer handling facilities suffice. Many early deer farms over capitalised because of inflated prices for livestock, as a result of a shortage of supply, and taxation incentives

Currently, deer values in New Zealand have fallen to productive values or possibly even lower. This has been a result of the removal of all forms of subsidy and incentive, supply and demand patterns for livestock and overall

national economic factors. Thus, presently from an on-farm point of view, deer farming has possibly never been more sustainable. In the early stages of establishment of an industry, when prices are high, the risk of being financially unsustainable is considerably higher.

3.2 Off-Farm

3.2.1 Transport, Processing, Storage, Shipping etc

In relative terms, costs beyond the farm gate are becoming increasingly important in determining the sustainability of deer farming. However, no one component of the industry can survive without the others. It is likely the symbiotic relationship between the producer and the processor and exporter will mitigate toward sustainability.

3.2.2 Markets

Possibly the most common question asked of the deer industry is "Are the markets sustainable - when will supply exceed demand?" Worldwide consumption of venison currently is tiny compared with consumption of other red meats. Venison is consumed by only a very small percentage of the population and in only a small number of countries throughout the world. Indeed one marketing feature which venison has is that it is a novel product on most markets. In today's fat conscious affluent societies, venison has a number of desirable features in competition with other red meats.

The New Zealand deer industry has a Game Industry Board which has responsibility for the co-ordinated development of new markets wherever appropriate in order to sustain a good return to the producer. Clearly market development is in the early stages of growth. A prime responsibility of the Game Industry Board will be to ensure that the appropriate market signals are placed before the producer to prevent over-supply of product in relation to market size development. Thus, the objective is to develop markets as supply increases and not to let one outstrip the other. How long this can be sustained is unknown, but the signs are that there is enormous potential for venison consumption in affluent countries.

In the long-term, sustainability of deer farming will depend on establishment of stable markets at a return which will sustain all components of the deer industry from the consumer to the producer.

4. Ecological Farming

Intensive mono-cultural agricultural systems are usually ecologically unstable. They require high inputs of chemicals for maintenance of pastures, weed control, fertilizer, and for animal health e.g. anthelmintics, trace elements, vaccines. Consumer resistance to chemically manipulated farmed produce is increasing. In livestock production the need to maintain a clean green image is nowhere more evident than in the deer industry. Traditional consumption is of venison which has come from a feral environment, which in relative terms would be substantially more chemical free than the farmed environment.

The tendency will therefore be for agriculture in future to be environmentally low impact. This has a huge range of implications and is beyond the scope of this paper. However, many factors may alter the nature of our current deer

farming methodology.

Ecological agriculture may require a move away from mono-cultural farming systems. This may be in order to better utilise natural vegetation e.g. using grazing and browsing species in association with one another. It may require plant species of both a grazing and browsing nature which are compatible with one another i.e. establishment of forage sources which are sustainable. It may involve the integration of a number of different grazing/browsing livestock species in order to sustain those pastures. Integrated management systems using a range of different animal and pasture species may require a lower chemical input for parasite control.

In this sense, in many countries where intensive agriculture is currently practised, the availability of deer to integrate with other species may be particularly advantageous. It may be more ecologically sound, for example, to manage a blend of sheep/cattle/goats and deer, than to manage any one species alone. Implicit with this of course, is a requirement that both from a foraging and animal health point of view, the species integrated are compatible. For example because of the association of MCF in deer with sheep it may be more appropriate to choose fallow deer where sheep are to be managed rather than red or Pere david deer. Conversely, red deer and goats may be a better combination than red deer and cattle because of nutritional requirements and parasites. Care will need to be exercised in determining which species to choose and it will therefore be most important when further wildlife species are to be considered for integration with farming, that their requirements and behaviour in the natural environment are well known before they are made to transfer them to a farming environment. It may well be a serious mistake to shift deer too far from their natural habitat e.g. attempting to adapt tropical species to a temperate environment, or to expose them to pathogens not experienced in their natural habitat.

In consideration of ecological aspects of deer farming, it becomes patently clear that the biggest problem is lack of knowledge about the biology of the species to be involved. For example just what are the nutritional requirements of a range of deer species and what are their relative susceptibilities to diseases which may be cross-infected from other grazing species. There is little doubt that these questions will be the focus of considerable research attention during the next decade or more.

5. Health

Sustainable deer production is not possible if animals cannot be kept healthy. There have been chilling experiences with farming of Seka, Pere david and Rusa deer in New Zealand where over 50% mortality rates have been caused by MCF. These experiences highlighted the relationship between the presence of the disease causing organism in combination with a range of stress factors which resulted in the precipitation of disease outbreaks of a magnitude rarely seen previously. Only recently has it been shown that sheep appear to be the carrier of the MCF virus giving a lead to a means of prevention. These experiences did, however, highlight the influence of a range of stress factors and their importance in precipitation of disease outbreaks. It also highlighted questions about the sustainability of the farming of certain species of deer in the New Zealand farming environment.

For red fallow and Wapiti type deer, experience has proven that deer farming

using current methodology, is sustainable i.e. with the assistance of anthelmintics, vaccines, trace elements and insecticides. A major question is whether deer health can be sustained without the use of chemicals. Indeed, it is ironic that the veterinary profession currently advocates and supports the use of a range of chemicals, which may alternately the sustainability of deer farming in view of a possible market backlash against such farming practices and a tendency toward a clean green product. Veterinarians must not be complacent that existing data suggests that chemical residues in farmed venison leaving New Zealand are very uncommon. This may be more by good luck than good management. Veterinarians have a considerable responsibility to advise clients on the proper use of therapeutic and preventive agents, to guarantee that there are no residues found in the products. Possibly never before has it been so important for veterinarians to understand the vagaries of the market place and the consumer in determining what farming practices should be applied and what drug and chemical usage is permissible.

6. Veterinary Service

Is the current service provided by the veterinary profession to the deer industry sustainable? The bulk of work undertaken by veterinarians on deer farms is routine in nature, velvet harvesting, tuberculosis testing, pregnancy testing, artificial insemination and embryo transfer. The relative importance of emergency veterinary work on deer farms has diminished significantly since early days of deer farming. Management has improved, there are fewer newly captured deer, and individual deer values have decreased. A small number of veterinarians offer an advisory or consulting service. The financial returns to a deer farmer obviously will influence usage of the service veterinarians offer.

Cost is becoming an increasingly important factor to farmers and the current veterinary service provided is generally regarded as a cost. It could be argued that a number of procedures that veterinarians perform e.g. velvet harvesting, pregnancy testing, tuberculosis testing, are technical in nature and could be done by appropriately trained and competent laypeople. Already tuberculosis testing is contestable with MAF laypeople and the trend may progress to a point where practices employ trained people for this purpose. The recent code of conduct for velvet harvesting accepts that laypeople be permitted to perform velvet harvesting but under veterinary supervision. Pregnancy diagnosis using ultrasonography could be conducted by laypeople, but should be under veterinary supervision. Thus, the sustainability of the current veterinary service to the deer industry may be limited in the face of the current market forces philosophy and driven by the need, or desire, to economise. Indeed, it could be suggested that in its present form veterinary service to the deer industry may not be sustainable. My belief is that there is a clear message to the profession to become involved with herd health and productivity advice and in a supervisory capacity for technical and animal welfare areas. If the profession fails to change in this manner but is forced to relinquish some of the technical routine work, there may not be sufficient financial incentive for veterinarians to provide an emergency service for deer farmers at all.

Implementation of these suggestions could require a substantial change in attitude and activity within the profession at the practice level. At the undergraduate veterinary teaching level the course is being structured at Massey University to better equip our new graduates for an advisory and professional supervisory role than has been undertaken in the past. There will need to be substantial postgraduate training opportunities for veterinarians to

improve their knowledge and skills of farm management and animal productivity.

With MAF Agricultural Advisory Service reduction in New Zealand and with the increased emphasis by research funding bodies toward researchers ensuring that research findings reach their target group effectively, the veterinary profession may be offered a golden opportunity to become more involved with extension activity and individual on-farm consulting as the go-between between research and the farmer.

7. Welfare

Many farming practices are coming under the scrutiny of animal welfare and animal rights groups. Deer farming is no exception. In Britain and some other countries it is illegal to harvest velvet from deer and there has been considerable debate about whether it is appropriate to transport deer to slaughter houses. In New Zealand and Australia these practices are common and apparently acceptable. In New Zealand the recent draft of a code of conduct for the harvesting of velvet from stags, provides an indication of things to come in terms of guaranteeing the welfare of farmed deer. From a welfare point of view there is an acceptance that ultimately some markets for our product may be terminated if animal welfare concerns are not addressed by those involved.

Therefore sustainable deer farming requires an acceptance of animal welfare concerns and an establishment of practices which comply with all the requirements for a state of wellbeing by the animal.

A measure of the producer's concern about market impressions of deer farming could be seen by the preference of many marketers to refer to farm venison as "ranchered venison", thus giving the impression of production in a more natural environment than the intensive farmed environment.

Animal welfare concerns may ultimately determine which species of deer may or may not be farmed. Some species which clearly undergo more stress during yarding and handling may not be permitted to be farmed in future. There is a great challenge to researchers and the veterinary profession to quantify the influence of various management processes on the wellbeing of the animal.

8. Conclusion

Sustainable deer farming, that is deer farming that can be continued into the future, relies on a multitude of factors. All of these factors have a direct or indirect concern to the veterinary profession. No one factor can stand in isolation. The veterinarian servicing the deer industry must be well aware of both the current requirements for sustainability and to be looking at trends which may indicate the course for sustainable farmed deer production in the future. Of particular concern to the profession will be low cost farm input, appropriate application of technology, reduction in the use of chemicals, maintenance of a high standard of health of the national deer herd and to ensure that the state of wellbeing of the animal is not negatively influenced by the farming practice.

The veterinary profession of the future needs to look closely at the prospect for provision of a veterinary service in the future and should begin to modify its

course to ensure that not only deer farming is sustainable, but also that veterinary services to that industry are sustainable