

Global Deer Farming: Past performance and Future Promise

140

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In addition to his job as programme leader for deer production and health at Invermay, Ken is active in the New Zealand deer industry being the current chairman of the Otago Branch of the NZ Deer Farmers Association and he was recognised through the NZ Deer Industry Award in 1995.

INTRODUCTION

The animal called a "global farmed deer" is a mysterious mammal which can vary greatly in size, geographical distribution and way of life. If it is domesticated then as Hudson (1989) puts it "---- it is husbanded rather than hunted; produced rather than procured". This congress has largely dealt with deer which are managed in the nature of traditional livestock. There are, nevertheless, grey areas where physical control of the deer is limited yet deer products for consumption and trade are highly organised and of high quality.

PAST PERFORMANCE

The number of extensively farmed or range reared deer greatly exceeds the number of fully domesticated farmed deer. Reindeer alone in Russia, Scandinavia and North America account for about 63% if the total farmed deer numbers (Pearse *et al.*, 1994). These animals are managed over huge areas, are penned and only handled at weaning, velvet removal or culling. Products of meat, velvet antler and skins are mainly used by the producers and will not be further considered in the context of this paper which will focus on deer which are farmed "in the nature of livestock".

Past performance by region

1) Asia : The area is dominated by China which now has a farmed deer population estimated to be in excess of 500,000 animals. About 70 % of the animals are Sika deer and most of the rest are red deer and wapiti (Sheng and Ohitaishi, 1992). After the establishment of new China in 1950 the industry grew from as few as 600 deer to the present day population (Li Chunyi, 1993). Deer production is focused on velvet antler and co-products mainly for the home medicinals market. The system of farming is through intensive husbandry procedures where deer are often kept in walled enclosures and fed prepared foods such as corn silage, wheat residues, hay and soya beans with limited controlled grazing of pastures. Velvet antler productivity is high through both genetic selection and supplementary feeding. Yield of 3 tine velvet antler from Sika deer is over 2.5 kg per animal and over 7.0 kg in the 4 tine product from wapiti-type animals. Research with red deer in one experiment documented reproductive rates in control hinds, where stag:hind ratios were low and stags were

interchanged between groups, as 69%. Those that received PMSG at the rate of 2-3 i.u./kg had a calving rate of 89% (Chen Xuejin *et al.*, 1996). Very modern technologies are now being used in parts of the Chinese farmed deer industry. Reproductive rate has increased from 25-30% prior to 1950 to over 90% in Sika deer in modern times (Li Chunyi, 1993).

Korea is a significant country for farming deer and is the major international market for velvet antler. Estimates of the industry's growth suggest that from a very low base in the 1970's there are now between 100,000 and 200,000 farmed deer most of which are Sika and Elk. Production is mainly aimed at the velvet antler market with the sale of surplus calves in the expanding industry providing extra income. The Korean Deer Farmers Association believes that the farmed deer population will reach a million animals by 2001 without accounting for possible increase by imports from outside Korea with the liberation of regulations in 1992 (Kwon, 1993). That target seems optimistic from a relatively small base herd. Korean production systems are based on small holdings in feedlot situations. Few deer are killed for venison, and with high feed costs the profitability of the operation seems to be largely dependant on velvet antler prices.

Many other countries within Asia such as Malaysia, Thailand, Vietnam and Indonesia do farm deer but the operations are on a very small scale.

2) North America : It comes as a surprise to many people that the first country this century to examine the possibility of deer domestication for farming purposes was USA. In 1908 the U.S. Dept Agriculture published a number of bulletins suggesting that deer could be profitably farmed for venison and urging the State to support a change of legislation which would allow deer farming to become established (Lantz, 1908). Nothing seems to have developed until the 1980's when a number of groups formed the nucleus of deer farming systems in both USA and Canada. The North American Deer Farmers Association is now well established and deals primarily with fallow and red deer. The North American Elk Breeders Association (NAEBA) has had a very rapid rise and over the last 2 years has had more than 1,000 delegates at the annual conference. There are population estimates of farmed Elk in North America as 120,000 - 180,000. The management of these animals is almost entirely for velvet antler production and the sale of live animals on an extremely buoyant market. NAEBA currently has a membership of over 1,600, seven full time staff and 20,000 animals on the society register. Plans are well advanced to use DNA testing in establishing the parentage of the progeny for registration purposes. The organisation has been able to raise over \$320,000 by an auction for research and development at its annual conference.

3) Europe : Europe is a complicated patchwork of countries farming different deer groups in different ways. The industry has arisen from demand for venison, particularly in Germany which goes back many centuries and continues through deer hunting. In Germany and Scandinavia red deer are considered almost sacred and farming operations are largely confined to fallow deer. In U.K. red deer is the main farmed animal although fallow are important in some areas. The Italians farm both red and fallow deer for venison and in Spain breeding for trophies is the main objective. In France there are red deer farmers who are mostly selling directly to restaurants or consumers.

High prices for venison offered in the German market in the 1970's were instrumental in developing the world trade. Delegates to the First World Deer Farming Congress in New Zealand in 1993 heard that most European countries believed that their own deer farming industries were profitable, were largely unsubsidised and would become increasingly profitable as international pressures reduced subsidisation on traditional livestock production. Increased profitability in the last 5 years has probably not been a feature of the European deer farm due to factors such as red meat prices in Europe, competition from non-European

suppliers and heavy metal pollution concentration in the forest floor moving into game offals and giving some negative perception of game meats. There is a current climate of change in the European common agricultural policy which will underline the view that consumers are becoming increasingly concerned with animal welfare and farming methods. These views are well recognised in the U.K. and have led to the present emphasis on product quality and food safety in the farmed venison sector.

For much of the year European deer farmers cannot rely on sufficient pasture and most hand-feed their animals (Fletcher, 1989). After calving in mid-summer, feed quality and especially protein levels fall and hinds benefit from a concentrate supplement. The Rowett Research Institute has shown that weaned calves in the autumn may increase their rate of growth at pasture by 40% as a result of increasing concentrate supplement, to which they became accustomed pre-weaning, from 0.25 kg/head/day to 0.5 kg/head/day. Later in the year increased feeding of concentrates to deer resulted in some decrease in pasture intake - a costly substitution.

Both breeding and environment are extremely important and variable in Europe. The highland deer of Scotland are both genetically small and live in conditions of difficult feed supply. The impact of environment was graphically demonstrated by the rearing of a few of the Glensaugh stags at the Rowett and showing almost double the weight at 2 years of age to the ad libitum feeding of high quality rations the year round. (Blaxter *et al.*, 1974). On the other hand genetics is certainly important and there are big strain differences in red deer from Scotland, England, Hungary, Germany, Denmark, Yugoslavia and Romania. Size difference gets even greater when including the maral deer of Eastern Europe. "Weight-for-age" comparisons in Europe, supposedly a function of quality management, are often confused and invalid because of differences in genetics. The British Deer Farmers Association has recently established a sire reference scheme which, through the use of AI and performance recording, aims to establish superior sires from performance base and use these selectively in improving herd genetics. The scheme leads the world in the scientific improvement of deer herd quality through genetics.

Probably the single most important production trait for farm profitability is reproductive rate. Non-farmed deer in Scotland have a reproductive rate of 40-45% of which about 30% survive to the yearling stage (Mitchell *et al.*, 1977). In contrast, good animal husbandry of farmed deer in U.K. has shown that a 85-90% reproductive rate can be achieved.

4) Australasia : The development of a major deer farming industry from inception to greater than 1.5 million animals in 25 years is truly astonishing and the New Zealand story was the subject matter of part of the First World Deer Farming Congress. The underlying reasons for this success story were very low traditional meat prices in the early seventies, the readily available feral deer herd where numbers were out of control and government policy was extermination, the country's pastoral farming system of natural grazing year round and the presence of a truly remarkable man in Sir Tim Wallis who had the vision and skill to enable wild deer to be captured from helicopters and placed on farms.

The early objective of New Zealand deer farming was to provide venison to the German market but as information became known about velvet antler as a commercial product some of the focus in the late 1970's shifted to velvet antler production and live sales on a very buoyant market. From the mid 1980's onward the industry has developed in a more even handed way with venison velvet and antler. In very recent times and associated with the Asian business crash the market for velvet antler which is mainly in Korea has tumbled with very low product prices to the farmer. Quite unlike the European scene, New Zealand's traditional agricultural

industry is unsubsidised and in this environment deer farming is highly competitive with traditional farming.

Fundamental to any livestock system is feeding and breeding. Both these topics have been covered by speakers from New Zealand at this Congress. While a great deal is now known about growing suitable pastures and how to manage them with deer there is much more work needed to find highly nutritious plants for summer dry conditions when hinds are lactating and in managing pasture in the autumn to take full advantage of the potential for a weaned calf to grow.

Breeding technologies such as artificial insemination and embryo transfer are now common practice in New Zealand's deer industry, and indeed around the world. In vitro production of embryos which are transplanted into recipient hinds is being done commercially. Organised genetic progress of the national herd through performance recording and the use of proven superior sires has not yet happened on any significant scale. A major reason for this is the importation of a range of different European red deer strains and the natural commercial protectionism that has followed. There is now so much of a mixed genetic pool in the red deer breeding hind herd that the time is ripe for developing group breeding schemes to estimate breeding values on an objective basis and lead eventually into a national sire reference scheme. It is interesting to see that the British Deer Farmers Association already has a sire referencing scheme in a developing stage through the use of some common sires on a range of properties via artificial insemination.

After spectacular growth in export venison up to 1993 production has largely levelled off to the current date. Some of the reason for high kill rate in 1993 was the slaughter of many breeding hinds. In more recent times confidence in deer farming, especially in relation to the traditional livestock products, has returned. This situation has been translated to decreased hind kill and a much reduced export venison output.

The Australian deer industry is based on about 250,000 red, fallow and rusa deer for antler velvet, venison and live sales run on a wide range of environments. Like New Zealand the industry is based almost entirely on naturally grazed pasture. Large distances in that country pose major problems in providing quality slaughter systems for venison production and the deer industry needs to solve this difficulty if it is to develop its potential to increase its production base. A major current high priority goal in the industry is to greatly increase the number of deer farmers and the herd size of existing farmers. Much of the farming field technology is similar in Australia to New Zealand although it must be applied to a wide range of environments, especially hot, dry summers. The velvet antler crop is marketed into Asia but venison production is mainly taken up by the local market.

FUTURE PROMISE

The global future for all deer farming countries will largely depend on how well they meet the venison customers' challenge for food safety, high quality, convenience, differentiation of farmed product from feral, while promoting deer farming as a natural pastoral farming system free of drugs and with high ethical standards of animal welfare. In addition to that daunting list we are going to need to find trace back systems so that customers who purchase venison can establish the country, the farm, and maybe the animal of origin. I heard recently of a case where a large scale Danish poultry producer has his picture, fax and email number on every one of his meat packages in the market with an invitation to the customer to contact him personally if the product is not up to standard. That is the future climate for meat marketing.

Venison into the new millennium

What are food customers who might be persuaded to eat farmed venison likely to be looking for in 20 years time? Micheline Beauchemin (1990) predicted massive increases in added value vacuum packed partially cooked (not sterilised) meat products. She said that in USA the value of refrigerated microwaveable meals was expected to reach \$15 m in 1989 and to grow to \$1.7 billion by the turn of the century. This is not traditional "fast food". In France where fine cuisine is well recognised two thirds of the 40,000 tonnes of vacuum packed partially cooked products go to the restaurant - hotel - institution trade and of this volume, one third of the meals are red-meat based. So how do things look now at the end of the century? It seems we are not achieving this promise due mainly to one factor called food safety. There have been a number of bad human health events recently in Japan, USA and Europe attributed to contaminated meat. These events have huge implications for producers and marketers of meat including farmed venison.

Marshall (1997) said "reducing faecal contamination of carcasses to the maximum extent practicable will be the single most important factor in achieving desired food safety objectives for fresh beef in the future". A similar statement could probably be made about chilled venison. The Vice President of the American Meat Institute quoted microbiological levels on US beef carcasses of 260,000 c.f.u./cm² (Marsden, 1990). Venison carcasses examined at three export plants in New Zealand had average bacteriological loadings of less than 100 c.f.u./cm² off the slaughter chain although the range in two of the plants did go as high as 100,000. One plant with an inverted dressing machine that mechanically pulled the skin off the carcass from the head to the tail recorded no carcass with a count higher than 100 c.f.u./cm² (Semán *et al.*, 1989). It is common sense that an ultra clean carcass off the slaughter line, if handled well during cutting and packaging will translate to packaged meat with a long shelf life as safe meat products. Farmed venison of the future, to attain a top quality chilled niche market label, must be quality assured in terms of feed safety, animal welfare issues and in using production systems that do not damage the ecology of the land.

If well managed, farmed deer can be slaughtered so that bacteriological quality at the point of slaughter is much lower than that from traditional ruminant carcasses, and it should be possible for chilled venison to fulfil the customers' expectation for "sous vide" products where other meats have so far failed.

Prospects for global growth in deer farming

The Peoples Republic of China, Russia and New Zealand together are believed to account for about 75% of the world's deer farm producers. Accurate existing information about China and Russia in regard to farmed deer numbers is almost impossible to obtain let alone develop into future plans. The best guess is that future production levels from these 2 countries will continue at about current levels or trend downwards. Some of the eastern European countries like Hungary which have historically sent feral venison into Germany are now becoming net importers in order to service a growing tourist business.

New Zealand, on the other hand, has excellent information systems and a well developed industry structure. Deer farming is on track to reach 2 million farmed deer by the turn of the century and that will produce major increases in farmed venison exports. Since the New Zealand Game Industry Board (NZGIB) has developed strategic plans for the future which indicate a commitment to excellence in quality factors it is likely that the increased export volumes of venison will set the international standards for quality in long shelf life chilled venison. The NZGIB is now looking at ways of brand labelling its product into Europe to provide clear differentiation of its farmed venison from feral venison. A prominent German

venison business man recently said about venison in general (farmed and feral) that supplies from the East are decreasing, those from Spain are small but improving in quality, those from Scotland are stable and there is an expectation that with the rise in living standards in the East the venison business will come to depend on New Zealand.

A vision for the future

New Zealand, as by far the largest producer of tradeable products from deer farms, will continue to lead the world in production as the national herd grows to be in excess of 2 million by the turn of the century. The New Zealand Game Industry Board has instigated quality management standards where almost all the deer slaughter plants are now ISO9000 accredited, 85% of all deer transporters are now fully accredited and more than half the deer farms in the country are registered for an on-farm quality assurance scheme. The European deer farming industry is putting effort into its own quality management systems and that must be the way to go. Feral venison can never compete with farmed product in terms of quality if the controlled slaughter and processing of farmed deer is done well. The challenge for the future among deer farming countries is to find a way to ensure that there are minimal differences in product quality between countries so that international demand for this gourmet lean, light and tasty meat will grow steadily.

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