
Deer farming in Asia

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Abstract

Deer are farmed to varying degrees throughout Asia. In China, over 260,000 deer are raised mainly for velvet antler production. Farm management is quite sophisticated with a mixture of feedlot and controlled grazing, and deer farming appears to be a profitable form of land use. Velvet antler production is believed to be about 115 tonnes (dry weight)/annum. Primitive but apparently effective cooking/drying procedures are used to prepare pharmaceuticals. In the Soviet Union, deer also are farmed mainly for velvet antler production with annual yields of 28 tonnes (dry weight) some of which is made into the medicinal liquid *pantocrin*. Because of the long cold Soviet winter, deer are fed for extended periods on roughage and some grain. Korea farms small numbers of deer for the local velvet antler market. Holdings are very small and intensively managed with 8–10 animals/farm. Income is derived from the sale of velvet antler and a small number of live animals. In Mauritius, venison production is the main objective of deer farming and there is much opportunity for expansion to meet local demands. Most deer operations are on marginal land, integrated with sugar cane operations. Deer farming in Japan is limited to a small number managed experimentally since 1983 and may provide an economic return from the presently under-utilised hill country, supplying lean meat and velvet antlers.

Introduction

Examples of both the oldest and youngest forms of deer farming are found in Asia. Containment of deer in China, where the animals are regarded as a symbol of longevity and bliss, can be traced to 200 BC (Kao, 1973) although deer have only been farmed systematically for the production of medicines since the 17th century. Since the 1950s, farmed deer numbers in China have risen sharply by a factor of 30. Other deer farming countries are the Soviet Union, Korea, and Mauritius. Japan, a major market for deer products, is currently investigating the farming of deer on hill country abandoned by traditional farmers in the 1960s.

Industry structure

China

Two main types of deer are farmed in China; sika deer (*Cervus nippon*) with six subspecies, and red deer (*Cervus elaphus*) with four subspecies. Most important is the Northeastern sika (*C. n. hortulorum*) commonly called *meihualu*, which was found mainly in the forests of the Changbai and Xinganling mountains. In recent times, the meihualu has been introduced to most parts of China and is particularly important on the borders with Korea and far eastern parts of the Soviet Union. The male has a mature body weight of 120–150 kg and produces a high yield of good quality velvet antler.

The most important red deer type is the Asiatic wapiti (*C.e. xanthopygus*) or *malu* which is distributed in the region of the big and small Xinganling mountains. Mature males weigh 250–350 kg. Xinjiang red deer (*C. e. sogarius*), numerous in the Xinjiang region, are smaller than their northeastern counterparts but grow very large antlers.

In recent years, controlled hybridisation between sika and red deer has been practised using semen collection, freezer storage of semen, synchronisation of females, and artificial insemination. Hybrid vigour is usually found and complete pedigree and production records are kept.

The population of farmed deer in China was estimated to be 260,000 (75% sika) in 1981 (Table 18.1) and increasing at 10–20%/annum (Pinney, 1981). Deer farming falls within the sector of Agriculture, Forestry, Health and Foreign Trade. Deer farms are state operated and wild deer are managed by the Forestry Department. Farm production of antlers and tails is marketed for either home consumption or export through the Pharmaceutical Adminis-

Table 18.1. *Numbers of farmed deer in China.*^a

Province	Meihualu	Malu	Total
Jilin	140,000	10,000	150,000
Heilongjiang	50,000	25,000	75,000
Xinjiang		30,000	30,000
Hepei, Beijing	3,000		3,000
Sichuan, Yunnan and Qinghai	1,000		1,000
TOTAL	195,000	65,000	260,000

^aPinney (1981).

tration (Pinney, 1981). Income is also derived from the sale of live animals and some meat for local consumption.

Soviet Union

In the late 19th and early 20th centuries, significant numbers of red deer were transplanted from Poland and Germany to the Baltic region and central part of the Soviet Union, but after World War I and the Civil War numbers in these regions had been reduced to a few hundred. After World War II, many deer were relocated from the Voronezhsky Reserve to the European part of the Soviet Union where they thrived under careful management including supplemental feeding and track formation during heavy snow (Pavlov *et al.*, 1974).

Because of the immense size of the country, diverse nature of the republics, and difficulty separating deer managed for hunting from those that are farmed, it is almost impossible to establish accurate statistics of farmed deer. Table 18.2 summarises regional populations of mid-European and Caucasian

Table 18.2. *European red deer populations in the Soviet Union.*

Regions	Subspecies	
	Mid-European	Caucasian
Azerbaijan SSR		1,300
Byelorussian SSR	5,000	
Georgian SSR		1,400
Kaliningrad	1,100	
Krasnodar territory		8,200
Latvian SSR	8,750	
Lipetzk	550	
Lithuanian SSR	2,150	
Moscow	450	
North Ossetian ASSR		750
Rostov	1,300	
Saratov	550	
Stravropol territory		500
Ukranian SSR	5,400	
Volgograd	600	
Voronezh	2,000	
Other areas	2,800	750
Total	30,650	12,900

(*C.e. hippelaphus*) subspecies of red deer. Many of the 54,000 animals are ranched and hunted rather than farmed.

In addition to the mid European red deer, the Ukrainian SSR has 8700 Carpathian and 1900 Crimean red deer. Asiatic wapiti (*C. e. xanthopygus* and *C. e. maral*) are reported to number 130,000–160,000 (Siviridov, 1978). Unspecified numbers of sika deer are farmed in the Soviet Far East and at least one group showing poor reproductive performance was shifted in 1968 to the Caucasus region (a journey of some 10,000 km) where production has greatly improved. It is believed that some 60,000–70,000 are currently held in the Caucasus region where many are farmed.

The primary purpose for farming deer appears to be production of velvet antler which is used in local medicines as well as exported. The Ministry of Agriculture is responsible for running the production units as well as cutting and drying antlers. There are convoluted and confusing links between the deer producers and agencies responsible for the processing of antlers, the quality control of the medicines, and the sale of final products.

Korea

Deer farming in Korea is quite recent although deer products have been used in medicine for many years. The principal species is the Taiwanese sika (*C. nippon taiouanus*). Projections based on Table 18.3 suggest that 80,000 deer will be farmed by 1989 (Kim Yong Kook, 1981). Production units are small (8–9 deer) and are generally owned by wealthy merchants and staffed by salaried employees. Velvet antler and the sale of part of the calf crop directly to consumers provides the farm income (Kim Yong Kook, 1981).

Table 18.3. *Deer (all species) and deer farm numbers in Korea.*^a

Year	Number of deer	Number of deer farms	Deer per farm
1970	680 (est.)	unknown	unknown
1972	1,400	unknown	unknown
1974	2,800	294	9.5
1976	4,450	447	10.0
1978	6,400	780	8.2
1979	7,100	887	8.0

^aKim Yong Kook (1981).

Mauritius

The tropical island of Mauritius in the Indian Ocean is very small (185,000 hectares) and about half is under cultivation. In 1639, the Dutch introduced rusa deer (*C. timorensis rusa*) for meat hunting, and the people have now combined intensive deer farming with the main economic activity of sugar cane production. Some of the sugar by-products are fed to the deer which are used mainly for local meat production. The island supports a population of over 30,000 feral rusa deer providing an annual harvest of 5000 and a current farmed deer population of about 10,000 (Lalouette, 1985). The island population of about 1 million people are mainly Moslems or Hindus. Some do not eat beef, and others do not eat pork, but they all eat venison. Consequently, venison production probably could be expanded ten-fold to meet local demand.

Operational methods and productivity

China

In the high mountains, hills, grasslands, and islands, deer are managed in grazing units, whereas on the plains where crops are grown and in forest regions, feedlot systems are most common. In both systems, a remarkable degree of domestication has been achieved by close contact with man and much hand feeding from an early age. One group of 200 deer apparently were transferred by two herdsman more than 100 km along a highway without a single loss. The animals were not frightened by trucks, streams of people, or noise and had an overnight stopover in a railroad station. Where land is available, herdsman take the deer out for grazing once or twice a day, controlling their movements with dogs or more recently by solar powered electric fences. The deer respond to a variety of stimuli such as poles, stock whips, calls, and musical instruments (Pinney, 1981).

On all farms, deer are separated by age and sex for feeding and management. Concentrates containing high protein soyabean meal (SBM) as a major portion are widely fed especially to improve antler production. Experience rather than documented experimentation seems to determine selection of diets for maintenance, growth, lactation, and antler production (Pinney, 1981). Table 18.4 outlines the concentrates used to supplement roughage such as chopped or ground maize and oak leaves. Very high levels of protein are frequently fed to stags in late winter to accelerate hard antler casting and initiation of antler growth.

Sika and red deer seldom have twins, and Chinese deer farms manage a calving rate in sika of 85–90% (surviving calves/hinds mated) and about 5% less for red deer. One farm reported a 5–8% twinning rate in sika deer

(Pinney, 1981). Age at first calving in sika is usually two years, and three years for red deer.

Velvet antler production for local consumption and export is a substantial and highly developed industry. Meat production can be considered a by-product and is used by farm workers or sold in small quantities to local communities. Other by-products like sinews, tails, and pizzles are used domestically.

Estimated velvet antler production and yield is given in Table 18.5 (Pinney, 1981). Home consumption might account for about 80 tonnes of dried antler and the remaining 35 tonnes is exported through Hong Kong, Singapore, South Korea, and Thailand. The Pharmaceutical Administration claims that annual production is only 30 tonnes, half of which is exported. The differences will not be resolved until deer and production statistics are better documented.

Velvet antler is harvested and processed according to the specifications of

Table 18.4. *Concentrates fed to Chinese stags during antler growth.^a*

	Concentrates kg/head/day	Soyabean meal kg/head/day	Estimated % of feed requirements	% as soyabean meal
Sika deer	0.7-2.0	0.4-1.6	20-55	up to 45
Red deer	1.5-2.5	0.7-2.5	25-45	up to 45

^aPinney (1981).

Table 18.5. *Estimated production of Chinese farmed antler velvet, 1981.^a*

	Head	Average kg/head (unprocessed)	Dry yield (%)	Dry weight (kg)	Total dry weight (kg)
Sika deer					
2-point velvet	98,000	1.0	30	0.3	29,400
3-point velvet	46,000	2.4	37	0.9	41,400
Total	144,000				70,800
Red deer	36,000	3.5	38	1.23	44,280
Grand total					115,080

^aPinney (1981).

traditional Chinese medicine. Antler from sika deer can be cut at the two-point stage (blood removed for local consumption) or three-point stage (blood remaining for export). Red deer antlers are usually cut at a four or five-point stage for the export market as long as calcification is minimal. Stag handling has improved from manual restraint to the use of a whole body crush with the feet off the ground. Once the stag is immobilised, the antlers are quickly sawn off, bleeding minimised, and the animal set free. All procedures are aimed at minimising stress with stags immobilised for only 3–4 minutes. Chinese medicinal herbs or Western drugs can be used to stop bleeding, diminish inflammation, and facilitate healing. After removal, the antlers are processed to either retain or remove the blood. A vacuum is applied to the cut end of the antler shortly after removal to produce the bloodless *snow-white* product. Export specification into the Korean market requires *blood in*, and this is achieved by heat-sealing the cut. Both antler products are dipped into boiling water (tip first) and left for 30–50 seconds. After 2–4 minutes, the procedure is repeated for about an hour. Larger antlers are left longer in boiling water than smaller ones. Top quality processed antler (export) is pink-red in colour, aromatic, and without decay or cracks. Final drying is done in either a well-ventilated room for 8–12 weeks or in a forced draught oven. Some Chinese believe that the medicinal and nutritional value of velvet antler is damaged by heat drying.

In traditional Chinese medicine, velvet antler is the most important animal product (Kong & But, 1985). It is used as a general tonic and specific treatment for a large number of human ailments such as lumbago, impotence, amenorrhoea, and anaemia.

Soviet Union

Most deer are managed in unfenced areas or, at best, large enclosures. Winters are long and harsh and a key feature of production is winter feeding. Deer do not appear to be held in feedlots but extensive trough feeding systems are built in the field to which the deer are signalled by a variety of high pitched calls. Winter rations comprise 1 kg of roughage and 1 kg of concentrates (mainly grain and acorn)/head/day. In some areas, grazing capacity is increased by cultivating and fertilising local areas and sowing alfalfa, meadow fescue, timothy, meadowsweet, or lupine. With adequate rainfall, kale and Jerusalem artichokes can be grown for extra feed. Digestive disorders are common when animals come off winter rations onto lush spring growth, particularly in northern regions. Apart from supplementary winter feeding, deer are managed rather extensively and only the stags are yarded and handled during the velvet harvest.

Velvet antlers are removed in late spring for export (mainly red deer type – maral) or for the production of pantocrin from sika deer. Stags are herded into yards, individually restrained in a body crush and antlers are quickly removed with a saw. No drugs are used and bleeding is minimal. Antlers are processed by immersing in boiling water for 40 seconds at intervals of several minutes. The procedures are repeated for about an hour and then the antlers are laid flat in a forced draught oven (70–80°C) for 6–8 hours. Oven drying is repeated periodically over 12 days (2–3 hours at a time) until judged to be dry and the antler tip still soft. Production of dried antler is thought to be about 28 tonnes from maral and 12 tonnes from sika deer.

Pantocrin is a dilute medicinal liquid made from a mixture of dry antlers, rectified spirit, and water. After mixing and stirring for 21 days, the liquid is placed in 50 ml bottles and either consumed domestically as a health tonic or sold in the Far East by Medexport.

Korea

Farming deer is very much a cottage industry in Korea with a large number of very small holdings. About half the daily ration is a mixed concentrate (dairy ration) while a third of the ration is barley bran. Thus, 90% of the total feed supply is in the form of concentrate. Many people think more roughage should be used and experiments are in progress to establish a better balance of ration components. Typically, sika deer are fed about 1.8 kg of feed/day and red deer about 3.1 kg, both on an air dry basis (Kim Yong Kook, 1981).

The deer are managed almost entirely in feedlot systems with space allowances of only 33–400 m²/deer. There is very little opportunity for improvement through breeding because of the small herds and the difficulty in exchanging animals. Labour requirements are high. Farm production from these small units consists of velvet antler cut from three or four stags and the sale of two or three pairs of calves.

Mauritius

Rusa deer are managed intensively at high stocking rates on subtropical pasture. Rotational grazing using electric fencing is now common, and during the drier months of September and October, molasses and urea together with sugar cane tops are offered as supplements. During the last five years, deer handling yards have been built on some properties and the animals are now regularly handled like conventional livestock with regular weighing, ear-tagging, weaning, and treatment for parasites.

In this subtropical environment, rusa deer are not strongly seasonal in their

calving pattern. Calving rates can be as high as 80% after entrapment of feral deer on farms but calf mortality approaches 50% in some years. After adaptation to farming conditions, reproductive rates improve greatly and the longer established operations now achieve 80–100% calving, and birth weights have improved from 3.5 kg to 5.5 kg over 4–5 years.

The objective is to provide meat for local consumption. Some venison is obtained from organised hunting which takes place each year and surplus yearlings from farms are slaughtered by shooting. Carcase weights for yearlings range from 40–60 kg. Velvet antler from rusa stags is saleable for the medicine trade and there have been recent moves to develop this potential source of income.

Production economics

China

Farm productivity can only be an 'educated guess' as reported by Pinney (1981). No estimates of the capital costs for buildings, yards, water supply, and fencing are available. Income is earned from the sale of surplus young stock, velvet antler, and a few slaughtered stags. Feed and wages costs/deer were reported in 1981 to be about US\$ 65 on a property farming nearly 700 sika deer and about US\$ 153 on another farming 900 deer most of which were the large red deer type (Pinney, 1981). The value of production from both farms was about US\$ 310/head. These two farms both gave gross contributions of about US\$ 154,000 and thus appear to be very profitable even allowing substantial capital and maintenance cost for facilities. Since the northeastern part of China is now largely self-supporting in food, deer in that part of the country will benefit from surplus grain, maize, and by-products from food processing industries. Low prices paid for feed and labour seems to ensure high profitability for Chinese deer farms.

Soviet Union

One state farm enterprise comprises 280 hectares of land and cost about US\$ 30,000 to fence to a height of 2.7 m. The fence was made of massively strong wire to hold deer and prevent access by predators. Farm profit was about US\$ 112,000/annum or about US\$ 160/animal. Six people managed about 700 deer and it was the least profitable of the deer, rabbit, mink, and nutria units on the same farm. Since antler from Soviet maral deer is judged to be the finest in the world by the influential Korean market, it commands premium prices and should ensure profitability in south central regions where these animals are raised.

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Korea

An economic appraisal of a typical Korean deer farm carrying five pairs of sika deer is given by Kim Yong Kook (1981) with translation and editing arranged by the late J. R. Luick. Expenses associated with the deer herd and fencing are much greater than those for land and labour.

Production costs are low when compared with the high prices paid for deer and their products. Table 18.6 summarises the economic returns from a typical enterprise (Kim Yong Kook, 1981). Depreciation of the deer is based on 50% for culled deer value and a longevity of 10 years. No allowance appears to have been made for labour.

Mauritius

Table 18.7 is derived from 1978 unpublished data and relates to the establishment of a deer farm of 360 animals on 14 hectares of pasture land. After allowing for all costs, the deer farm is likely to return about 11% on invested capital.

Prospects

China is clearly the leading producer of velvet antlers but further development of deer farming in that country depends on improved

Table 18.6. *Economics (US\$) of a typical Korean deer farm carrying five pairs of sika deer.^a*

<i>Expenditure</i>		
Depreciation of deer	1,100	
Feed Costs:		
Concentrates	1,610	
Hay	1,210	
Depreciation on shed and facilities	147	
Cost of cutting velvet antler	294	
Other costs (e.g. veterinarian, drugs)	294	
		4,950
<i>Income</i>		
Sale of calves two pairs @ 4400	8,800	
Sale of products from four stags	2,350	
		11,150
<i>Net farm income</i>		6,200

^aKim Yong Kook (1981).

marketing. Increased production will need to be absorbed by increased local consumption, a decrease in international export price, or significant penetration into Western markets which are sceptical of the medical claims made for velvet antler. With improved supplies of stock feed, the Chinese will have the capacity to substitute velvet antler production from the heavy red deer type (malu) for the lighter sika (meihualu). This should earn farmers greater income from export production but put more pressure on the major international market of South Korea. Venison is likely to remain very much a by-product of the antler industry.

Very little is known about recent changes in Soviet deer farming and although there is enormous capacity to extend existing herds it is impossible to predict what changes will occur in this state-owned industry.

Table 18.7. *Expenditure and income estimates (in US\$) from a deer farm in Mauritius.^a*

<i>Capital expenditure</i>	
360 deer × 130	46,800
Sowing of pasture	2,200
Fencing 2750 m × 3.30	9,075
Feeding troughs, water, molasses tank, store, sundries	6,100
	64,175
<i>Recurrent expenditure</i>	
Labour (1 stockman)	1,560
Feed supplement (Molasses, urea, copra cake, fish meal and minerals)	2,496
Pasture maintenance and fertiliser	1,365
Repairs and maintenance	182
Interest on capital (5%)	3,220
Depreciation and sundries	1,638
	10,461
<i>Income</i>	
42 carcasses × 45 kg × US\$ 1.82/kg (wholesale)	3,440
100 carcasses × 45 kg × US\$ 3/kg (retail)	13,500
140 kg offals and pieces × US\$ 3.25/kg	455
	17,395
<i>Farm profit</i>	6,934
<i>Return on capital</i>	10.8%

^aMeat Producers Association of Mauritius (personal communication, 1978).

Korean deer farming will continue to grow with assistance from the Korean Deer Farming Research Council established in 1980 (Kim & Han, 1985). There is interest in importing wapiti or elk because of the superior velvet antler production, but there has been no progress in changing regulations that prohibit importations. One of the major constraints on expansion is poor coordination in marketing products from Korean farms made more difficult because of the large number of small holdings.

Because the small island of Mauritius with a large population must import most of its meat requirements at high cost, the deer farming industry is likely to further expand in size and profitability. With good management, the subtropical climate will produce high yields of pasture and the sugar cane industry is a good source of feed supplements. Deer farms are relatively few in number and operated by the European minority. This situation tends to provoke poaching and may somewhat inhibit the industry's growth.

Japan is a highly industrialised country representing a significant market for Oriental medicines. The 5 million hectares of hill country (Satoyama), once the main site of Japanese hill farming, is now largely abandoned. Sika deer are naturally part of the Satoyama's ecosystem and some people believe that deer farming on this hill country will be an attractive and economic land use (Tamate, personal communication). The Japanese Deer Farmers' Association was established in 1985 and is supported by Professor Tamate and the staff of the Department of Animal Science at Tohopu University. Japanese people appreciate lean meat, many use velvet antler products, the population is large, and has a very strong economic base.

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