
12. DEER

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The deer family (Cervidae) is widespread in Europe, Asia, North and South America and North Africa. It includes 11 living genera and 48 species. In the USSR there are four genera with six species. 1) Roe deer (Capreolus) includes only one species, Capreolus capreolus. 2) True deer (Cervus). There are three species in the USSR: European fallow deer (Cervus dama), sika deer (Cervus nippon) and red deer (Cervus elaphus) with five subspecies in the USSR - European red, Bukhara, Caspian, maral, and izyubr. 3) Elks (Alces) have only one species, the European elk or sokhaty (Alces alces). it includes three subspecies: European, American, and Ussurian. 4) Reindeer (Rangifer) has only one species (Rangifer tarandus).

Three species are domesticated in the USSR: 1) Reindeer, with 2 340 000 domesticated and 900 000 wild. 2) Sika deer which number nearly 65 000 domesticated and 15 000 wild. 3) Marals estimated at 46 000 domesticated and 40 000 wild.

12.1 REINDEER

The northern regions account for nearly 50% of the territory of the USSR. The programme for their comprehensive development and exploitation of their resources involves improving special local branches of agriculture, such as deer farming, hunting and fishing. A big role in providing food for the local population is played by reindeer breeding. The USSR (with about 2.3 million head) accounts for 74% of the world's domesticated reindeer stock. In addition, the northern USSR is inhabited by about 900 000 wild reindeer.

The reindeer (Rangifer tarandus) is the most recent genus in the family Cervidae. Researchers trace its origin to the beginning of the Quaternary period (Pleistocene) in southern and temperate latitudes of North America. It assumed its present form towards the mid-Pleistocene; later during the time of the great glaciations, when temperatures fell in the northern hemisphere, it spread widely over the north of Europe, Asia and North America.

The reindeer genus was spread everywhere during the Riss-Wurm Interglacial period, which is often termed the mammoth and reindeer period. Its habitat shrank considerably in historic times which most probably occurred not without man's contribution.

The boundaries of the reindeer habitat have changed markedly in historic times, especially the southern border which has continuously moved northwards. It has shifted from a score or two up to 500 km, and this trend is still going on, especially in European USSR.

The domestication of reindeer occurred on the territory of the present-day USSR. According to some authors it happened at the end of the glacial period after the dog; they were thus one of the first animals to be domesticated (Bogoraz-Tan, 1933). Other scholars trace the origin of reindeer breeding to the 1st or 2nd centuries A.D. i.e. to a much later period than the time of appearance of other agricultural animals.

It is commonly assumed that reindeer domestication occurred not individually but by group or herd taming. The primitive hunters followed the wild deer herds; they did not set themselves the task of catching and rearing individual animals but used the most elementary methods (crowding, slaughter of herd leaders, unconscious selection etc.) and went over gradually to the management of herds.

Reindeer supplied man with all he needed for his survival in the rigorous conditions of the North. For its domestication it needs neither stalls nor corrals; it is able to find its own food, to endure very low temperatures and, by its migratory habits, to avoid overgrazing.

The economic importance of reindeer husbandry for the northern regions cannot be overestimated. The total volume of venison produced per year is 45-50 000 tons. Venison is the main agricultural product in the northern districts of the Kamchatka, Magadan and Tyumen regions.

Reindeer husbandry has a great social significance, 22 national minorities being involved in this branch of the economy. It ensures employment for the local population and the growth of its material well-being. Reindeer husbandry provides a greater economic return than other branches of agriculture or fishing-and-hunting. It promotes the development in collective and state farms of new enterprises, such as fur farming, dairy cattle breeding and plant growing.

Reindeer supply high-quality venison, skins and furs, and young antlers containing a biologically active substance termed rantorin. Reindeer are very widely used as transport animals, but this becomes less important every year with the increasing use of mechanized vehicles.

Reindeer have a light build, long thin strong legs, a short tail, comparatively long ears and a somewhat light head. All males of the family Cervidae have antlers but in the genus Rangifer the females have them as well. Antlers grow from pedicles on the frontal bone of the skull; they are shed every year, after which they regrow. Deer antlers are not covered with a horny coat like those of the Bovidae and do not build a continuous horny mass like those of rhinoceroses. During their formation the antlers are covered and protected by a furry skin with short thick hairs forming the so-called "velvet". After the ossification of the antlers this skin splits and withers away.

Reindeer have a pronounced sexual dimorphism. Males are usually bigger than females. Many reindeer have sexual distinction in their colouring as well.

Domesticated reindeer differ from their wild counterparts by more varied colouration (brown, pied, white, grey etc.), less slender body build, broader, shorter and rounder hoof soles. They graze pastures more closely, feeding not only on green herbage and lichens but on withering parts of plants as well. From each unit area of pasture they reap a much greater "harvest" than wild deer, which raises the yield of reindeer pastures considerably. All the reproductive processes of domesticated deer occur 2-4 weeks earlier than those of their wild counterparts, which means an earlier maturity of the former. The live weight of the young of domestic deer in October (i.e. towards the beginning of the winter period) exceeds that of wild ones by 30%. Important features of domestic deer are their herding instinct, absence of migratory instinct, more phlegmatic temperament as well as quick adaptation to external stimuli such as those from human dwellings.

The Far North is known for its extreme climatic conditions; the total solar radiation varies through the year from 0 to 15 kcal/cm, temperature from -64 to +38 C and the length of daylight from 0 to 24 hours.

Using a special method of cadastral survey of the entire Far Northern territory, 489 million ha of deer pastures with a reindeer population of 3 412 000 head were identified and assessed. Of this area the tundra zone and adjoining forest-tundra account for 300 million ha, with a carrying capacity of 2 500 000 head (136 ha per head), whereas taiga areas cover 189 million ha with a carrying capacity of 1 million deer (700 ha of pastures per head). The pasture area of an average deer breeding farm totals about 1 million ha.

Reindeer eat about 400 plant species, including 58 species of bushy fodder lichens (reindeer "moss"), 44 species of shrub willows and birches, 34 species of sedges, 24 species of legumes, 34 species of Compositae, 15 species of the buckwheat family (Polygonaceae), 7 species of horsetails and various species of grasses.

In summer reindeer feed on nutritionally valuable green vegetation. The content of the rumen at this time is as follows: leaves and stalks of shrubs 13-75%, various herbs 23-44%, grasses and sedges 2-17% and reindeer "moss" 16%. The reindeer eats 17-22 kg of green material per day which contains 4.3 kg of air dried matter. For 100 kg of live-weight up to 400 g of digestible protein and 6-7 feed units are needed. In autumn deer go over gradually to feeding on reindeer "moss". In early autumn the proportion of lichen in the reindeer diet averages 52.2%, that of green plants 36.1% and that of fungi, moss and pine needles 11.7%. During October-November the proportion of reindeer "moss" in the rumen increases to 71%. The amount of digestible protein needed per 100 kg of live weight falls to 150 g and the feed units to 4.78. In winter the proportion of lichen in the diet is 50-99%, that of green plants 14.4-48.1% and that of moss, twigs and dead grass 7.1-28%. If there is a shortage of lichen the proportion of green feed and of twigs increases. In spring deer go over gradually from lichens to green feed. A characteristic feature of lichen is a high content of carbohydrate and low content of protein and minerals - hence the shortage of digestible protein and of a number of macro- and micro-elements in the winter diet of reindeer.

The reindeer's ability to adapt to the rigorous conditions of the Far North is the most essential biological peculiarity of these animals. Their organism responds to changes in the feeding and climatic conditions by adaptive reactions. Changes occur in metabolism, thermoregulatory processes, reproduction, growth and development.

In summer deer enjoy the most valuable and nutritious feed and build up a store of nutrients. On average, deer feed for 39-48% and rest for 52-61% of the time. Digestibility reaches 68-70%.

In winter they expend a lot of energy in obtaining food. To find sufficient nutritious plants, they scrape away up to 70 m² of snow, executing 2490-4390 movements. About 67-75% of their active time is taken by snow digging and food procuring. Stags lose 28-30% of their live weight and hinds 10-15%. Especially great are the weight losses of skin, muscles, heart, lungs and liver, i.e. the organs with reserves of nutrients.

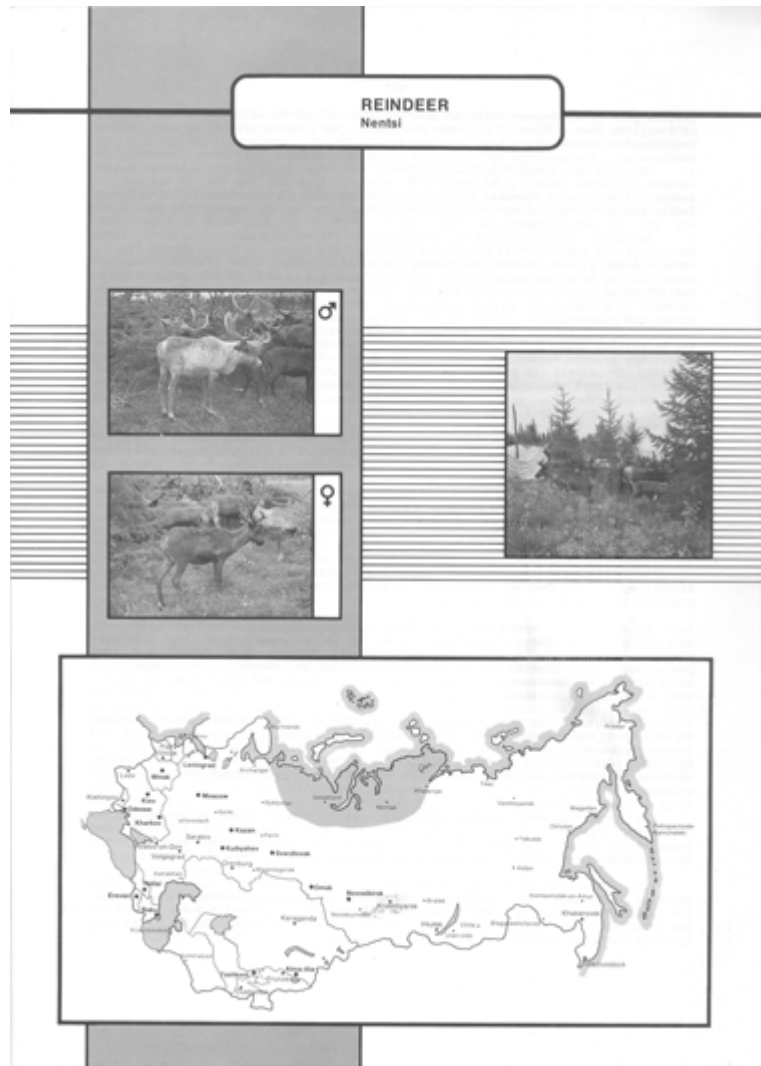
An important adaptive characteristic of deer is the seasonal nature of their reproduction and their very early maturity. The rutting season is in

September-October. Gestation lasts about 7.5 months. Offspring are born in April-May, i.e. in the most favourable period of the year. By autumn the live weight of fawns increases 7-8 times, reaching at the age of 6 months about 60% of the adult weight.

In winter the young do not grow. The next period of intensive growth occurs during the summer-autumn season. Females reach sexual maturity at 1.5 years and stags at 2.5 years. The period of active reproduction of stags lasts 9-10 years and that of hinds 12-14 years. The maximum longevity of domestic deer is 22 years.

The diploid chromosome number is 12-74. Five transferrin alleles have been detected, which occur with different frequency in different breeds and populations. The commonest is TfD, the least common TfE. The genetic similarity index, based on the transferrin locus, between taiga and tundra reindeer is 0.55, which is less than that between some breeds of other domestic animals.

Four native reindeer breeds have been identified in the USSR - Nentsi, Chukotka, Evenk and Even. They differ in productivity and conformation as well as in adaptation to specific natural and climatic conditions. All reindeer breeds are a result of selection, by various northern people.



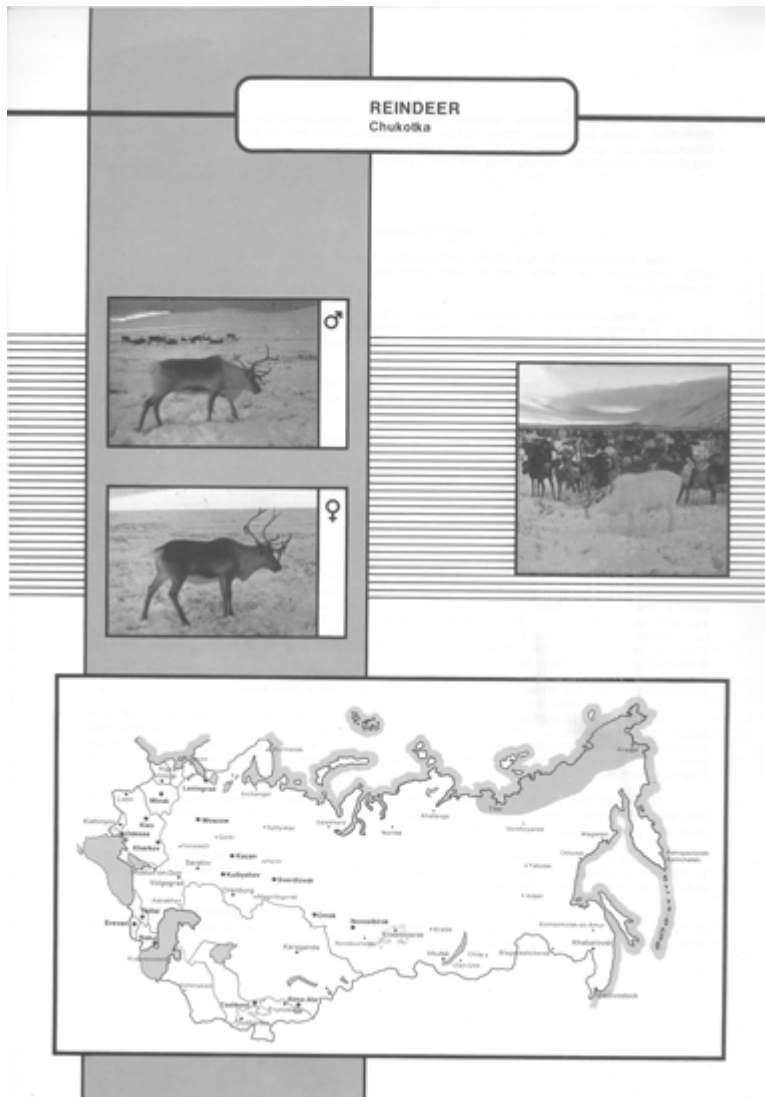
NENTSI (Nenetskaya)

The Nentsi breed was developed by the Nentsi people. In the 1930s breeding work began on a large scale and considerably increased size, strength and productivity.

The Nentsi breed is reared in the north of European USSR and to the east of the Urals, i.e. in the lower reaches of the rivers Ob and Yenisei. In the past Murmansk region was the breeding area of the Saami strain (Murmansk breed) but in the 1930s it was replaced by the Nentsi breed. At present the Nentsi breed numbers more than 850 000 head. This is a homogeneous group of animals with average size (as compared to other breeds), strong body build and mainly light brown in colour.

The skull structure of the Nentsi breed in different regions shows their common origin. The greatest skull length of adult stags is 365-384 mm and of hinds 328-353 mm, the skull width being 166-170 mm and 152-159 mm respectively. Skulls of the Nentsi breed are broad and have a short facial part. Their characteristic feature is an arch-like bend of the anterior end of

the nasal bones; the frontal bones are markedly depressed between the eyes, the occipital crests rising above the line of the facial part of the skull. Withers height of stags is 101.5-106.9 cm while that of hinds is 94.6-100.4 cm; oblique body length of stags is 109.8-115.4 cm and of hinds 98.9-106.0 cm; heart girth of stags is 122.3-128.9 cm and of hinds 114.5-123.8 cm; shank girth of stags is 12.1-12.8 cm and that of does 10.2-11.8 cm. The average live weight of stags before the rut (September) is 130-135 kg; that of adult females in October is 90-95 kg, of 6-month-old male fawns 56 kg and of their female counterparts 50 kg. The carcass weight of medium fat adult stags is 50-60 kg, that of females 42-45 kg. The live weight of pedigree animals is 20-30% higher than the average. The average dressing percentage is 50-51. Five to six month fawns are chosen for slaughter. They supply high-quality meat and valuable skins. Reindeer of the Nentsi breed are extensively used for draught but not for riding or pack carrying. Natural and climatic conditions in areas where Nentsi reindeer are bred are relatively monotonous. This is a low-lying country, in the main, with occasional ranges of low and medium mountains (the Khibini Mountains, the Urals), considerable precipitation in winter and comparatively warm summers. The average temperature fluctuates from -0.5° to 3.8°C . In summer the herds graze mainly on the Arctic coast in the tundra zone, which has abundant green vegetation, while in winter they are driven into the forest tundra with its profusion of feed lichens and protection from wind. A characteristic feature of this breed is that they feed chiefly on reindeer lichens for 8 months (from October to May). As the lichens do not contain sufficient nutrients, the animals' weight falls sharply toward spring. Rutting occurs at the end of September through October. Females usually give birth to one fawn. The fawn crop in years with favourable feeding and weather conditions is 85% and in pedigree herds up to 93%. The typical diseases of Nentsi reindeer are gadfly strike, necrobacillosis and pneumonia. Some animals are resistant to these diseases, but this question still requires proper investigation. Nentsi reindeer are perfectly adapted to local natural and climatic conditions. Transferring them to regions lying more to the south ended everywhere in failure. The animals perished within 2-3 years. The Nentsi breed is the most uniform and fixed one. Bigger animals are to be found on Arctic islands such as Kalguev and Vaigach. According to scientists this is due to favourable feeding conditions and is not due to genetic differences. The use of island sires in mainland herds did not bring about any improvement. There are 30 pedigree herds of the Nentsi breed within the area. For many years the breeding work has been carried out in experimental production farms of agricultural research institutes of the Far North, of the Murmansk experimental reindeer breeding station and of Yamal and Naryan-Mar agricultural experimental stations. The Nentsi is considered to be the most numerous and successful breed. However, because of large-scale industrial activity in a number of regions the area of lichen winter pastures is being reduced, which can have a negative impact on the local reindeer production.



CHUKOTKA (Chukotskaya)

The Chukotka breed is a result of selection by the Chukchi. It is reared in the Chukotka and Kamchatka peninsulas and in northeastern Yakutia. The total stock of these animals is about 600 000.

The Chukotka breed is considered to be the most recent and was formed not before the end of the 1st millennium A.D. Their main products are venison and skins; they are not used for transport. Even the herding was done by the Chukchi on foot. To preserve the stock, the most active specimens with a poor herding instinct were culled. As a result a characteristic feature of Chukotka reindeers appeared - their willingness to graze even poor pastures intensively and without straying from the herd. The Chukotka reindeers' ability to put on weight (fat) is surpassed by no other breed. This enables them to endure severe winters and lack of food when pastures are covered with an ice crust - a not infrequent occurrence. Chukotka skulls are small in size, the greatest skull length of stags being 358-362 mm and that of hinds 323-334 mm; the greatest skull width is 157-

167 cm and 147-157 mm respectively. They differ from the skulls of other breeds in being broader in both the cerebral and facial parts and in having a shorter muzzle.

The prevailing colour of Chukotka reindeer is dark brown. As regards their conformation, reindeers of this area have the most low-set, strong, round and slightly elongated body and shortish legs. Withers height of stags is 97.7-105.2 cm, that of hinds 90.2-99.6 cm; oblique body length of stags is 107.7-112.5 cm, that of hinds 102.4-105.9 cm; chest girth of stags is 132.6-135.3 cm and that of females 124.0-131.2 cm; shank girth of stags is 12.5-13.5 cm and that of hinds 11.3-12.2 cm.

The average live weight of stags before the rutting season is 130-140 kg and that of hinds 93-96 kg. The live weight of male fawns at the age of 6 months is 61 kg and of females 58 kg.

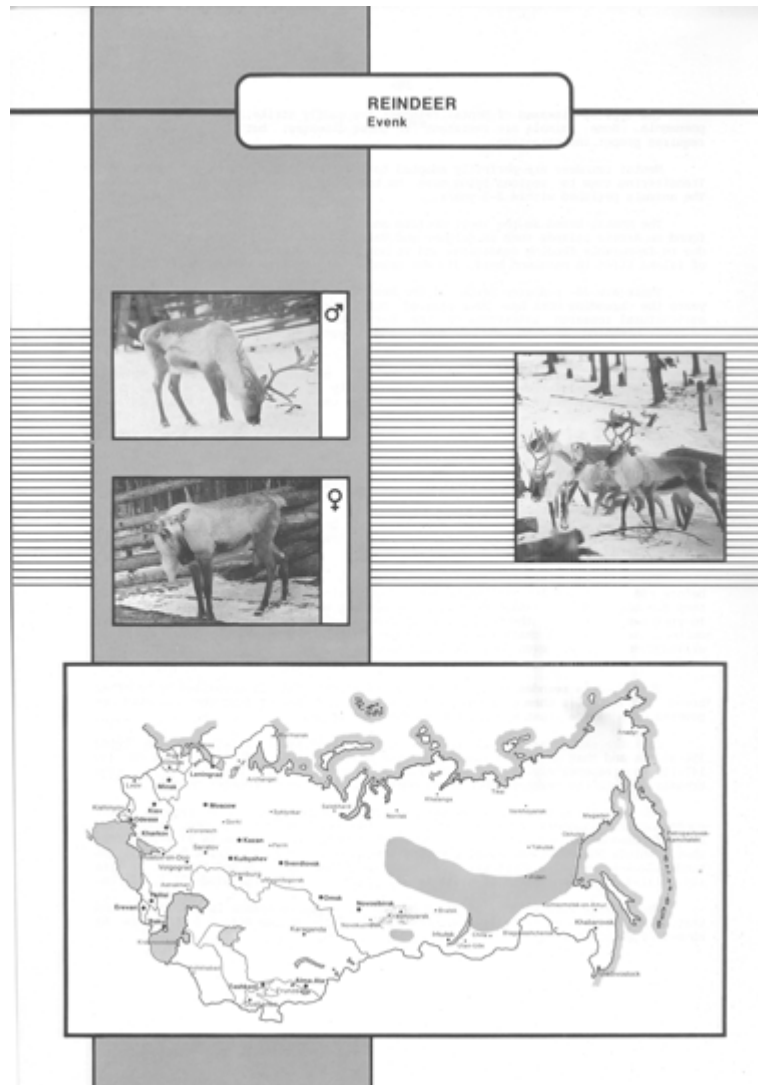
The Chukotka reindeer are known for their high meat production. Carcass weight of fat adult stags is 60 kg or more. The average slaughter yield is 53-55% and in very fat animals it can exceed 60%. Chukotka reindeer carcasses are also notable for their high meatiness.

Chukotka reindeer are adapted to the tundra plains with their short cool summers and long winters with scarce snow cover. Calving occurs 15-20 days earlier than in other breeds. They grow very quickly and by the age of 4-5 months there is already a big reserve of nutrients. Chukotka reindeer are comparatively resistant to necrobacillosis and pulmonary diseases and endure more easily the attacks of bloodsucking animals.

Three pedigree state farms for breeding Chukotka reindeer have been set up: Nizhnekolymski in the Yakut Autonomous Republic, Vozrozhdenie in Magadan region and 50th Anniversary of USSR in Kamchatka region.

Reindeer of the Chukotka breed are very popular thanks to their early maturity and adaptation to the conditions of arctic and subarctic tundras.

They have been introduced into western Yakutia and into the Taimyr peninsula and are used for crossing with other breeds.



EVENK (Evenkiiskaya)

The Evenk breed was formed by the Evenk people (or their ancestors) and is distributed everywhere this northern nationality lives. It is considered to be the oldest breed and to have been the basis for developing other breeds. Archaeological findings give evidence that deer raising for transport originated in southern Siberia (around Lake Baikal, Tuva ASSR, Altai territory), where the ancestors of the present-day Evenks dwelt. As a draught animal, which could also be used for riding and pack carrying, a large and tall deer was needed, like the present-day Evenk breed. The ancient origin of this breed is proved, among other things, by its differentiation into special strains.

The total stock of the Evenk breed amounts to about 250 000 head. They are reared in the Taiga zone of Siberia and the Far East from the Yenisei to the coast of the sea of Okhotsk and Sakhalin island. Most of them are in the Evenk Autonomous District, Yakutia, Buryatia and Tuva, Khabarovsk territory, Irkutsk, Chita and Amur regions. Large size is a distinguishing

feature of reindeer in the Tuva ASSR and Irkutsk region. According to a number of scholars, they form an independent strain -the Tuva-Tofalor type. The Evenk breed has the largest skull. The average skull length of adult stags is 409 mm (range 389-430 mm), that of adult hinds being 361 mm (range 351-369). Skull width at the widest point is 177 mm (171-182) and 161 mm (157-163) respectively. The skull of the Evenk reindeer is comparatively narrow; the transition from the facial to the cerebral part is only slightly marked and interorbital depressions are not deep. The prevailing colour is light brown but in eastern areas a considerable number of grey animals can be seen.

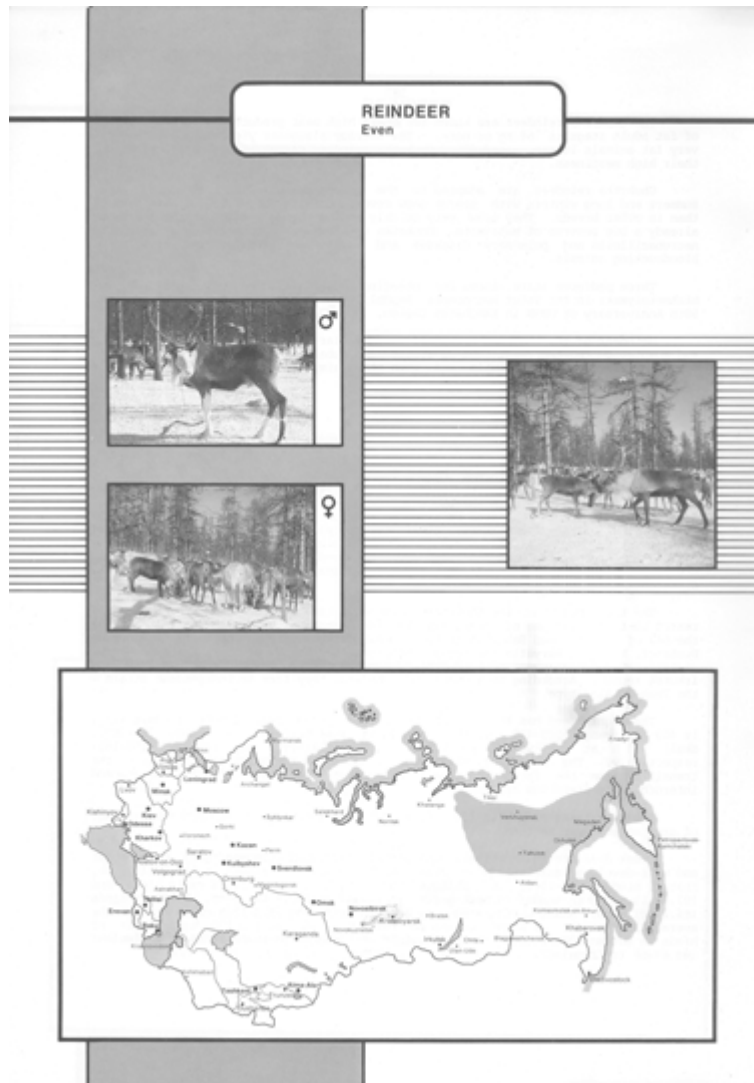
Evenk deer are tall animals with a well-developed elongated body, deep chest and well-developed muscles and skeleton. Withers height of stags is 113.0-118.3 cm, that of hinds 100.9-106.5 cm; oblique body length is 114.0-127.4 cm in stags and 107.1-115.7 cm in hinds; chest girth of stags is 126.6-143.5 cm, that of hinds 116.2-131.0 cm; shank girth is 13.3-14.8 cm in stags and 11.2-12.5 cm in hinds. The average live weight of stags before the rutting season is 140-170 kg and that of hinds in autumn 108-120 kg. The live weight of 6-month-old fawns is 68-72 kg (males) and 63-68 kg (females).

The animals of this breed are known for their high load-carrying capacity and endurance and are still extensively used for transport.

As regards meat production they are second to no other breed of reindeer. The weight of fat adult stags is 70-85 kg, that of hinds 50-60 kg, the slaughter yield being 48-49%.

The Evenk breed is well adapted to taiga conditions. In winter they easily scrape away snow to get their food and can dig holes over one metre deep. In summer and autumn the herd spreads far away from the fenced enclosures. During the rut they often stay in separate groups or herds. During the autumn slaughter two embryos are discovered in many females but in most cases one foetus is being resorbed. However, twins account for 3-5% of births, a comparatively high figure. Improved feeding and management (supplemental feeding and undisturbed grazing) can promote prolificacy considerably.

A state pedigree station, Surindinski, has been set up, where the best specimens of the Evenk breed have been concentrated. This is, actually, the only pedigree reindeer plant in the world. The entire range of breeding work is being carried out here, and the genetic structure of the population is being investigated, as regards blood groups and polymorphic serum proteins. On the basis of these data it is possible, for the first time, to establish the fawns' paternity, which permits the introduction of line-breeding.



EVEN (Evenskaya)

The Even breed is reared in the mountain taiga districts of Yakutia and of Magadan and Kamchatka regions. The total stock of the Even breed is nearly 550 000.

In type this breed is intermediate between the Chukotka and Evenk breeds. They are well adapted to mountainous areas, occupying alpine pasture in summer and river valleys and depressions in winter. Mountain areas are extremely varied; however in this zone the common feature is the comparatively short migration routes and small herd size, the latter being due to the low carrying capacity of the available pastures.

The greatest skull length of Even stags averages 381 mm, and that of hinds 355 mm, the greatest skull width being 165-172 mm and 154--162 mm respectively. Compared with the Evenk breed, the Even deer have an even less pronounced transition from the facial to cerebral part.

The prevailing colour of this breed is light brown.

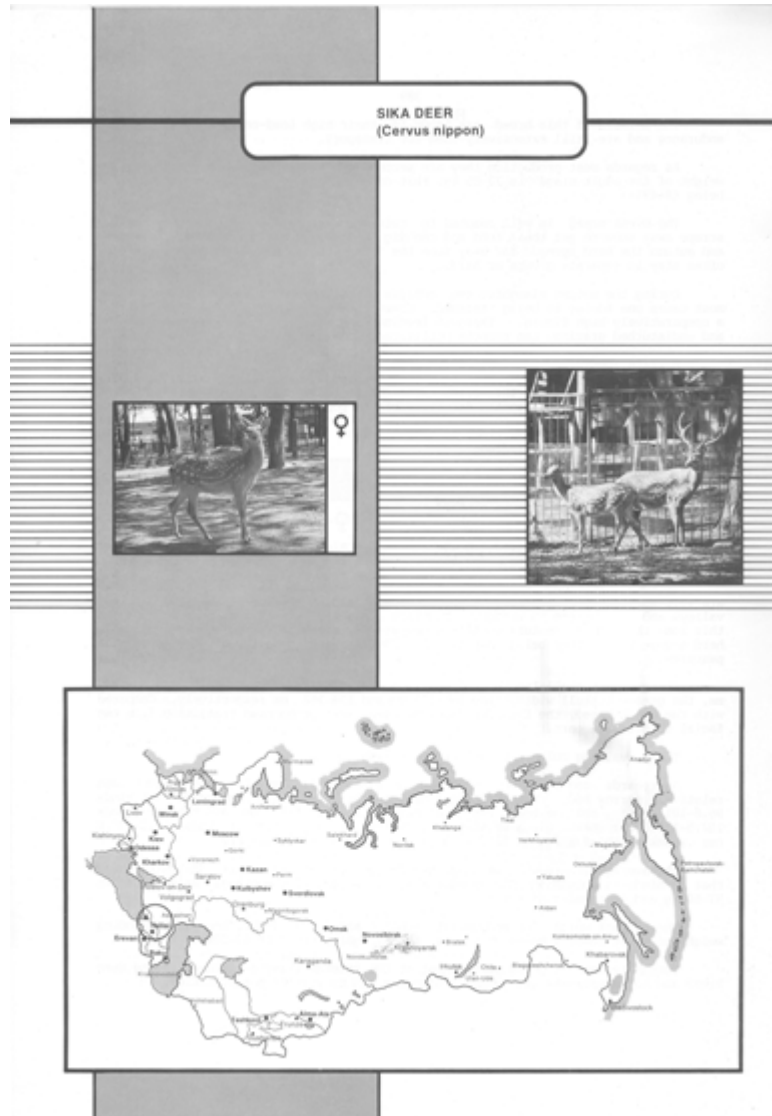
As regards conformation, the Even deer are tall animals with a long and relatively narrow body. Withers height of stags is 102.1-111.4 cm and that of hinds 96.8-101.1 cm; oblique body length of stags is 109.4-119.7 cm and that of hinds 107.5-110.0 cm; heart girth of stags is 126.9-135.3 cm and that of hinds 116.7-126.0 cm; shank girth of stags is 12.7-13.5 cm and of hinds 11.7-12.8 cm.

The average live weight of stags before the rutting season is 135-145 kg while that of hinds in autumn is 91-103 kg. The live weight of 6-month-old male fawns is 57-60 kg and of females 55 kg.

The carcass weight of medium-fat adult stags is 55-65 kg, the corresponding weight of adult females being 45-50 kg; the slaughter yield is 49-50%.

Intensive work is being carried out at the present time to further fix the Even breed and to investigate its genetic structure and biological peculiarities. Scientific and technological progress and development of the breeding work provide a new approach to reindeer production. Agricultural experiment stations and pedigree stations are now being organized, in contrast to the time when the breeding was done by traditional methods only. The latest achievements in biology make it possible to establish the parentage of fawns. So that now reindeer breeding can be carried out on a strictly scientific basis.

Thus reindeer production can maintain its special place while achieving the efficiency of other branches of animal husbandry.



12.2 SIKA DEER

The sika or spotted deer (*Cervus nippon*), which was on the brink of extinction at the beginning of the 20th century, occupies a special place in the deer family. The curative properties of drugs made from the antlers in velvet have long been highly valued in China and Tibet. At the beginning of this century the price of antlers reached 500 roubles per pound. Therefore, antlered deer were intensively hunted and the sika population was dramatically reduced. Thus, in 1919 there were barely a thousand wild sika deer in Primorski territory of the USSR.

According to palaeozoological data, the genus *Cervus* originated in southern Asia. In the course of evolution the earlier small antlerless animals increased in body size and acquired antlers. Sika deer represent the most ancient and primitive form of the genus as shown by the simpler structure of their antlers which, as distinct from the red deer's antlers, are devoid of the second supraorbital tine. In addition the adult animal retains its spotted coat.

Nevertheless sika deer are closely related to the red deer and can cross with them in any combination.

Wild sika deer are distributed in Japan, Taiwan, Korea, northeast China and southeast USSR - the Primorsky territory. There is some evidence, however, that some hundred years ago sika deer also inhabited the islands of the Minor Kuril ridge.

In the 1920s the stock of wild sika deer in the Far East numbered 900 to 1000 but by 1949 it had dropped to 300. In 1974 therefore sika deer were entered in the IUCN Red Data Book and in the Red Book of the USSR. By 1981-82 it had been possible to raise the number of wild sika deer in Primorski territory to 3500.

Acclimatization of sika deer in other suitable areas began at the end of the last century. They were brought from Ussuri territory to New Zealand where they adapted well and increased to 30 000 head. A bit later (at the beginning of the current century) sika deer were brought to western Europe. Germany and Denmark at present have a stock of more than 2000.

Introduction of sika into the European part of the USSR started in 1909 when several animals were brought from the Far East to the Ukrainian steppe (Askania Nova). After World War II more than 600 were delivered from reserves and state farm parks to be set free on moors in 14 regions of Ukraine. This activity resulted in several permanent habitats of sika deer on the Ukrainian territory. By 1980 sika deer had been introduced into 40-45 sites on the territories of 25 regions, territories and autonomous republics. The introduced stock and their descendants now total 2500 head.

Adaptation was not equally successful in all sites.

The number of wild sika deer in the Soviet Union at present is approximately 15 000.

Sika deer habitats in Primorski territory are primarily oak and broad-leaved forests of the Manchurian type with good undergrowth, and less commonly, cedar broad-leaved forests at altitudes not higher than 500 m. The animals readily feed on the shrubs that replace a burnt-out forest. The amount of winter precipitation in the form of snow should not exceed 800 to 1000 mm, the snow should not be deeper than 30 cm and the snow period should average less than 45 days. Southern and southeastern slopes of coastal ridges are most suitable places. In the western part of the USSR sika deer are primarily found in deciduous and mixed forests and in pine forests when the snow is deep.

In the Primorski sika habitat there are more than 129 plants in their diet, with bushes and twigs constituting its major portion (up to 70% by volume). The main feed comprises acorns, leaves, buds and browse as well as shoots of oak, Manchurian aralia and lime. Besides, sika deer eagerly feed on Lespedeza, Acanthopanax, Manchurian nut, Amur grape, elm, maple, ash, sedge and umbellifers in summer. During the second half of winter when the snow is deep the animals browse on willows, Chosenia, bird cherry and alder. On the seashore they feed on *Zostera* and *Laminaria* seaweed which contain salts.

In trans-Ural and European USSR sika deer have more than 390 species of plants in their diet with only one-eighth of them the same as in Primorski territory; 15 species represent excellent fodder while 173 are good. It is worth noting that the summer diet contains less shrub and tree feed as compared to Primorski territory as the animals graze high grasses at this

time. In winter they browse on filbert, oak, aspen, willow, pine shoots, elm, Euonymus, buckthorn and fir tree bark. Deer readily eat hay as supplementary fodder.

Domestication of sika deer began much later than that of marals. Ponosov was the first to begin breeding them in Primorski territory in 1781. He bought sikas from hunters who had caught them alive and in a few years he had a herd of 500 head in the Valentine bay area. A number of other farms followed his example. The first large sika breeding farm, however, was set up by Yankovski on the Sidimi peninsula in Peter the Great bay, on the coast of the Sea of Japan. At the time there were wild deer in the peninsula. In 1908 a large area exceeding 2000 ha was fenced and by 1914 Yankovski's farm could boast 2000 sikas. Almost at the same time another large private farm for breeding sika was set up on Ascold island to be followed a little later by farms on other islands in the Sea of Japan. Two main types of sika breeding have emerged: in domestic deer sheds and in parks. The conditions in domestic deer sheds were unsatisfactory because of insufficient area per animal and inadequate quality of feed. The animals in the sheds were given stored food throughout the year and were not allowed out to graze.

In larger farms there were both sheds and parks so the deer could spend the whole year on pasture. Supplementary feeding was provided only in case of very severe winters. With adequate park area (2 to 3 ha per animal) the deer had sufficient green fodder even in winter. In the course of several years, however, the quantity of feed in the winter parks fell drastically due to the slow regeneration of browsed trees and bushes, which led to a considerable loss of deer. With the exception of several well-managed privately-owned farms, the majority of deer were kept under unsatisfactory conditions.

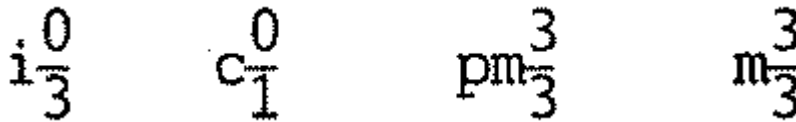
During the early stages of domestication even elementary pedigree breeding was lacking; the animals were untamed, all stags and hinds were kept together and inbreeding was practised which reduced viability. The deer stock on private farms developed diseases, live weight and productivity declined and barrenness increased. Some of the breeders formed the opinion that domestication of deer inevitably leads to their degeneration. Others believed that it was possible to avoid degeneration by allocating larger areas to the animals - up to 10 ha per head. Evidently, the breeders did not realize that the process of domestication should not imitate blindfold the conditions of the deer's natural habitat. A drastic change was necessary in the management of sika breeding; this change was brought about by the organization of state farms. It is worth noting that domestication of the sika deer followed the example of reindeer domestication, that is taming of the herd rather than of individuals. The first state farm to breed sika deer was set up in the Far East in 1924 to be followed by others in 1929-30 and later. The state farms worked out the system of deer management and feeding, developed extensive pedigree breeding, radically improved veterinary aid and perfected the technique of cutting off velvet antlers. This allowed the sika deer stock to be increased by 72% and the output of the major commercial product, velvet antlers, by 282% in the period from 1932 to 1939 alone.

The sika deer is of relatively moderate size. Live weight of adult males is 120-140 kg, that of adult females is 70-100 kg. It is slenderly built, very

mobile and graceful. The head is of medium size, light, somewhat narrow in the facial part. The ears are large with little hair inside. The medium-sized neck has a well-developed mane. The body is short with a rounded rump and a tail longer than in many other species. Thin, graceful and muscular legs end in small sharp hoofs. Males have antlers with not more than 5 tines.

The summer coat of adults is predominantly bright red with a large number of white spots on the sides. The lower the spots the larger they are. A black crest goes along the back from the occiput to the tail. The prevailing colour of the winter fur is grey or brownish (to dark brown) in males and light grey in females. The spring moult occurs in April and the winter moult in September.

Maximum cranial length of a sika reaches 320 mm. Cranial width between the eye sockets and antlers is less than its width between the supra-auricle tubercles. The posterior ends of the nasal bones are located at the level of the anterior ends of the eye sockets or somewhat in front of them. The dental formula is:



Sika deer reach maturity at the age of 16-18 months. Rutting starts in September and lasts 1.5-2.0 months. Oestrus in females lasts several days. Repeated matings occur at short intervals. Hinds that fail to get pregnant come on heat for a second time. The gestation period is 218-223 days (7.5 months). Females usually produce one fawn; twins are exceptional.

Newborn fawns weigh 4.75-6.95 kg and are up to 50 cm high. The fawns immediately start to suck and begin to walk several hours later. The fawns are usually weaned after 5-6 months of suckling; if not, the suckling period can last till the next calving. During their first year young animals grow fast, particularly in summer and autumn; they cease to grow after their second year. Nevertheless, they continue to lay down fat and males and females reach their maximum weight at the age of 7-10 and 4-6 years respectively. The life span of the sika deer is 18-20 years.

Velvet, i.e. unossified, antlers are the main product from sika deer. They are first cut at the age of two, prior to the completion of the antler's growth. The older the animals the sooner their antlers grow and the earlier they can be cut off. The antler weight increases from 389 g at the age of two years to 1436 g at the age of 10 or more.

Velvet antlers are used to produce a valuable drug, pantocrine, which primarily affects the nervous system resulting in complex functional changes in the organism. It is a highly potent tonic with a therapeutic effect on various diseases.

Apart from velvet antlers sika deer yield high quality meat and skin. The carcass weight of an adult male is 60-100 kg. Secondary products comprise tails, tendons (of knee and hock joints down to hoofs), male genitalia with testes and 2 or 3-month embryos.

Breeding is aimed at increasing the yield of the main product, i.e. the weight of velvet antlers. The farms keep records of pedigree stags and carry out their evaluation. All stags are divided into four classes: elite, 1st, 2nd and 3rd class. Pedigree breeding involves the animals of the elite and the 1st

class. Each farm sets up a pedigree nucleus that comprises healthy, well-built hinds aged 3-10 years with a body weight exceeding the average (over 85 kg) and sires of the elite class aged 5-10 years. In order to fully exploit the best sires they are given valuable hinds in a series of controlled matings.

The data on sika deer breeding on the steppe (Askania Nova) demonstrate the high adaptability of these essentially woodland animals. This is confirmed by the results of the introduction of 222 sika deer from Primorski territory into the Gorno-Altai autonomous region where they produced more offspring than in their original habitat. On the Altai farms, the stock has grown 23 times in 33 years and the fawn crops and the yield of velvet antlers during this period were higher than in the Primorsky territory. Greater productivity of sika deer in the Altai region was achieved by maintaining sex and age groups separately in so-called gardens, separate pasture corrals, and adequate feeding. During late autumn, winter and early spring the diet of the sika deer should contain silage, hay, browse and twigs, and concentrates.

Sika deer bred on farms number 65 000 animals. Further increase in productivity depends on the adequate organization of pasture maintenance, appropriate feeding throughout the year and the level of pedigree breeding. The results of 50-70 years of domestication of sika deer on the farms of the Primorsky territory as well as the data on their breeding in other zones, especially in the Altai region, show that the best representatives in advanced farms considerably exceed their wild counterparts in all parameters. The time has come to develop a breed of sika deer and to use outstanding pedigree specimens for large-scale improvement. There are now sufficient grounds to recognize the Altai breed group of the sika deer. Such infectious diseases as foot-and-mouth, rabies, blackquarter, necrobacillosis, haemorrhagic septicaemia (pasteurellosis), anthrax, tuberculosis and leptospirosis are encountered in sika deer. In addition, there have been cases of ringworm and coccidiosis. Dicrocoelium helminths have been found in deer in various places. Farmed sika deer displayed 4 species of flatworms, 3 species of tapeworms and 29 species of roundworms. Wild sika deer may be hosts for ticks (Dermocentor, Ixodes and others). Great trouble and damage is inflicted by flies (Simulium maculatum), dermatitis, horsefly (Hippoboscidae) deer ticks (Lipoptena cervi), Trichodectes and other ectoparasites. On farms, rhinopharyngeal gadfly proved to be very harmful.

Keeping in parks and adaptation of deer to different zones of the USSR do not diminish the importance of protecting the wild population. Sika deer suffer from deep snow and have a lot of enemies: wolf, tiger, leopard, lynx, brown bear and wild dogs. Wolves represent the main danger and account for 25% of deaths. Industrial and agricultural development of the territory also produces an unfavourable effect on the indigenous deer population. Vigorous efforts are necessary for better protection of the wild population of sika deer and for the preservation of the original gene pool of this valuable animal species.