

RUTGERS COOPERATIVE EXTENSION

NEW JERSEY AGRICULTURAL EXPERIMENT STATION

Deer and Elk Farming

Michael L. Westendorf
Extension Specialist in Animal Sciences

Bonnie A. Altizio
Program Associate in Animal Sciences

Introduction

Deer and elk are viable alternative livestock animals. Over the past few years, these animals have gained in popularity and the number of farms has increased. Although relatively new to the United States, long-time farming of these species has been practiced in New Zealand, Ireland, Germany, Great Britain, and Russia.

The most popular species of deer farmed in the U.S. are red and fallow deer. Elk, which may also be referred to as waipiti, is another popular alternative livestock animals. The United States farmed deer population is widespread and farms can be found in 45 states. In Canada, deer are farmed in every province. Elk is almost as popular and can be found in 36 states (8).

Management and Behavior

Deer and elk are described as:

- Doe** – female fallow and whitetail deer
- Buck** – male fallow deer
- Hind** – female red deer
- Stag** – male red deer
- Cow** – female elk
- Bull** – male elk
- Fawn** – young fallow and whitetail deer
- Calf** – young red deer and young elk

A mature hind weighs about 110 kg and a stag weighs about 250 kg. Hinds become sexually mature at 16 months of age and give birth to a single calf that weighs about 8 kg. To increase the chance of a successful breeding, a female should weigh approximately 80 kg. The breeding season begins in early September continues through June, and is followed by a 234-day gestation period. Most calves are born in May or June. Stags reach maturity at 24 to 30 months

of age and can remain sound breeding animals until 8 years of age. One stag can breed approximately 40 hinds.

Fallow deer are the smaller of these two deer species. The doe is approximately 50 kg, while the buck can weigh close to twice that amount. To ensure successful pregnancies, fallow deer should weigh close to 37 kg. The breeding season and gestation length are similar to that of red deer. Harems are often formed during the breeding season and a male can breed 35 to 40 females. Single births are common and the fawn weighs about 5 kg.

Elk are larger ruminant animals that stand 5 to 6 feet at the shoulder and weigh 230 to 400 kg, depending on gender. Elk reach maximum size and weight at 8 to 11 years of age. Breeding takes place from September through November, and cows give birth to a single calf after a 250-day gestation. Calves are born from May through July. At birth, calves weigh 18 kg and within 1 year can grow to ten times that size. Elk cows can begin breeding at 18 months, but bulls should wait until 2 or 3 years of age. Cows are able to breed until 15 years of age and their life span in captivity is estimated at 20 years (14). One bull can breed 17 to 20 cows. The estrus cycle is about 21 days, and to prevent late breeding, it is recommended that males be pulled from the herd on or before November 1. Natural elk reproductive behavior begins with a bull initiating an autumn courtship via a bugling call to attract the females. Sexual activity begins at 16 months and the younger bulls often do not breed because of competition from the mature animals. After the calf is born, cow and young live alone for a few weeks before joining the herd. At that time, the bulls separate to form their own group. Harems are often formed in early summer, consisting of a bull, 6 cows, and 4 calves. Mating groups are often retained for one season only (15).

In a controlled environment, breeding could become more challenging. If the females are not coming into estrus, you

might want to take advantage of the “stag effect.” This requires you to bring the bulls within close range of the female so that the sight, smell, and sound of the male is noticed by the female. This may bring her into estrus earlier. The use of artificial insemination is becoming more popular and the reported conception rate for elk is about 50%, and is higher for red and fallow deer. Two types of breeding programs are: single-sire mating and multi-sire mating. Single sire mating uses one stag per a group of hinds. This method can improve genetics within the herd and allows for more accurate breeding records. Stags should be changed after every two estrus cycles (estrus cycles are 18 days apart) to ensure pregnancy. Using the multi-stag breeding program, several hinds and stags are grouped together. Although this method requires fewer pastures, it increases stag aggression, is difficult to record an individual stag’s performance, and may put the younger stags at a disadvantage (13).

If an elk calf has been rejected or needs to be separated from its dam, goats can be used as nursemaids and their milk provides a good replacement. If the calf is orphaned, it is important that it receive colostrum within the first 24 hours. If elk cow colostrum is not available, goat, sheep, cow, or replacement powder is acceptable. Monitor calves daily until at least 3 weeks of age to note any scours or illness (2).

Many producers wean the calves before the rutting season at about 2 months of age. A less stressful method of weaning allows the calves to have a small amount of contact with their dams through the fence (2).

Good record keeping is an essential part of any successful livestock operation. If you are raising deer for venison, it is recommended that you pair mother and offspring soon after birth. Calves should be tagged no more than 12 hours after birth. Tagging is the same method of identification that is used by cattle farmers. This method permanently attaches a tag, an identifiable mark, in the ear. At this time, the offspring is easy to catch. If tagging will not work with your operation, DNA blood typing can be done to match dam and offspring.

Deer and elk farming have several advantages over other livestock operations. Both of these alternative species can convert pasture into protein efficiently and can utilize poor forage (10). In addition, they produce a high ratio of lean meat per pound of live weight (10). These species are hardy and labor requirements are reduced (10). Deer have a high fertility rate and a long reproductive life (13). Deer are capable of calving easily and weaning their offspring early (13). Additionally, they can be easily transported and have a calm disposition (13). They are able to endure both cold and hot weather, and possess a low disease susceptibility (13).

Fencing and Handling

Both deer and elk facilities should provide grazing areas, a fresh water supply, and shelter. Red deer and elk may take advantage of an open water supply, such as a lake or pond and use it for wallowing. Grazing areas should be fenced with high-tensile wire, with a minimum height of 6 feet for deer and 8 feet for elk. To keep calves in the pasture and predators out, install a strand of barbed wire at ground level or run an electrified wire slightly above ground level (13). A suggested stocking rate for deer is 4 to 6 adults and nursing calves per acre of pasture (13). For elk, the suggested stocking rate is 2 to 3 adults plus nursing calves per 1 acre of pasture (9). Shelter, in the form of a group of trees or a run-in shed, should be provided for inclement weather and calving. A handling area with solid walls and squeeze gate is useful, and an area equipped with a chute is helpful for vaccinating and removing antlers. For safety, one should not handle the males while hard antlers are still attached. To minimize stress on both handler and animal, physical restraint is recommended for short procedures and chemical restraint is suggested for lengthy ones. For chemical restraint procedures, please consult with your veterinarian.

Nutrition

Good nutrition is an integral part of keeping animals healthy and in sound breeding condition. Although deer are ruminants, their nutritional requirements and digestive anatomy differ from cattle. Deer are able to push particles through the digestive tract rapidly and produce copious amounts of saliva, which enables them to digest complex dietary components (11). Deer and elk are herbivores that feed on grasses and twigs (7). Red deer consume pasture, trees, and brush (13). Fallow deer are primarily grazers (8). Elk are early morning and late afternoon browsers that feed on a variety of grasses in the summer and woody growth in winter (15). Elk can also consume feed that is appropriate for cattle such as grasses, alfalfa supplemented with pellets, corn, and other concentrates (6). Land area that is adequate for one cow can accommodate up to three elk, or four red deer, or seven fallow deer (8). Good quality feed should be provided to animals before the rutting season because severe weight loss occurs during the breeding season (13). If animals are being raised for slaughter, grain supplements may be made available to insure weight gain and proper conditioning (13). Mineral blocks should be provided in the pasture (13).

One management strategy for feeding the herd is to separate the group by age so that the dominant animals do not consume significantly more than others do.

Although nutrition plays a role in antler development, supplementation does little to increase velvet production

(11). Prior body condition and body weight from the previous rut are the main factors that determine velvet yield (11). Inadequate amounts of protein and calcium will stunt growth (7). Testosterone levels dictate the size of the next set of antlers and the surge of testosterone is greater in the autumn for mature animals (11).

Copper levels in the diet are important. If this mineral is deficient, it may lead to permanent damage of the nervous system. If detected in the early stages, damage may be stopped, but if left undetected, it may cause death (6). Signs of deficiency include curled hair, hair loss, hoof growth, a staggering gait, exceptional weight loss, and in severe or prolonged cases the inability to stand. If left untreated, death is the eventual result. The soil should be tested as an aid in determining the proper supplement. Deer have a high requirement for copper (5). If cause of death is unknown, arrange for lung, kidney, liver, and intestinal tissue samples to be checked for abnormalities (5). Copper deficiency can be determined through liver biopsy (5).

Ingestion of poisonous plants can cause decreased productivity, and in severe cases, death. The website listed below is one example of a poisonous plant database: <http://res.agr.ca/brd/poisonpl>

Herd Health

Among the diseases that affect these species are Chronic Wasting Disease (CWD), Malignant Catarrhal Fever (MCF), Tuberculosis (TB), and Johne's Disease. Chronic Wasting Disease is a transmissible degenerative brain disease which has been confirmed in limited areas, more specifically, the western United States and some provinces of Canada. CWD has not been diagnosed in farmed deer, but it can affect elk (8). It is similar to Mad Cow Disease in cattle or Scrapie in sheep. Most cases of CWD occur between 3 to 6 years of age and are always fatal. The most obvious sign of this disease is weight loss over time while the rest of the herd appears to be healthy. Other signs include decreased interaction with the rest of the herd, listlessness, lowering of the head, blank facial expressions, and repetitive walking in set patterns in a pen. Post-mortem examination confirms CWD and no diagnostic tools are available. The origin and mode of transmission of this disease is still unknown (6).

Malignant Catarrhal Fever (MCF) is a highly fatal viral disease affecting both exotic and domestic ruminants. Red deer, elk, and fallow deer appear to be less susceptible to MCF than other species of deer (12). Of the two recognized strains, one is often associated with contact with sheep. Over 98% of sheep and 80% of goats are infected with the sheep-associated strain but are well-adapted carriers and show limited or no clinical signs (3). MCF is suspected to be spread through direct contact with infected secretions,

either via direct animal interaction, or via fomites (feeders, waterers, birds, care givers). Airborne transmission may be possible. There is no evidence of transmission between deer. The incubation period ranges from 3 weeks to 6 months (4).

There are both acute and chronic forms of the disease. Acute symptoms, if any, can include fever, depression, lack of appetite, diarrhea, salivation, breathing difficulty, and enlarged peripheral lymph nodes. Death usually occurs within 1 to 3 days. Chronic symptoms may include those of the acute form and, additionally, nasal and ocular discharge, muscular tremors, incoordination, photophobia, and necrotic skin lesions (1). A positive diagnosis requires detection of characteristic histopathological lesions, further supported by detection of virus antibody in serum, or viral nucleic acid in tissue, or lymphocytes. There is no vaccine for MCF.

Tuberculosis is caused by the *Tubercle Bacilli* and affects many mammals. The three known types of tuberculosis are human, bovine, and avian. It is spread through food, water, and air. Bovine TB can affect deer and elk. They can also contract the avian TB from infected birds on the property. This strain is not harmful, but will show up positive on a single cervical, skin TB test.

Johne's disease is caused by the *Mycobacterium paratuberculosis* bacteria. Young animals can be infected and not show symptoms until 3 or 4 years old. Symptoms of Johne's disease include: loss of body condition while the animal is still eating, thirst, diarrhea, rough coat, dry skin, and no fever. The animals may appear to recover from the symptoms, but then lose their appetite at the end. Once the animals show symptoms, death usually follows within 1 month to 2 years (6).

To prevent injury to handlers and other herd mates, antlers should be removed in early summer to allow safe breeding (13). For routine health practices, one might want to combine antler or velvet collection with vaccinations and worming. Adult deer and elk are usually vaccinated for clostridia diseases once a year and calves are given a booster when weaned (2). Cows are usually vaccinated 2 months prior to calving and should not be handled during the last few weeks of pregnancy as this stress may cause abortion (2).

Products

Both deer and elk can provide venison and velvet, in addition to other by-products including hides, antler buttons, and ivories (eyeteeth). Generally, red deer are raised for both venison and velvet while fallow deer are farmed for venison and breeding (8). White tail deer are mainly raised for breeding and trophy hunting. Elk are primarily raised for velvet and trophy hunting (8). Deer and elk can also be

sold into the breeder market as yearlings, weanlings, and older stock. Mature males may also be sold as trophy animals to game and hunting preserves (9).

Prior to establishing a deer operation, one should research demand and identify possible markets (direct or through distributors) (13). Many avenues are available to promote products, such as county fairs, mail-order businesses, national associations, agricultural publications, web sites, and trade publications. You can market directly through consumers or distributors. Velvet can be sold through marketing co-ops or pools (9).

Red and fallow deer are mainly raised for venison. Red deer yearlings are slaughtered at 14 to 20 months of age at about 90 kilograms. Two-year-olds are slaughtered at 24 to 30 months of age and weigh 110 to 135 kilograms (13). Fallow yearling bucks are slaughtered between 15 and 20 months of age weighing in at approximately 45 kilograms. Two-year-olds are slaughtered at 27 to 30 months and 60 kilograms. Yearling elk should be slaughtered at 14 to 20 months of age or at a weight of 190 to 205 kilograms. Two-year-old elk (24 to 30 months) can be slaughtered at 260 to 270 kilograms (9).

Consumption of venison is growing at a rate of about 30% per year. This low-fat, low- cholesterol meat is becoming popular among health-conscious consumers. The table below compares a 3-ounce serving of various cuts of cooked, lean meat to venison. This information was taken from information provided by the USDA (13). It is estimated that in 1992, Americans consumed about 1.2 million pounds of commercially raised venison (13). Only 25% of this venison is raised in the United States, with the balance being imported from New Zealand (13). Although elk are primarily raised for velvet, there could be a potential market for elk venison once the livestock market prices decline (2). The velvet market is overshadowing the elk venison market.

Presently elk venison consists of animals that are older and culled (2).

In addition to venison, red deer produce good quality velvet (13). It is harvested in early summer at about 55 % full growth, and weighs about 1 to 5 kilograms (13). Fallow deer produce a small amount of velvet, about 1/4 to 1/2 kilogram and the demand for this product is not very great. An average elk bull produces about 3 kilograms of velvet at age 2 years, which can increase to about 10 kilograms at maturity (6). A bull produces new velvet each year and this event occurs when daylight hours lengthen. Velvet grows from March to June and is harvested after 60 to 80 days (6). If left unharvested, the velvet will harden into antlers and falls off in the spring (6). Castrating males prior to antler growth will completely inhibit development. If castration is performed during antler growth, it may cause permanent retention of velvet and no hard antler will form (7). Velvet should be removed from the antlers using the most humane method available. Three methods of immobilization are suggested by the elk industry: chemical, physical, and electrical restraint. Administering a drug that renders the animal unconscious employs chemical restraint and then a local anaesthetic is applied to the antler. The physical method of restraint involves using a hydraulic chute (2).

To maximize velvet production, good nutrition is essential. This should be provided year round, especially during the autumn and winter, because the bulls tend to lose condition in the rut. Once the buttons (March) are cast, the velvet is growing and it is too late to improve nutrition as well as velvet growth and quality.

Velvet is used to make traditional Asian medicines and tonics. In 1996 the most valuable antler reportedly sold for \$78 per pound (6). The antler is harvested or removed from the animal, frozen, graded, dried, cut up, and sold. Prices

Various types of meat and their characteristics (3 oz. Cooked portion)

Type of meat	Calories	Cholesterol (mg)	Fat (mg)	Protein (mg)
Venison loin	139	62	5	22
Beef brisket	223	77	13	24
Ground beef	213	84	12	25
Pork shoulder	207	82	13	22
Beef bottom round	189	81	8	27
Lamb loin	183	80	8	25
Veal cutlet	155	112	4	28
Chicken breast	140	72	3	26
Salmon	140	60	5	22

paid for velvet vary between \$50 to \$65 per pound (6). The market for the velvet is unstable and is dominated by other larger velvet producing countries such as Russia and New Zealand (9).

Statistics

The United States population of farmed deer (not including white tail deer) is currently estimated to be 100,000. Canada has about 60,000 deer that are currently being farmed. 1999 estimates of farmed elk are 50,000 to 60,000 which included both numbers for both the United States and Canada. New Zealand leads the world in farm deer production with over 1 million animals. Colorado, Montana and Idaho are the three top elk-populated states in the U.S. (8).

Information Sources

North American Elk Breeders Association
1708 N. Prairie View Road
P.O. Box 1640
Platte City, MO 64079
(816) 431-3605
<http://www.naelk.org/index.html>

North American Deer Farmers Association (NADeFA)
9301 Annapolis Road #206
Lanham, MD 20706-3115
(301) 459-7708
<http://www.nadefa.org>

Exotic Wildlife Association
216 Highway 27 West
Ingram, TX 78025
<http://www.exoticclassifieds.com/ewa.html>

National Alternative Livestock Association
P.O. Box 66
Crawford, NE 69339

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