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Biology & Behavior of Deer

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The Cervidae, the mammalian family comprising all known deer species, represents a collection of animals that occupy a wide range of latitudes and environments. It is simply not possible to generalize briefly about the biology and behavior of the entire family - that would require a voluminous treatise and the combined resources of many cervid biologist. However, the range of species suitable for domestication for deer farming is relatively small and these species share some common characteristics.

Generally, for a species to be a likely candidate for intensive husbandry it should meet certain criteria; such as ...

(1) Tolerance of environmental/climatic ranges encountered at the chosen locality: Species with wide climatic tolerances (e.g. red deer, fallow deer) are generally the most favored domestic species around the world; those with narrow tolerance limits (e.g. chital deer, rusa deer and other tropical species) tend to be restricted to a very narrow latitudinal range.

(2) Sociable & gregarious: Species that tend to be solitary and occupy large defensible territories (e.g. moose, roe deer) are behaviorally unsuited to intensive husbandry requiring high stocking densities. Those species that naturally form large sociable groups (e.g. fallow deer, reindeer) are better suited to such high stocking densities.

(3) Non-migrating: Species that annually migrate over large distances (e.g. caribou) are hard to contain within a given land area. Nomadic herding practices have been adopted in some cases (e.g. reindeer herding in Scandinavia and Russia).

(4) Grazers versus browsers: Most deer farming operations are based on pastoral systems, with grass species providing the bulk of feed. Cervid species that inhabit forest ecosystems tend to be selective browsers (e.g. white-tailed deer, roe deer) and are often unable to adapt to pastoral grazing. Conversely, open range species (e.g. reindeer, caribou), or forest-fringe dwellers (e.g. red deer, fallow deer, Wapiti) are well able to graze pasture and, in many cases, can survive without access to browse.

(5) Disease resistance: High stocking densities are associated with increased challenge from pathogens (often from other domestic species). Species of high susceptibility to a range of pathogens are unsuitable for farming.

(6) Physiological tolerance to handling stress: Species that succumb to disorders related to stress induced by close contact with humans cannot be successfully farmed unless fully habituated to such contact (e.g. bottle-rearing of fawns).

(7) Non-seasonal breeding patterns: species that naturally have a non-synchronous birth season can be easily manipulated to ultimately give birth at a time of year best suited to the locality (i.e. strategic joining of males and females to synchronize conceptions). However, most cervid species of northern temperate origin have highly seasonal breeding patterns that are entrained by photoperiod changes (manipulation of seasonal breeding patterns in these species is the subject of discussion later in this seminar). Some tropical cervid species are non-seasonal breeders but have very limited climatic tolerances.

The most favoured cervid species for intensive farming exhibit most (but rarely all) of these characteristics and include:

(a) Fallow deer (*Dama dama*); farmed in New Zealand, Australia, U.S.A., Canada, Germany, Switzerland, Denmark, Sweden, Italy and Ireland.

(b) Red deer (*Cervus elaphus*) farmed in New Zealand, Australia, Canada (Ontario), U.S.A. (a few states), Britain, Sweden, Denmark, Eastern Bloc Europe.

(c) Wapiti (*Cervus elaphus*); farmed in New Zealand, Canada (Alberta, Ontario), U.S.A. (a few states).

(d) Sika deer (*Cervus nippon*); farmed in New Zealand (limited numbers), China, U.S.A. (limited numbers).

(e) Chital (Axis) deer (*Axis axis*); farmed in Australia, U.S.A. (Texas ?).

(f) Rusa deer (*Cervus timorensis*); farmed in New Zealand (limited numbers), Australia, Papua New Guinea, Southeast Asia, Mauritius, New Caledonia.

(g) Sambar deer (*Cervus unicolor*); farmed in Southeast Asia, Australia (limited numbers).

(h) Reindeer (*Rangifer rangifer*); extensive ranching in Scandinavia, Russia, U.S.A. (Alaska).

For the purposes of this paper I will discuss biology and behavior of red and fallow deer only, as these two species account for about 90 per cent of all farmed deer, excluding reindeer in the arctic tundra and sika deer in China. For various reasons, both biological and political, it is unlikely that the major native deer species of North America (i.e. white-tailed deer and mule deer) will be farmed or ranched on a large scale. However, Wapiti are ranched in some states of North America.

Both red and fallow deer are forest fringe dwellers and have proven capable of adapting to marked changes in habitat. Provided that predation can be minimized, both species thrive in a pastoral environment. In fact, in New Zealand, most deer farms provide little access to forests and the deer spend their entire existence grazing rather than browsing (many cervid species, including white-tailed deer, do not thrive in a pastoral environment and are completely unsuited to this form of husbandry). It must be recognized, however, that both red and fallow deer seek forest shelter for a reason (principally to escape predation) and transference to another environment can be fraught with difficulties.

It is, therefore, important to understand the biological needs of these animals in order to manage them in a low-stress environment.

Key points about the biology and behavior of red and fallow deer are as follows:

(1) Deer depend on their acute hearing, sense of smell and speed of movement to avoid predators. Their reactions to danger are amazingly quick and they are built for speed not strength. As a consequence, we often view deer as being "nervous". However, we would be better to recognize that, rather than being nervous, they are constantly alert and fast to react. For deer to feel comfortable in an environment in which there are no forests in which to hide, it is important that they are habituated to the benign presence of people and are not unduly subjected to unusual stresses (e.g. barking dogs) which may cause panic.

Deer in an open pastoral environment become habituated to people and events, and they are less inclined to panic. In fact, they tend to maintain a determinate distance from people; even to the point whereby the herd will spread out in a semi-circle with a constant radius. This is called "flight-distance"; that is, the distance at which they remain alert to danger, but will not run away. As deer become more habituated, the flight distance diminishes; even to the point where physical contact can be made. This is particularly noticeable in situations whereby favored feed rations are provided daily by the farmer.

No matter how tame deer appear to be, they will always remain alert to danger. The principle of good farming is to modify their concept of danger so that they do not panic when faced with normal agricultural practices.

(2) Red and fallow deer exhibit highly seasonal patterns of growth and reproduction. Both species have evolved in continental Europe under the influences of hot summers and cold winters. These environments typically display marked variations in season feed availability. The major evolutionary response of deer to these conditions is to produce their offspring at a time of year most conducive to survival (summer) and to regulate their metabolism in line with fluctuating feed supply and temperature. These patterns of growth and reproduction are genetically fixed within the species and will be displayed to a similar degree in all environments in which they are likely to be farmed.

Farmers will need to fully understand the seasonal biological patterns of their deer in order to provide the appropriate environment and feed to ensure optimum

performance from their livestock. These patterns will be discussed in detail elsewhere in this seminar.

(3) Rutting behavior of male red and fallow deer occurs in autumn, being generally slightly earlier for red deer than fallow deer. The stags/bucks actively compete for access to estrous females. During this time male deer become very aggressive towards each other, and sometimes towards humans. It is important to provide the right environment for rutting deer to ensure high conception rates amongst the females and low mortality/injury rates in the males. For example, excessive numbers of males - females in confined environments can result in low conception rates due to intense rivalry between males and high death rates amongst the males.

Rutting management will be discussed in detail in the session on reproduction.

(4) Male red deer and fallow deer grow new antlers annually. Old antlers are cast in spring and new antlers grow through late spring and summer. They harden in late summer in response to increased testicular secretion of androgenic hormones. Antlers are primarily for display while males gain access to females during the rut. However, when the bluff fails, antlers have a more sinister role - they become primarily weapons of defense and offense. Antlers are the hardest known biological tissue and can withstand high impact stress. Red and fallow deer males classically lock their antlers together during combat and a pushing contest ensues. However, it is not uncommon for severe injuries to occur, sometimes leading to the death of one of the opponents.

Much has been said about the removal of antlers from male deer. Traditional thinking (particularly in Europe) is that antler removal is akin to "physiological castration". Experience in New Zealand, where most farmed stags/bucks have their antlers removed before the rut, is that antler removal has little affect on rutting activity and greatly simplifies management during the rut. It certainly reduces the incidence of mortality amongst adult males.

Antlers also pose a danger to humans. Having experienced the wrath of an angry antlered stag at very close quarters (modesty forbids that I display my sensitively sited scars), the aesthetic appeal of antlers cuts no ice with me. I prefer full antler removal before the onset of the rut.

The golden rule of farming deer is ... "never trust a stag/buck during the rut; especially if he carries a full rack of antlers". Having done my moral duty of providing the warning, I will admit that there is nothing more majestic in nature than a stag or buck with a full rack.

(5) Female red and fallow deer, as is typical of many cervid species, give birth in summer months. The calves/fawns do not closely associate with their dams for the first two or three weeks after birth. They prefer to "hide-out" rather than follow their dams. It is normal, therefore, to see calves/fawns hiding by themselves. The dams will seek out their offspring at regular intervals to nurse them. Following suckling and nursing, the calf/fawn will walk away and hide in any available cover.

Good management practice during the birth season includes providing adequate shelter for young calves/fawns to hide in. This will provide protection from extreme heat (particularly important in Southern states), and predators ("hiding-out" is an important adaptation for predator avoidance). Shelter will be in the form of groves of trees, shrubs, long grass and even artificial structures such as stacked hay bales, sheds, etc.

However, it is important not to compromise good pasture quality for lactating females in order to provide shelter for calves/fawns. Rank grass (standing hay) may be good shelter, but is very poor feed. It would be preferable to allow only a small portion (10 per cent) of each birth paddock to become rank grass, while maintaining the remainder of the paddock as high-quality pasture. Small areas of forest provide excellent shelter, but need not account for more than 10 to 15 per cent of the paddock area.

If inadequate shelter is provided within birth paddocks, it is likely that calves/fawns will attempt to seek shelter outside by maneuvering through the mesh fence. This will invariably lead to a high incidence of calf/fawn deaths through "hang-ups", or other forms of misadventure. A number of farmers in New Zealand now eliminate all forms of shelter in a five to ten yard wide strip on either side of the fence. This reduces the temptation for calves/fawns to wander through the fence.

Excessive disturbance during the birth period can result in dams rejecting their newborn offspring. However, if the deer are well habituated to the presence of people, it is possible to handle calves/fawns. This may be necessary in order to shift deer from one paddock to another. It is important, however, not to disturb the hind/doe during parturition and within two hours of parturition. Doing so may result in the female rejecting her calf/fawn and may inhibit the "bonding" process that occurs within an hour of birth.

(6) Red and fallow deer can withstand wide climatic extremes. In general, fallow deer appear slightly more tolerant of extremes in heat, while red deer appear slightly more tolerant of extremes in cold. The differences are marginal. However, where climatic extremes exist, it is always important to provide adequate shelter. Both species will actively seek shade in the heat of summer and wind shelter during winter.