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Reproduction of Deer and Management During the Rutting Season

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Red deer (Cervus elaphus), fallow deer (Dama dama) and Wapiti (Cervus elaphus) exhibit highly seasonal patterns of reproduction. Calves/fawns are born during summer months when climate and feed availability are most conducive to survival. The synchronous birth season is a consequence of a short period of sexual activity in the preceding autumn when the males (stags, bucks or bulls) exhibit intense rutting activity and the females (hinds, does, or cows) come into estrus (heat), are mated, and conceive.

These events during the rut are regulated by various environmental cues, the most important of which is the regular annual change in photoperiod (amount of daylight within each 24-hour period). Sexual activity is stimulated by decreasing day length as autumn approaches. While seasonal changes in climate and feed availability may influence marginally the onset of the rut, these environmental cues are notoriously variable between years and unreliable predictors of a suitable birth season. However, daily photoperiod changes are constant between years for any given latitude and are a very reliable seasonal cue.

Female Reproductive Cycle

Female deer that accept the sexual advances of the male, and are willing to mate, are described as being in estrus (or heat). Such receptivity is a hormonally induced condition that occurs for only a very short duration (matter of minutes or hours) each year. Ovulation occurs within 48 hours of the occurrence of estrus. Most females mate and conceive to the first estrus of the rut. If, however, pregnancy does not occur, the female may exhibit a series of heats at either 18-day (red deer) or 21-day (fallow deer and Wapiti) intervals for four to six months, or until pregnancy occurs. The interval between two successive heats is termed the estrous cycle.

Most females conceive to their first estrus of the season and, therefore, do not exhibit estrus cycles. This gives the impression that the female breeding season is only two to three weeks in duration.

Estrus behavior in female deer appears quite passive compared to that of other livestock species. Furthermore, as the duration of estrus is very short (i.e. is usually terminated at mating in many deer species), it is seldom observed by deer farmers. Methods of estrous detection used for sheep and cattle can sometimes work reliably for deer (e.g. crayon mating harness designed for sheep work very well on fallow deer).

The gestation length (interval of pregnancy) varies with species but is fairly constant within species. Average gestation length is 234 days for red and fallow deer and 250 days for Wapiti. Conceptus mass does not appear to influence female liveweights until about 120 days of gestation. Thereafter, pregnant females have a higher daily liveweight gain than non-pregnant females, such that towards the end of gestation pregnant red deer hinds are about 30 - 40 lbs. heavier, and pregnant fallow does are 12 - 16 lbs. heavier, than their non-pregnant contemporaries.

Pregnancy diagnoses can be reliably performed by real-time ultrasound scanning between 35 and 90 days of gestation with a rectal probe. Older foetuses can be detected with a belly scanner.

The fawning season of fallow deer generally starts later than the calving season of red deer, but tends to be more condensed. The first fallow births usually occur in early June, whereas red deer births may start in mid-May. However, fallow births are heavily concentrated within the 20-day period between June 5 and June 25, whereas, red deer births are generally more evenly distributed over a 40-day period.

Very late-born calves/fawns do occur on some farms. This is particularly so if sire males remain with the females throughout the autumn and winter months. This allows persistently cyclic females to conceive at their third, fourth or even fifth estrus. As it is generally believed that calves/fawns born in August and September have low survival rates and complicate management, it is becoming common practice for farmers to remove sires from the breeding herds after only six weeks (i.e. removal at the end of November). This will prevent calves/fawns being born later than July, but will likely increase the number of non-pregnant females (at least within the first year of adopting the practice). Failure of these females to give birth within the correct period in the following year probably indicates reproductive disorders and they should preferably be culled.

Lactation is a considerable metabolic drain on female deer. All attempts should be made to optimize feed quality during this period, in order to maximize lactational yields and calf/fawn growth rates. If pasture quality over summer is inadequate it will be necessary to resort to additional supplementary feeding of pellets, grain, hay or silage. Pasture planning will need to be instigated at least one month before calving/fawning is expected to start.

Careful observation of female behavior during the calving/fawning season may help farmers recognize problems if they should arise. An understanding of the normal parturient and maternal behavior patterns is necessary in order to detect abnormal situations requiring attention.

- Females tend to become restless up to 48 hours before parturition. They will often disassociate from the main herd, pace the fence line and, as birth becomes more imminent, frequently lick their vulval region.

- In small paddock situations it is often difficult for hinds/does to segregate from the herd and disturbance by other females can occur. This can be reduced by offering more land area for calving/fawning and consequently reducing the stocking intensity.

- The interval from the first signs of parturition (e.g. waterbag emergence) to the final stages of birth can range from 20 minutes to six hours. Longer intervals may indicate a difficult birth requiring assistance.

- Following parturition, the female usually spends 30 - 60 minutes alternating between cleaning the newborn calf/fawn, removing the afterbirth, and suckling the youngster. As bonding occurs during the first hour it is very important to avoid disturbance at this stage.

- In small paddocks (0.5 - 1.0 acres) it has been noticed that young calves/fawns may suckle from their dam about seven to eight times during daylight hours for the first ten days. Suckling activity is usually initiated by the dam. This behavior may differ for deer kept under more natural surroundings (larger paddocks, forest cover, etc.) as frequent disturbances of calves/fawns by other females often lead to suckling activity between the youngster and its dam.

- Calves/fawns actively seek shelter in which to hide. Ensure adequate hiding places are available, but do not sacrifice pasture quality. Rank grass is good cover, but poor feed. Trees, shrubs, branches, hay bales, etc. make excellent calf/fawn cover.

The range of normal birth weights is as follows:

fallow deer	:	8.5 - 10.0 lbs.
red deer	:	16.0 - 24.0 lbs.
Wapiti	:	24.0 - 30.0 lbs.

Calves/fawns born below these weights generally have poor survival rates. Low birth weights may relate to poor nutrition during gestation.

Female Puberty

For red deer, fallow deer and most Wapiti, first estrus and ovulation normally occur at 16 months of age (second autumn). For puberty to occur at this age, females must exceed minimum weights according to species; 55 lbs. for fallow deer and 145 lbs. for red deer. Threshold liveweights for puberty in Wapiti have not been determined. In practice, farmers should aim to attain average liveweights at 16 months of age well in excess of the threshold weights. This will ensure that most animals in the herd reach puberty at this time.

Male Reproductive Cycle

Apart from siring offspring, male deer contribute nothing to the growth and development of calves/fawns. Yet their entire annual cycle centers around reproduction. Stags/bucks invest incredible amounts of energy into mating activity during the rut, a period of only two to three weeks each year. The remainder of the year seems to involve recovery from the effects of the rut, or preparing for the next rut.

For adult male deer, rapid liveweight gains occur during spring and summer months, such that peak annual liveweights are attained immediately prior to the rut in autumn. The increases in liveweight mostly represent increased deposition of subcutaneous and depot fat, as well as increased neck muscle mass.

During the rut (October/November) adult male deer drastically reduce their feed intakes and markedly increase mobile activity. The resultant negative energy balance leads to very rapid mobilization of fat reserves and some catabolization of muscle, such that stags/bucks may loose up to 30% of total body weight in a three to four week period. They regain little liveweight over winter. It is not regained until the onset of spring, when the growth and fat deposition cycle starts over again.

Testicular development in adult male deer also undergoes annual cyclic changes. Testicular size increases towards the rut, attains maximal spermatogenic and androgenic output during the rut, and goes into complete quiescence in spring and early summer. The antler cycle of stags/bucks is closely linked to the testicular cycle. Old antlers are cast during early spring when the testes regress. Casting is in response to a marked decline in the testicular secretion of the hormone, testosterone. The new antler grows during the following period of low testosterone secretion through spring and summer. As testosterone secretion is reinstated in late summer, the velvet antler mineralizes and eventually the soft outer layer is stripped off (August/September). The hard antlers are retained throughout autumn and winter.

Rutting Behavior

The autumn rut lasts only a few weeks and is associated with profound and spectacular changes in the behavior of stags/bucks. The most characteristic behavior is the rutting vocalizations: "roaring" of red deer, "groaning" of fallow deer and "bugling" of Wapiti. Such vocalizations can occur throughout the day, but appear to be more frequently emitted at dawn, dusk and at night.

During the rut, males have been observed to reduce grazing activity from 30 - 40% of total daily activity in summer, to as low as 2 - 5% in October. This, along with increased mobile activity associated with rutting, results in a severe loss of liveweight. During the rut, male deer become very aggressive; particularly towards one another, but also occasionally towards humans.

Management During the Rutting Season

(a) Weaning: It is generally preferable to wean calves/fawns prior to the start of the rutting season. This allows the dams to "dry-off" and gain liveweight before ovulation is expected to start. It also facilitates the establishment of mating groups that requires sorting of hinds/does for particular sires.

However, weaning is feasible only if there are enough paddocks to adequately separate weaners and their dams. Furthermore, lactation will not inhibit ovulation unless the hinds/does are in poor body condition. Therefore, inhibition of lactation is not a necessary prerequisite for optimal conception rates during the rut.

(b) Multi-sire vs. single-sire mating: Single-sire mating regimens are generally used when a farmer wishes to guarantee and identify offspring from a particular stag/buck. In fact, single-sire mating is a key element in all genetic improvement programs and is useful if young sires (e.g. 16 months old) are to be used. It is important, however, to insure against stag/buck infertility by replacing sires after one or two estrous cycles. While the incidence of infertility is very low, the economic impact of just one infertile sire can be severe.

It is also important to maintain the correct ratio of females. In general, older sires will cover more females than younger sires; as follows,

Recommended numbers of hinds/does per sire stag/buck:

Age of Sire	Number of Females
16 months	10 - 15
27 months	15 - 20
39 + months	30 - 35

When paddock numbers are limiting, it is considerably easier to establish multi-sire mating groups (i.e. more than one stag/buck per mating group). The ratio of males to females remains similar as for single-sire mating, but there are important considerations with respect to paddock size and topography. As male deer are strongly territorial during the rut, it is important to allow the mating group sufficient area and varied topography for individual sires to develop non-overlapping territories. Should the land area be too restrictive it is possible that stags/bucks will expend too much energy fighting over territorial boundaries. Furthermore, younger bucks will be restricted from mating in the close proximity of larger dominant bucks. This could lead to a situation where the dominant sire is expected to do all or most of the mating.

(c) Removal of sires after the rut: It is often advisable to remove sires by the end of November to restrict the duration of the birth season and to facilitate winter feeding management. Often the stags/bucks will want to leave the hind/doe group at this time and it is not uncommon to find them away from the main herd. If such is the case, sire removal can be achieved simply by observation and closing gates at the appropriate time.

If single-sires are to be grouped together after the rut, it is advisable to run them separately in adjacent paddocks for several days. This allows them to become familiar with each other and prevents excessive fighting once they are brought together.

(d) Beware of dangerous stags/bucks: Many male deer lose much of their fear of humans during the rut. Red stags and Wapiti bulls in particular are very dangerous due to their size and speed. A person cannot outrun these animals. It pays to be very cautious.

Early signs of aggression include teeth grinding, tongue lolling, flared pre-orbital glands and exaggerated goose-step walking. This is often just bluff, but may pre-empt an attack. Bottle-reared male deer are the most dangerous of all.

(e) Antlers: While stags/bucks with full racks may look impressive, they are considerably more dangerous to both the females and humans. It is always preferable to remove antlers prior to the start of the breeding season. In multi-sire mating situations do not place antlered males with antlerless males - the former will completely dominate the latter. In single-sire situations keep mating groups separated by at least two fences - if antlered males fight between a single fence barrier, they will ruin the fence.