CHAPTER FOUR

REPRODUCTION IN CAMELS

Reproductive performance of male and female camels can be improved by careful attention to management throughout their life. Better feeding and management may also help to prolong the lifespan of a camel.

The **sheath or prepuce** is large, fleshy, and triangular in shape. A well developed lateral perpetual muscle directs the penis towards the rear when urinating but towards the front at erection for copulation.

The camel has a T-shaped uterus and the left ovary is usually more active than the right ovary in egg shading. The sight of pregnancy is almost invariably in the left horn of the uterus. The left ovary is usually more active than the right ovary in the ratio of about 55:45 of egg shade. The site of pregnancy is almost invariably in the left horn of the uterus, indicating that ova or embryo migrations occur. The left horn is larger than the right but the real reason for the migration is not known.

4.1. Sexual maturity in males and females

Puberty is time of sexual maturity, when animal becomes capable of propagating its species. Sexual maturity is often related to physical maturity.

Under most conditions male camels reach puberty as early as 3 years, but the optimal age to begin is between 4–5 years.

At 6 years of age males are in full reproductive vigor and their sexual abilities remain more or less constant until they are 18 to 20 years old. Usually the best males are selected for breeding and the rest are castrated or used as baggage camels.

Female camels are normally mature at 3 years of age, but they are not generally bred until they are 4 years old. They may continue to breed until they are over 20 years old.

4.2. The rut and Male and Female sexual cycle

Onset, length and season of rutting

Rut is the physical and physiological sign of sexual activity in a male camel. The male undergoes behavioral and hormonal changes during the rutting season. Male camels show a strong “rut” when they are ready for breeding, at sexual maturity and at various times of the year. The average duration of rut is about 3 months. It is affected both by age and nutrition.

The breeding season lasts about 3–5 months on average. Older males may continue in rut throughout the year and in the case of well-fed younger animals rut may last for up to 5 months. There was no specific rutting season for animals on or near the equator (probably within the tropics), where rutting may take place throughout the year.

When driven to hard work the male camel’s sexual inclinations may diminish or disappear. There appears to be very considerable geographical variation in the breeding season of camels.

Rutting

In normal situations the male is docile and easily controlled. However, in the rutting season he can become extremely restless, aggressive and dangerous. The rutting males become irritable, readily attack each other and timid males soon learn to keep away from the territory staked out by more aggressive males. In other words heavy and strong (and therefore usually older) males are often dominant over smaller and weaker males. Dominant males attack those lower down the pecking order, or subordinate animals, which then lose libido and go out of rut.

Signs of rut

The male camel blows a balloon-like structure out of the side of his mouth. It is an **exudation of pool glands in dromedary** and **extension of soft pallet in Bactrian** and known as “**dulaa**”. The pool glands (occipital glands, glands between the ears) in male camels secrete a sticky dark, bad-smelling fluid during the rut. The secretion has an androgen concentration similar to

that of the blood. These secretions are often the first signs that mating season is approaching and can help a handler to begin to proper his herd for mating.

The appearance of he camel is accompanied by a roaring-gurgling sound (attractive sound) to females. Besides, frothy discharge from the mouth (lips are often covered with saliva), grinding teeth, waving head and neck about, diarrhea and loss of appetite are observed during the rut period.

The back legs are spread, and the tail is then beaten against the penis, urinate frequently with the urine being splashed about the camel and anything close to it by the tail. Eventually, the hindquarters have a strong urine odor.

During the rutting period the usefulness of the male as a work animal is diminished, because he loses his appetite, develops occasional diarrhea and displays abnormal behavior patterns.

The **female camel** has a palatal flap and neck glands. These glands are dormant. This suggests the dependency of secondary sex characteristics on the androgens.

Sexual cycle of the male camel

The male camel is a seasonal breeder, the season corresponding with that of the female. The female camel is also seasonal breeder and mating occurs

during the rainy or cold season. Longer hours of daylight initiate the breeding season.

The male camel can mate at 3 years of age, but the optimal age to begin is between 4–5 years. At 6 years of age they are in full reproductive vigor. The male can breed for 7 years.

Sexual cycle of the female camel

The pattern of the reproductive cycle appears to relate to the harsh environment in which the camels live. The calves are born in the months most suitable to guarantee their survival.

The female camel is a seasonal breeder (seasonal polyoestrus), the season corresponding with that of the male. There is no spontaneous ovulation in the camel, so that without mating there is no breaking open of the follicle that allows the release of the egg. This type of cycle involving reflex or induced ovulation is known as a follicular wave.

Ovulation occurs 30 - 48 hours following copulation and without pregnancy there is no formation of a corpus luteum. If the camel is well fed, oestrus can occur within one month post partum. If the camel has no milk, then oestrus occurs within 28 days. This means that with good feeding conditions camels can be mated as soon as the young calves start grazing.

In camel there are four distinct phases of follicular wave: the **mature follicular stage**, **atretic follicular stage**, **non-follicular** and **growing follicular** stages.

The period of **oestrus** is easily recognizable by the general symptoms. As an induced ovulator the female camel normally needs the stimulus of sexual act for eggs to be shade. When mature follicles are available in the ovary the female becomes willing to accept the male.

- **Mature follicular stage** - it is equivalent to oestrous (heat) in other domestic animals. Female camels accept the male only during this stage and should be watched for signs of “heat” and mated only at this time.(4 – 6 days)
- **Atretic follicular stage** – starts after a varying period of time if mating does not take place during the mature follicular stage. Follicles regress and become smaller in size. (7 – 14 days)
- **Non-follicular stage (14 – 18 days)** – Does not show any follicular activity, and the emergence of several follicles on the surface of the ovary
- **Growing follicular stage (18 – 28 days)** – The establishment of one or two dominant follicles

Under good managerial conditions, a female may breed twice in two years. Multiple ovulations may occur, but the incidence is low.

Length and frequency of oestrous cycle

The term oestrous cycle correctly refers to animals, which are spontaneous ovulator. In camels the breaking open of the follicle that allows the release of the egg does not occur spontaneously and some kinds of stimulus are

required to induce release of the ova. This type of cycle involving reflex or induced ovulations is properly known as follicular wave.

The length of the oestrus cycle is normally 2–3 weeks (14 -21 days), although in the Bactrian camel the period can extend to 30–40 days. Although 21 days was considered as being the period of heat, dromedaries can come into silent or unobserved heat periods.

The oestrous period it generally lasts 3-4 days although a range of 1–7 days is given. Both are slightly shorter than the range of 6–8 days of the Bactrian camel.

Signs of oestrous

During the oestrous period the female dromedary shows both anatomical and nervous signs of heat. She is generally restless, seeking the company of the male and tending to bleat continuously. She develops a swollen vulva, often associated with a discharge. Oestral camel cows emitted a penetrating, foul smell fluid from the vulva that could be smelt over long distances, but which had an excitative effect on the males. The vulvar lips contracted and swelled at intervals and that the animals tended to raise their tails and micturate more frequently during oestrus. Females at this time are generally capricious, and when forced to work excited by weights applied to their flanks.

The external symptoms of oestrous are that: camel becomes restless and often aggressive, the female seeks out a male and stands beside him, is very ready to be mounted, bleat frequently or even continuously, lift the tail and

wave about and pass small quantities of urine frequently. Besides the vulva is opened and closed irregularly and it emits foul smelling mucus (foul smelling to humans and is a very attractive scent to male camels). The vagina is also pink colored and moist, although the degree of wetness decreases as heat progress

Vaginal examination shows that the cervix is moist and relaxed. Rectal examination shows uterine horns are swollen at the beginning of heat, although not so much as in the cow.

Females that are not in heat do not mount others in heat, but they will run after them in playful manner and attempt to bite their vulva. Males seek out females by smell, usually sniffing along the neck and not at vulva.

4.3. Courtship and mating behavior and reproductive process and fertility rates

Camels are “slow” breeders with low reproductive rates. This is due to their large size, their long life and their adaptation to the harsh environments in which they live.

Copulation

The camel bull tends to herd its females and constantly investigates their perennial regions. After having picked up their smell he displays “flehmen”.

He forces the receptive female to sit and mounts her from the rear and coitus takes place.

Physical maturity is the term used to denote that the animal is physically large enough to cope with both the pregnancy and the rearing of calve. Both male and female should be used for mating during physical maturity.

If females mated before physical maturity they may remain stunted or calves born will tend to be small with a lower chance of survival. If males mated before physical maturity the quality of the sperm may be poor, the animal will be exhausted due to inexperience at mating and reduce the ultimate size and fertility.

Incase if the male selects a female and she is not willing to go down quietly when he approaches her, he will bite at her neck and eventually roughly force her to the ground. There the female utters her guttural protest, while the male first straddles her and then gently slides down until he is squatting on his back legs.

During copulation the bull gurgles, froths, extrudes the dulaa. Mating is carried out with the female sitting in sternal recumbency and the male squatting behind her with his hind legs flexed and his forelegs extended on either side of the female as seen in fig. The duration of copulation can vary and tends to decrease as the weather becomes warmer. On average dromedaries mate for 5.5 minutes but this can range from anything between

3 - 25 minutes. Bacterian tend to mate for less time i.e. on average 3 minutes but can be as long as 10 minutes.

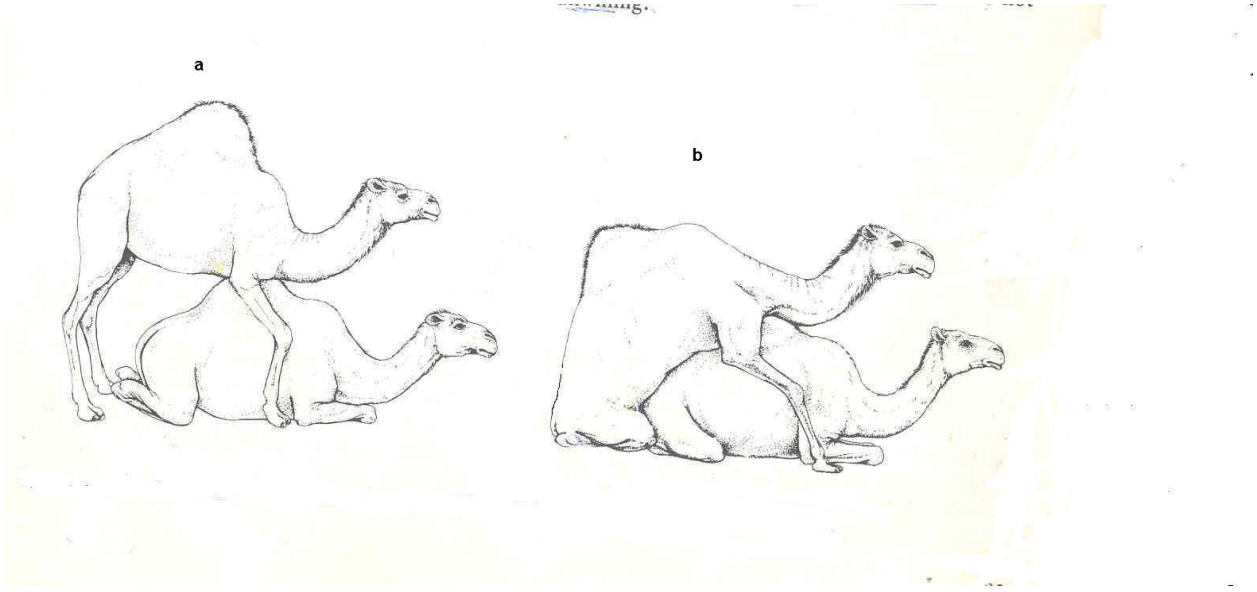

Figure: Copulatory position of the camel: a) approach stage, and b) full coitus

Erection is only achieved after the female is mounted in a sitting position and the penis is not fully extended until after intromission is complete. Ejaculation appears to occur almost throughout the entire duration of copulation. Straining of the body in the camel accompanied by an extension of the neck usually signifies occurrence of ejaculation. Fibroscopic evaluation of the cervix before and after breeding has shown that semen is deposited partly intra-uterine and partly intra-cervical or vaginal

The volume of a natural ejaculation can be as much as 15 ml. Motility of sperm is low about 60 to 80 percent

Pregnancy diagnosis

When a female camel is pregnant she will run away from any male which approaches her. Pregnancy can be detected by the herders within 10 days after mating. They watch for the female's pregnancy symptoms such as coiling the tail backward to the hump, frequent urination, the head lifted up with ears pointed straight, and the long neck curved back to the shoulder when a male camel or a man approaches. These symptoms are prominent after more than a month of pregnancy, but are not as pronounced in the first few weeks of pregnancy. However, due to their professional experience, the herders can correctly judge whether the camel is pregnant within a short period after breeding. The rutting male also detects the pregnancy after a week or so.

In addition to this, pregnancy can be diagnosed by rectal palpation from 1.5 months (45 days) after conception by an experienced person. The surest method of pregnancy diagnosis is by radio immuno assay. Pregnancy determination is important in the care of the females, the selection of males and in long-term planning.

Gestation period

The camel has a bicornate uterus which T-shaped rather than the normal Y-shaped. The length of gestation period in one-humped camel (dromedary) is 365 to 395 days (average 387 days) whereas that of the Bactrian camel is 402 days (13.5 months).

Female camels tend to dry off naturally after conception. Camels are known to reject further breeding after conception, and oestrous cycles are normally discontinued. Camels are known to reject further breeding after conception.

Age at first calving

Better feeding, improved health care and improved overall management will enable camels to produce their first calf at a younger age. The averages age at first calving is between 5 and 7 years. This disadvantage is largely offset by the camel's longer breeding life.

Calving interval

The interval between successive births in camels appears to average about 24 months or 2 years. This is probably related to the long gestation period of the camel and the very seasonal nature of its feed supply. A camel conceiving in one raining season calves after 12 or 13 months later. She then has to feed her calf and the action of the milk hormones prevents her returning to the reproductive cycle state for some time. Because the period of good feed is short by the time she is ready to start the cycle again and her nutritional status is not good enough for this to happen. She therefore does not conceive until the next raining season and does not calve for 2 years.

Male to female ration

There is considerable divergence as to the ideal ratio of males to females during the breeding season. Estimates vary from as low as 1 male per 5–7 females, through medium levels of 1:10–30 to as high as 1:50–80. When

sexual mature, the male dromedary can mate (serve) 50 to 80 females in one season when he is in good condition. On the contrary the male Bactrian camel can mate with 10 females per season.

A camel stallion can breed three females per day at the peak of the breeding season, although higher levels are possible.

Parturition (giving birth)

Parturition generally occurs with the dam in a lying position, although delivery in the standing position is also possible. Most females will deliver unaided.

The parturition time lasts about 5 – 6 hours in most cases. The three of stages parturition are dilation of the cervix, delivery of the fetus and expulsion of the placenta. The initial stage, or let down, is the longest. The second stage of parturition (expulsion of the foetus and foetal membranes) is very rapid and lasts about 15 minutes. The afterbirth generally breaks away within 30 minutes. Females stand up soon after delivery. It is by standing up that the umbilical cord is severed.

The hormonal mechanisms that are responsible for starting the process of parturition (expulsion of the young) are not well known.

The camel does not lick its young following birth nor do they eat placenta or afterbirth as do the cow and mare, but it is an excellent mother. After delivery camel herders often dry the calf with a sack or straw and shelter it away from cold draughts and wind.

If the female loses her young she will become very distressed. In order to keep the female producing milk the skin should be taken from the young camel and stuffed with straw. The female will continue to produce milk for her "baby". In llamas and alpacas pregnancy lasts for about 1 year. Both the llama and alpaca will easily accept any young animal and foster it with no difficulties at all.

Fertility Rates

Fertility is defined as the ability of the male and female to produce viable germ cells, mate and conceive, and subsequently give rise to living young. The fertilization rate of camels is considered very low, 50% fertility or even less has been recorded. Even under improved management the fertility rate of camels is very unlikely to be much higher than 50 % in pastoral herds. The theoretical maximum annual calving rate is thus 50 – 80%.

Infertility and slow breeding habits of the camel can be associated with poor feeding and management. The factors contributing to low fertility in the camel are many and complex. These are anatomical abnormalities, foetal death, late age at first calving, limited rutting potential, prolonged calving interval, inadequate nutrition, management practices & disease.