

Camel Reproduction – Is It Seasonal?

The female dromedary is a seasonal breeder; it is sexually active for one short period of the year during the rainy season - spells with low temperatures and abundant rains giving good quality grass. (In the Sudan this takes place from March until August.)

Camel reproductive physiology is different from other livestock: both males and females come into heat. Once the breeding season has begun, the female camel will come into heat every 20-25 days. However, it's not as simple as this; in fact, camels are induced ovulators and exhibit follicular cycles with follicles developing and regressing successively. Ovulation will occur only when mating takes place. It could more accurately be described as waves of follicular growth than regular oestrous cycles.

For example, the duration of the follicular cycle is very variable from one country to another (depending on the plane of nutrition, management practices, health and genetic factors):

- India: 17 to 23 days
- Egypt: 24 days
- Sudan: 28 days

The oestrous period generally lasts 4-6 days. Female dromedaries show both anatomical and behavioural signs of heat. Ovulation occurs 24-48h after mating. It is a combination of sperm chemical factors and male stimulus that induces the LH surge. **The ovarian cycle involves a succession of follicular phases, usually with the absence of a corpus luteum; ovulation is caused by mating.**

Anatomy of the Camel: Is it Similar or Different Compared to the Reproductive Tract Anatomy of Other Animal Species?

The female dromedary reaches puberty at about three years old and is seldom bred before four years of age. The anatomy of the camel uterus is very similar to equine and bovine species.

Uterus

The dromedary camel has a bicornuate uterus located in the abdominal cavity. The left horn is slightly larger (8 to 15cm) than the right (6 to 10cm) (99 % of pregnancies occur in the left horn). The cervix is short (4 to 6cm) and extends into the vagina. The camel's cervix has a number of mucosal folds arranged in three or four rows. As in cows, the uterine body is short: 2 to 3.5cm. The oviducts are narrow (1 to 2 mm) but become larger at the ovarian end.

Ovaries

Average ovarian size is between 13mm and 29mm, and their morphology changes according to the physiological stage. The size and weight of the gonads are influenced by the stage of the reproductive cycle. The gonads are fairly flattened organs with numerous ovisacs giving them the appearance of

a bunch of grapes. The follicles generally take about six days to grow to maximum size (range two to 14 days). Grown follicles remain for five to 19 days (average 13 days) before regressing over a 7- to 10-day period. Approaching ovulation follicular diameter is around 1.5 to 2.5cm. A corpus luteum is normally observed throughout pregnancy. Its shape varies between spherical, oval and elongated. In early gestation, it has a flabby consistency, becoming larger and firmer as pregnancy advances. The corpus luteum of pregnancy is light brown with a greyish central cavity, and variable numbers (one to three) may be found on the same ovary. The incidence of double ovulation is around 14 %. Twin births occur in only 0.4 % of cases.

Benefits of Ultrasound in Camel Reproduction? How do you Use It?

The use of ultrasound is necessary to follow the follicular growth pattern in order to determine the precise moment of ovulation, as is common practice in equine reproduction.

Ultrasonography has made it possible to distinguish four phases during the follicular cycle:

- **Recruitment** (Average two to four days, with 2-3mm diameter follicles.)
- **Growth** (Average six to 10 days, until dominant follicles reach a size of around 2cm.)
- **Maturity** (Corresponds to oestrus, when the dominant follicle is able to ovulate at around 2.5cm diameter. If dominant follicle size is over 4-6cm diameter, ovulation is impossible. This takes on average four to eight days.)
- **Regression** (Average 11 to 16 days, the contents of the follicles will become echogenic due to the presence of fibrin.)

Ultrasound Pregnancy Diagnosis:

The traditional method used by the breeder is that of the statement of the tail. Pregnant females raise the tail to the male camel, or even in the presence of the breeder. Ultrasound is the best method to check early pregnancy from 17 days, when it's possible to see the conceptus and corpus luteum. It is important to note that a single examination is inadequate to confirm pregnancy because of the high incidence of late embryonic mortality (at around 40-50 days).

The camel's rectum is very long, sinuous and tightened: without experience and practice, it is very tiring performing pregnancy diagnosis by ultrasound!

The gestation period of the dromedary is often quoted as about one year, with a range of 355-389 days. Uterine involution post-partum takes around 20 days. The average time between births is usually around two years. Generally, fertility rates in camels are extremely low; this may be due to a lack of developing follicles, embryonic mortality, and abnormal anatomy of the genital tract.

(Sources: Dr A Zarrouk, Dr O Souilem, Dr JF Beckers, Prof Dauda Iliyasu, Prof PI Rekwot)

All ultrasound images shown were taken with an Easi-Scan Curve from BCF Technology



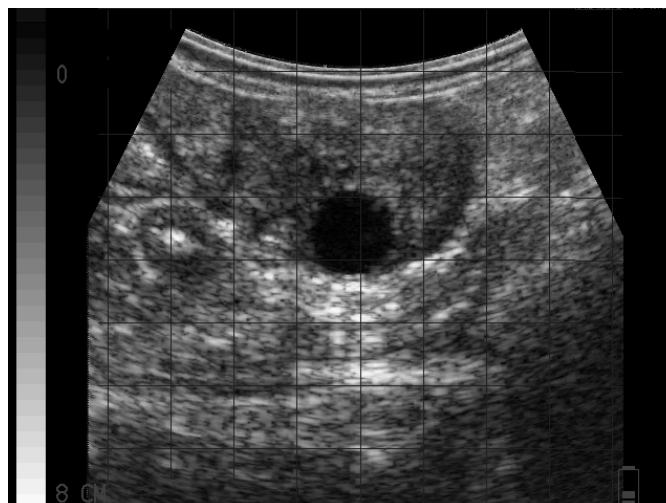
3 large degenerating follicle



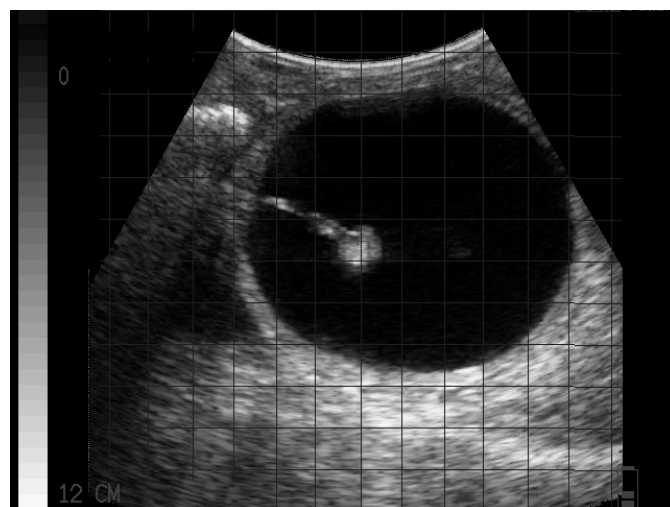
51 day pregnancy



20 day pregnancy



mature follicle



40 day pregnancy



Mr Lilian SELLENET. After 15 years practising Artificial Insemination in bovine and goat within an AI Cooperative located in Bourgogne called CECNA, I joined the French AI School in Miermagne, where I worked as a trainer. During that time, I actively participated to a project dedicated to Sudan, which consisted in creating an AI School and in training both vets and technicians to make insemination and pregnancy checks in cows using ultrasound.

Furthermore, I had the opportunity to learn how to perform scanning in camelids thanks to Professor Logman while I was in Sudan. Since 2013, I have been in charge of reproduction and managing a team of 130 AI technicians within an AI Cooperative based in Normandy, named Origenplus.