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Reproductive cycle in bitch, pseudopregnancy

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REPRODUCTIVE CYCLE IN BITCH

Bitch is a monocyclic animal and there is no frequent, recurring period of estrus. All bitches have a period of anoestrus or sexual quiescence between successive heats irrespective of whether they have been pregnant or not. This condition anoestrous/sexual quiescence is treated by Prolactin, antagonists like cabergoline and bromocreptine. The estrous cycle is traditionally divided into 4 of phases:

1. Pro-estrus: characterised by vulval edema, swelling and a sanguineous/bloody discharge. The bitch is attractive to males but will not accept the male. Duration of pro-estrus is 9 days.

2. Estrus: Vulva becomes less edematous and vulval discharge becomes clearer, less sanguinous and less copious. Duration of estrus is 9 days. Allows the male to mount. Ovulation occurs 1-2 days after the onset of estrus. She remains still while the male mounts and copulates. During the copulatory tie which lasts for 15-25 minutes. she becomes restless and irritable.

The progesterone levels start to rise before ovulation which confirms morphological evidence of preovulatory luteinization of mature follicle 60-70 hours before the ovulation. This preovulatory P4 rise may provide the stimulus for bitch to accept the male.

3. Metestrus: starts when bitch ceases to accept the male; however, there is dispute about its duration.

4. Diestrus/Anoestrus: At the end of metestrus the bitch passes into a period of anoestrus without any external signs. The same is also true after parturition following a normal pregnancy. This phase lasts 2-10 months before the bitch returns into proestrus.

Changes in cell types and their relative numbers during various stages of estrous cycle bitch

Cell types	Pro-estrous		Estrus		Metestrous	Diestrus/Anoestrus	Vaginitis
	Early	Late	Early	Late			
Parabasal	+++	+	-	-	-	++	±
Small intermediate	+++	++	-	-	+	+	±
Large intermediate	±	++	+++	+++	-	-	±
Anuclear keratinized	-	++	++++	+++	±	-	-
Red blood	+	+++	++	-	-	±	±
Neutrophils	+	-	-	+	+++	+	++++

Parabasal cells: Small round cells with round nuclei and small amount of cytoplasm;Uniform in size and shape.

Intermediate cells: May be small er laget Round nuclei, nucleus similar in size as parabasal cells; Entire cell approximately twice the size of parabasal cells; Cytoplasm becomes angular, irregular and folded as cell enlarges.

Superficial cells: the nuclei become small, pyknotic and fades; Cytoplasm may contain vacuoles with age. These cells are commonly called cornified cells and once nucleus is lost, they become anuclear cells and get cornified.

Commification is the degeneration process.

PSEUDOPREGNANCY/PSEUDOCYESIS/FALSE PREGNANCY/PHANTOM PREGNANCY/PSEUDOGENETRA/ NERVOUS LACTATION

Pseudopregnancy is very common in bitch, queen and doe and occasionally seen in mare.

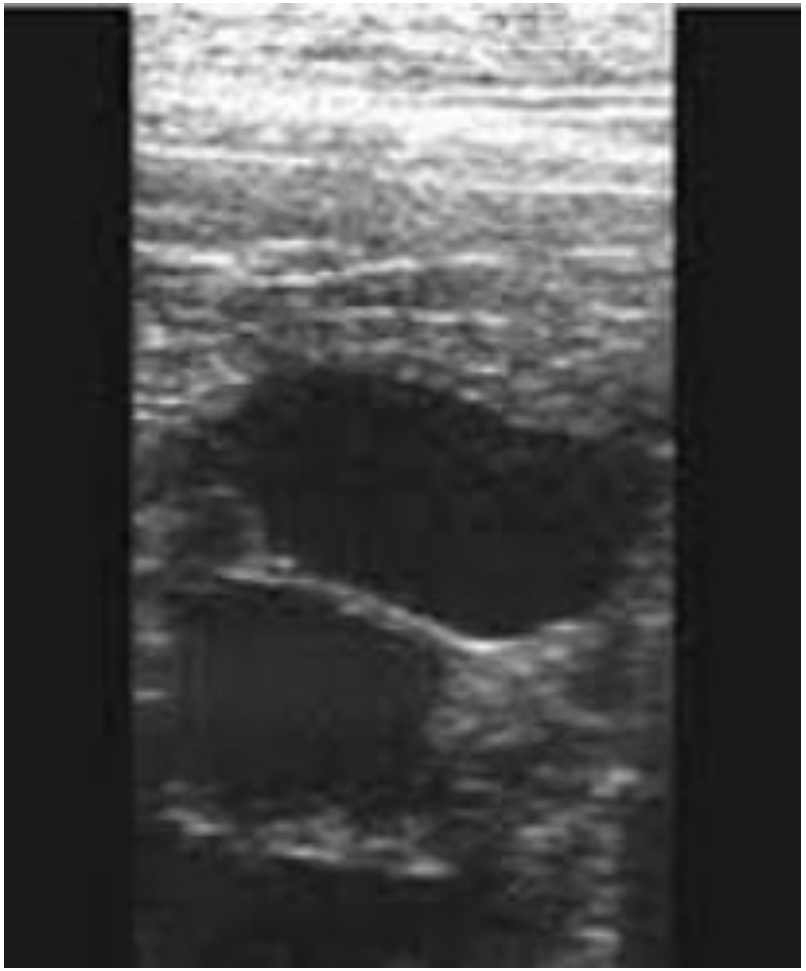
Bitch: Pseudopregnancy is believed to be due to intensification and prolongation of metestrus. There is mammary development and lactogenesis. The bitch will show all the external signs of pregnancy and will ultimately undergo mock parturition with nesting, loss of appetite, straining, emotional attachment to inanimate objects and heavy lactation. Prolactin inhibitors such as bromocreptine and cabergoline have been used successfully to treat the condition.

Queen (female cat): Sometimes receptors located in queen's vulva are stimulated when the queen is mounted by other females, castrated male cats or by stroking over this area. Sterile matings that induce ovulation lead to pseudopregnancy. Nesting behaviour and milk production are rarely seen in pseudopregnant queens but hyperaemia of the nipples will be evident as in pregnancy. The queen's appetite may be increased with some redistribution of fat leading to an increase in abdominal size.

Doe (female goat): Pseudopregnancy in doe is also known as Hydrometra or cloud burst. It is the accumulation of sterile secretions within the uterine lumen. Exact aetiology of this condition is not known but it is always associated with high progesterone levels secreted by a persistent functional corpus luteum, cessation of cyclic activity and variable degree of abdominal distension. One possible cause of Hydrometra is early embryonic loss.

Two types of pseudopregnancy:

1. Fertilization is followed by early embryonic loss, persistence of CL and doe appears as pregnant. Abdomen is enlarged and slight udder development. Such type of pseudopregnancy lasts for the period similar to normal pregnancy or even longer till until spontaneous regression of CL. At termination of pregnancy large amount of fluid is voided from uterus and this is known as Cloud burst.



2. When the doe is not mated at estrus, there is cessation of cyclical ovarian activity but no marked Hydrometra. At the end of the period of acyclicity the affected does expel a bloody discharge.

MATING AND OVULATION IN CATS

During mounting the tom (male cat) mounts the queen (female cat) and grasps her neck with his teeth. The queen's hind legs paddle as he adjusts his position and this becomes more rapid during the coitus which lasts up to 10 seconds.

The queen cries out during copulation and as the tom dismounts, she may strike out at him, displaying the typical "***rage reaction***". This is followed by a period of rolling and licking the vulva. As soon as this post-coital reaction has ceased the tom will usually attempt to mate the queen again and there may be several mating within 30-60 minutes. Receptors are present in the vulva that is stimulated during copulation leading to release of LH from anterior pituitary. 50% of queens ovulate in single mating and multiple matings may require toensure adequate release of LH to induce ovulation. Övulation is 'all or nothing' phenomenon.

ESTRUS DETECTION

As per The American Heritage® Stedman's Medical Dictionary, estrus may be defined as "The periodic state of sexual excitement in the female of most mammals, excluding humans, that immediately precedes ovulation and during which the female is most receptive to mating." The reproductive efficiency depends on, how soon after calving, the cow come into heat and success of first or subsequent insemination. The ultimate goal of heat detection is to predict actual time of ovulation.

Methods of estrus detection

1. **Record systems:** All heats, including those observed in the early post-partum period, must be recorded and record systems should be used on a daily basis.

(i) Breeding wheel or Herdex record system: These are the wall-mounted reproductive, record systems use colour-coded pins or markings to point out reproductive events for each animal.

(ii) Heat expectancy chart: These are specially designed calendars showing 21 day estrous cycle so that upcoming heat can be predictable.

(iii) Computer generated action list: Some softwares are available which make a list of animals those need special consideration or action on a definite period.

(iv) Heat symptoms (Visual Observation): The animals are visually observed for the specific signs of heat and the signs are different in different species. A best and most common method of estrus detection may be a direct visual observation of the cow standing firm while being mounted by other cow.

2. Rectal examination:

Rectal examination is the most efficient method for examination of reproductive tract and by palpation the internal signs of heat are recorded. During estrus certain cyclic changes occur in the tract and these may be:

Cervix: soft and relaxed; os of cervix- open.

Uterus: The uterus is erect, tonic and turgid at estrus. Uterine tone can be classified as: i. uterus flaccid uterus (-), ii. Uterus exhibiting mild response to manipulation (weak tone; +), iii. Curled and turgid uterus (moderate tone; ++), iv. Uterus very much curled, turgid, ovaries not easily approachable (intense tone; +++).

Ovaries: Well developed graffian follicle (fluctuating fluid filled structure) is palpable on either of the ovaries (mostly right ovary).

3. Methods for mount detection (Heat detection aids):

(i). Painted/Chalked Tailheads; This is mainly used by the dairy industry to locate riding cows in large, confined herds. Tail heads are marked daily by an AI technician. If the chalk is rubbed off by the next observation, this indicates the cow was ridden and is possibly in heat. Different colours of chalk are usually used to mark different strings of production. Marking the tail head with chalk, paint, or crayon and observing for evidence of rubbed off or smeared markings are less expensive than kamar detectors and have gained popularity in larger herds. This system works most effectively in loose-housing arrangements where cattle can be restrained in self-locking head gates to be marked or observed for evidence of smeared or rubbed-off markings, which indicate the animal was mounted.

(ii). Kamar Heat-Mount Detector: These devices are glued just cranial to the base of the tail. Pressure from the brisket of a mounting animal requires approximately 3 seconds turning the detector from white to red from a small storage chamber into a bigger visible plastic compartment. This timing mechanism helps distinguish between true standing heat versus false mounting activity.

False positive consequences are more common when cattle or buffalo are restricted in crowded pens or when infested with external parasites rub or scratch their backs.

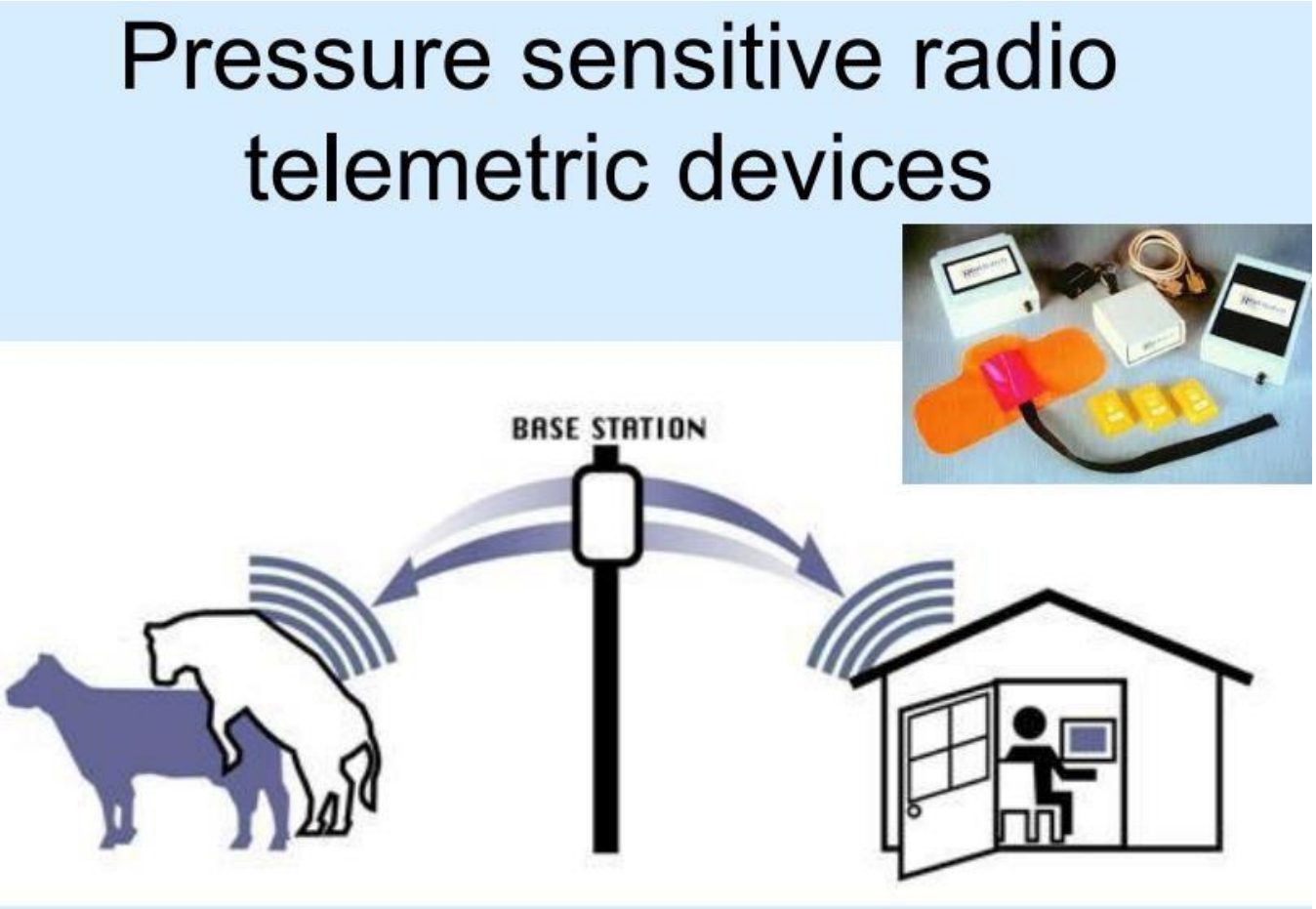

KAMAR
HEATMOUNT® DETECTORS

(iii) Bovine Beacon: Glued to tail head of cow. It contains fluorescent dye that glows in the dark when cow is mounted by another cow.

(iv). Novel estrus detection strip: It consists, a reflective material covered by a low-sheen black acrylic paint. The strip is applied to the sacrum and when the cow is mounted the black covering is rubbed off. The reflective strip can be observed by using video camera.

(iv). Chin-ball markers on vasectomised bulls: One of the most effective ways of determining heat is to attach this halter device under the chin of a vasectomised bull. The marker consists of a paint reservoir with a steel ball valve, similar to a ballpoint pen. When bull rides another animal, the chin ball marker is activated, and paint marks are left on the in-heat animal's back.

(v). Heat Watch or ShowHeat: The Heat Watch system for electronically monitoring mounting activity has been commercially marketed since 1995. This system provides continuous, radiotelometric monitoring of mounting activity and automated identification of animals.



(vi). Video recording system: This system has been used widely to monitor estrus behaviour, provided the animal must be identifiable and must be allowed to interact in a loose-housing system. This system will be successful only if the videotapes are reviewed daily, especially after the herd has been monitored in the evening. Major disadvantages are the cost of initial investments for installment of the device and time to review the recordings.

4. Activity monitors (Pedometer): An important external indicator for incidence of estrus is restlessness and consequently spend more time to walk and standing instead of resting. Electronic pedometers are available for automatically recording activity. Activity is measured by a mercury switch that is turned off and on by movement of the cow. The overall movement as well as activity of estrus buffalo is increased up to 40% as compared to normal buffalo.

5. Conductivity of vaginal fluids: Conductivity of vaginal mucus changes with the stage of estrous cycle. Electrical resistance of reproductive tissues and their secretions has been measured and used as a means of estrus detection and for timing of insemination. The electrical resistance of reproductive tract secretions is highest during the luteal phase and declines during the follicular phase of the estrous cycle. The lowest resistance readings occur coincident with the LH surge, a few hours after the estrogen peak and onset of estrus. After the LH surge, "electrical resistance increases. This tool is labour intensive; washed in disinfectant, and dried prior it is used in another cow. Without proper cleanliness, the device could spread disease among animals. The probe is expensive.

6. Heat detector animals:

(i). Vasectomised or surgically altered bull: Either a vasectomised bull or bull with a deviated penis from its original line (surgically altered) could be an efficient heat detector. These animals are prepared with a chin-ball marker which marks the rump of cows and buffalo those were mounted during estrus. Bull with surgically deviated penis to prevent intromission may be more expensive than vasectomised bull, however, this method is favoured since vasectomised bulls can copulate with cows and there may be chances of disease spread.

(ii). Female with Testosterone treatment/androgenized: Non-lactating culled cows or heifers, even freemartin heifers can be utilized for the testosterone treatment to make heat detector animals.

7. Laboratory methods:

(i) Progesterone concentrations: Progesterone level decreased during estrus period and its concentrations remains low and varies between 0.20-0.50 ng/ml (always less than 1ng/ml) This can be detected either by RIA or ELISA method to predict the timing of Al

(ii) Endometrial biopsy: Phosphates activity increases its peak and persists even 1-2 hours after onset of estrus.

(iii) Cervical mucus fern pattern test: Vaginal mucous shows typical fern pattern at the time of estrus. The fern pattern is seen in Crystoscope (developed by Scientists of IVRI, Izatnagar). It is available in market with different names e.g. Lykascope (Lyka Health Care Ltd).

The fern pattern can be classified into three types:

Typical: Clear fern leaf like pattern with well marked branches and has bright and thick boundaries.

Atypical: Mixed type appearance. Fern branches remain discontinuous and are not projected further into branches.

Nil type: No fern like appearance.

(iv). Vaginal pH fluctuates throughout the estrous cycle but is lowest, 7.32, on the day of estrus in cattle.

8. Other methods:

(i) Ultrasound scanning: Echo-texture of reproductive organs and presence of mature ovulatory follicle on any one of the ovary are the characteristic features of estrus cow and buffalo.

(ii) Mechanical nose: Direct electronic sensing system can be used to detect a particular pheromones secreted by the animals during estrus period. In the near future trained sniffing dogs may be used for this purpose.

(iv). Estrous synchronization: A definite time of insemination/breeding can be expected by use of estrous synchronization protocols. This will be discussed in the next chapter.

Thank you