

# Clinical Diagnosis of Pregnancy

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**I**N SOLVING some of the breeding problems and treating diseases of the reproductive system, the question of diagnosis of pregnancy has occupied a prominent position in the minds of many veterinarians. The value of an accurate diagnosis of pregnancy can not be overestimated. Although biochemical tests for pregnancy are available, they are less efficient than the clinical methods now available to the veterinarian in most instances. Clinical diagnosis of pregnancy is most important in the mare and cow and is most readily made in these animals because of the availability of their internal genitalia to rectal palpation. The failure to identify an existing pregnancy may result in abortion, should the corpus luteum be expressed or the uterus douched. On the other hand, failure to identify a sterile animal will result in delay and financial loss.

## **First Evidence**

The first presumptive evidence of conception is the cessation of estrum. Ovulation occurs regularly throughout the year in the healthy, well-fed mare and cow. The domestic cow passes through a complete estrous cycle every 18 to 23 days (av. 21 days) unless pregnant. The cycle for a mare varies from 20 to 25 days (av. 22 days). Some pregnant females (unipara) come in heat and copulate if opportunity offers. Estrum is prevented where there is a persistent corpus luteum, a macerating fetus in utero, and in cases of pyometra.

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The presence of a uterine seal is an aid in the final diagnosis of pregnancy. The mucous flow of estrum is adhesive in character, enabling the spermatozoa to reach their destination and preventing bacterial infection. The adhesive mucus changes to cohesive mucus during pregnancy, and the cervical canal is occluded in the cow from about 40 days to the end of gestation. When visible, it appears as a mass of gelatin. It is the opinion of some investigators that the cervical seal is constantly formed and discharged. As it is pushed back through the cervix, portions are expelled; consequently, it is not always possible to see the seal. Pregnancies do occur during which the cervix does not constrict completely—hence no cervical seal is evidenced. The inability of the examiner to demonstrate a cervical seal does not nullify the possibility of a positive diagnosis of pregnancy. The seal may fail to form or be destroyed in a case of purulent cervicitis. In certain pathological conditions, a false cervical seal is formed, in fetal mummification in which the fetus dies early or fails to form, and in special types of cervicitis. In cases of trichomoniasis following fetal death and maceration, with uterine distension, the cervical seal persists for a considerable period and thus causes the examiner to believe that pregnancy is continuing.

## **Palpation Per Rectum**

The most valuable aid in the diagnosis of pregnancy is information obtained by palpation of the uterus per rectum. It is a physical impossibility in animals such as the bitch, the ewe, the sow, and the doe,

but many of the changes which take place in the uterus following conception can be readily detected in the larger animals. In preparation for making an examination per rectum, the examiner must have his fingernails short enough not to damage the rectal mucosa. A rubber glove and sleeve may be used advantageously. Little or no restraint is necessary in the bovine. An assistant may stand beside the animal and hold the tail or the operator may hold the tail with one hand and examine with the other. The examiner is provided with a pail of water and soap. The region of the anus and vulva is cleaned with soap and water. With soap applied to the hand and arm as a lubricant, the hand is held palm downward in the shape of a cone and pushed slowly and carefully into the rectum. Ballooning of the rectum stimulate peristalsis which hinders palpation. The hand must not be forced against any peristaltic waves or severe damage to the wall of the rectum will result. It is possible to have a cessation of rectal peristalsis by pinching the clitoris in most bovine females. Inserting the cone-shaped hand first in an upward and inward direction tends to prevent straining due to ballooning of the rectum. The sense of touch which is destroyed by prolonged pressure may be restored to the hand and arm of the operator by washing in water as hot as possible and by a vigorous massage. It does not, however, relieve muscular fatigue. After the rectum is freed of feces, the cervix is easily identified lying in the midline of the floor of the pelvis. The size, shape, and consistency should be noted. The non-gravid uterus lies almost entirely within the pelvic cavity with its anterior extremities protruding into the abdominal cavity in the adult bovine. The body is short (3-4 cm. in length). The uterus is bicornual. The two horns extend forward, united by connective and muscular tissue for 4-5 cm. before they separate and curve downward, forward, and outward, forming a spiral coil as they taper gradually into the Fallopian tubes. A characteristic elongation, engorgement, and change in tonus occurs during estrum. The uterus although not an erectile organ assumes many charac-

teristics of erectile tissues (tonus). A characteristic enlargement may be demonstrated in the pregnant uterus. Except in the case of bicornual pregnancy there is a marked difference in the volume of the two horns. In a case of pyometra, both horns are regularly equal. Sacculations occur in the pregnant horn as transverse folds or grooves. These sacculations may be explained by the rapid rate of elongation of the uterus in contrast to the slower rate of the broad ligament of the uterus. The latter is noted especially in heifers and second calf cows. The amount of sacculatation is lessened by each subsequent pregnancy. A pronounced thinning of the wall of the gravid horn may be demonstrated. A collection of fetal fluids within the uterus gives the uterine wall a resiliency which is characteristic. This may be described as the tendency for the compressed uterine walls to quickly take their former position when the external pressure applied manually is released. This may be differentiated from pus in pyometra which is slow and sluggish in action. The surface of the pregnant horn is very smooth particularly in respect to longitudinal folds, which may be detected in metritis.

### **Pregnant Horn**

In a heifer there is a rapid enlargement of the pregnant horn for the first 14-21 days, after which it remains static in respect to size. In older cows the increase in size of the pregnant horn is more gradual and continuous. These conditions make possible the diagnosis of pregnancy in a heifer at thirty-five days and in an older cow at forty days with a reasonable degree of accuracy. However, the sixtieth day following conception is a more desirable time for an examination for pregnancy. Pregnancy has been diagnosed in the boven by Walsh at twenty-eight days. In cases where trichomoniasis exists, the animal should be re-examined after four months since the fetus may undergo sterile maceration.

Cotyledons and a viable fetus may be demonstrated at 90-120 days. The uterine enlargement at 90 days has been estimated to be the size of a kitten ball; at 120 days,

the size of a foot ball. The Danelius method of pregnancy diagnosis involves the grasping of the wall of the uterus and allowing it to slip between one's fingers, three ledges are detected: the uterine wall, fetal membranes, and the wall of the rectum.

### **Uterus of Mare**

The uterus in the mare is cruciate in form and is situated chiefly in the abdominal cavity. In a pregnancy examination, the uterus must be carefully examined from horn tip to horn tip. An enlargement of firm consistency approximately the size of a lemon may be palpated at thirty to thirty-five days in a cornual pregnancy. At forty-five days it will have increased to the size of an orange. If nidation occurred at the junction of the horns with the body, it is very difficult to detect the enlargement before sixty days. Pregnancy in the mare has been diagnosed as early as thirty days. The consistency of the enlargement must be taken into consideration so that it may be differentiated from an abscess in the wall of the uterus.

### **Ovaries**

Information of great value in pregnancy diagnosis may be obtained from an examination of the ovaries. The bovine ovaries are oval in form and measure approximately 3-4 cm. in length, 2.5 cm. in width, and 1.5 cm. in thickness in their largest part. They are located usually near the middle of the lateral margin of the pelvic inlet in front of the external iliac artery especially in a pregnant animal. The ovaries are usually palpable in the bovine during the first half of the gestation period. A fully developed, normal corpus luteum may be demonstrated in a pregnant, healthy cow twenty-one days post coitum. If fertilization has not taken place, the corpus luteum is atrophied and a new follicle is prominent in either ovary. If the zygote has perished, abnormalities such as an enlarged corpus luteum or cystic ovaries may occur. A normal corpus luteum of pregnancy is prominent and extends beyond the adjacent ovarian surface. If the uterus is distended with

an exudate, the corpus is regularly central in the ovary and less prominent. The corpus luteum of pregnancy is from 16-20 mm. in diameter and usually oval in shape. It is firm in consistency. The pregnant ovary may or may not be located on the same side as the pregnant horn. One can suspicion pregnancy on the eighteenth day if there is no regression of the corpus luteum by that time.

In the mare, the corpus luteum of pregnancy is of minor significance and rarely obtains the size of the follicle it replaces. It is almost completely degenerated after sixty days of pregnancy. Due to the fact that it atrophied early in gestation, it is of little value in diagnostic work.

### **Middle Uterine Artery**

The middle uterine artery is of great significance in the diagnosis of pregnancy in the bovine. It arises usually by a common trunk with the umbilical from the internal iliac arteries. In the non-pregnant animal the middle uterine is approximately 3 mm. in diameter. It is a movable structure descending on the lateral pelvic wall a short distance behind the external iliac and running a tortuous course on the broad ligament to the cornu of the uterus. The posterior uterine artery rises from the internal pudic and supplies the posterior portion of the uterus, also the bladder and vagina. The uterovarian artery, which rises directly from the aorta, is small and not of great significance in the bovine. At three months of pregnancy the diameter of the middle uterine artery to the gravid horn is approximately one-fourth of an inch in diameter; at six months, three-eighths of an inch in diameter, and at eight months of pregnancy, the diameter of the middle uterine is one-half inch in diameter. Not only is the size of the artery of diagnostic significance but also the characteristic pulsation which simulates the sensation of a frothy substance being pumped through the vessel. This characteristic pulsation is absent in the case of a non-viable fetus, and it is possible to thus determine the status of a fetus.

In the mare the most prominent artery

is the uterovarian which rises directly from the aorta. It is located in the anterior part of the broad ligament of the uterus. The anterior and posterior uterine are of less significance in the mare.

### Fetal Fluids

The fetal fluids are of significance in diagnosis when the bulk of the uterine contents is evaluated. In the bovine there is a constant increase in fetal fluid up until the seventh month of pregnancy, after which there is a steady decline until parturition.

The palpation of the fetus per vagina has a very limited application in the pregnant animal. The presence of a cervical seal and the small size of the vagina make the introduction of one's hand inadvisable. It is not uncommon to find the feet of the fetus posterior to the cervix in the cow or mare.

### Visual Examination

A visual examination of the cervix revealing one which appears very smooth and flaccid is indicative of pregnancy. The cervix of the non-pregnant animal is wrinkled and firm.

After the sixth month of pregnancy the fetus occupies a position in close contact with the lower right flank, particularly in right horn pregnancy. By a quick thrust of the fist in an inward and upward direction, the fetus will be pushed away and may be palpated as it rebounds in the fetal fluid against the fist.

### Auscultation

Another aid in the diagnosis of pregnancy may be obtained by auscultation of the fetal heart. Its application also is limited to advanced stages of pregnancy. The fetal heart beat is distinguished from that of the mother by the difference in frequency. The fetal heart beat is approximately twice as rapid as that of the mother. The success or failure of this symptom is largely dependent upon whether there is a right horn pregnancy or a left horn pregnancy. If the left horn is pregnant in the cow, the fetus may be pushed into the left flank by the rumen, but it com-

monly does not lie in direct contact with the body wall. It rests on the floor of the abdomen and lies parallel to the right abdominal wall but not in contact with it. The viscera tend to insulate the fetus, making auscultation difficult. If the right horn is pregnant the fetus is usually in contact with the abdominal wall and hence facilitates auscultation of the fetal heart.

### Advanced Pregnancy

By the time the fetus can be palpated by abdominal ballotment or the fetal heart can be heard, pregnancy is so far advanced that the value of diagnosis is considerably reduced, and the physical signs of pregnancy are available to both the owner and the veterinarian. A change in volume and form of the abdomen is noted, also the enlargement of the mammary gland and milk secretion. It is often possible to demonstrate abdominal movements due to fetal and uterine activity. The latter are indicative of approaching parturition.

Due to the limitations of the various methods of diagnosis, it is absolutely essential that the diagnostician utilize a combination of the symptoms presented rather than basing his diagnosis on any one sign.

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Two new valuable products have been made from sugar recently. Vitamin C has been made from beet pulp by a new process at the Bureau of Standards. A new synthetic blood plasma, called dextran, has been developed as a by-product in the manufacture of sugar by a group headed by Professor Anne Tiselius in Sweden. Dextran can be used as a substitute in blood transfusions without regard to the patient's blood group and can be produced in unlimited amounts at a low cost.