PREGNANCY DIAGNOSIS IN COW:

Introduction:

The economic value of an early diagnosis of pregnancy in the cow is quite clear. Whether one is dealing with dairy cattle or beef cattle, the ultimate goal is an average 12-month calving interval for the herd. Every management practice, which contributes to attaining this goal, is well worth consideration. Pregnancy diagnosis is one of these tools. Most cows that fail to conceive will return to oestrus in approximately 21 days post breeding. Due to a number of different causes, a small percentage does not. The members of this latter group are the ones that need to be discovered by pregnancy diagnosis as early as possible. Regardless of how good a management programme might be, not all cows that return to oestrus are detected. These cows also need to be discovered early so that additional attention can be given to heat detection so that they can be rebred.

Different techniques:

The ideal pregnancy test would be one that is inexpensive and highly accurate, that could be conducted at the farm-by-farm personnel, utilizing milk, urine or other easily obtained specimens that would detect pregnancy at 17 to 19 days post breeding. No such test is available today. The milk progesterone assay test shows that progress is being made. This test is conducted on milk samples taken 21 to 24 days post breeding. These tests can be conducted in a laboratory with appropriate equipment or in the farm with a commercial enzyme immunoassay progesterone kit.

The prediction of pregnancy using this test is based on the progesterone level in a single sample of milk taken at 21 to 24 days post breeding. For cows producing positive samples (11 mg/ml), 80% have been pregnant 40 to 60 days post breeding as determined by rectal palpation. Essentially all the cows producing milk negative to the test (2 mg/ml) have been open.

The difference between the predicted pregnancy based on progesterone level at 21 to 24 days compared to actual pregnancy at 40 to 60 days post breeding have been referred to as false positives. In reality, a high percentage of those cows may actually have been pregnant at or shortly before the 21 to 24 day sampling period. Embryonic mortality then would be the reason for their not being pregnant when palpated 40 to 60 days post breeding. Some of the positive samples may have been due to non-pregnant cows with long but normal oestrus cycles and some may have been due to errors in sampling (wrong cow or wrong time in the cycle).

The best validated method for measuring progesterone in milk or blood is by radioimmunoassay, which must be done by a trained technician in a laboratory equipped for this procedure.
Several different enzyme immunoassay progesterone kits are available and are practical for on the farm use. The major drawback with this technique is the cost of equipment and the need to have a trained technician for this procedure. Pregnancy diagnosis is more of an art than science. There are various methods for pregnancy diagnosis like:

1. **Managemental method**
2. **Ultrasound**
3. **Radiography**
4. **Vaginal biopsy**
5. **Laboratory method**
6. **Clinical method**

**1. Managemental method:**

This is based on the history of service by a bull or artificial insemination and non-return to oestrus. This is not a reliable method. The animal apparently may not return due to various reasons other than pregnancy.

**2. Ultrasound method:**

There are different types of machines available. The most commonly used machines today are B-mode real-time, meaning that they produce an acoustic image in real time. They usually range from 3.5 - 7.5 MHz. With greater MHz you see more detail but have less depth penetration. There is more depth penetration with lower MHz, but less detail. These machines cost from $10-20,000.

This is done by using high frequency sound waves. The high frequency sound waves sent from exterior return with altered frequency on touching a moving object. This is then recorded in oscilloscope. This is not a practical method.

**3. Laboratory method:**

The blood or milk progesterone level is used as an indicator of pregnancy in this method. This method has disadvantages like:

a. The test is conducted 21 to 24 days after insemination. Even if the cow is not pregnant it will be in Dioestrus phase with corpus luteum actively producing progesterone, which can give a false positive result.

b. Requires manual dexterity in handling the equipment

c. Embryonic Death after 24 days can mislead.

**4. Clinical method:**

This method is most practical and most reliable. Pregnancy is diagnosed by per-rectal examination of the animal and the anatomical changes in the reproductive organs like ovaries, uterus, uterine artery and palpation of foetus is taken as the indicator of pregnancy.

**Estimation of stage of pregnancy by rectal palpation**

Pregnancy diagnosis by rectal palpation remains one of the most practical means for detecting pregnancy in cattle:
Why do you need to estimate the stage of pregnancy? There may be lost records and you need to predict dry off dates. You may need to stage pregnancy if records are not kept or a bull runs with the herd. You may need to confirm AI dates, or an AI date may not match what you feel. You may be asked to estimate parturition dates for cattle.

**Rectal Palpation:**

1) **Structures to be palpated:**

**Cervix:** The cervix is chiefly a landmark serving as a guide for locating other structures. The position of cervix can give an indication of the stage of pregnancy, but a diagnosis should never be based on the cervix alone.

**Uterus:** Most of the diagnosis is based on the uterus and its contents. The size of the uterus (asymmetry) influences its position in relation to the pelvis and should be noted. The thickness and tone of the uterine wall are important. The uterine wall becomes thinner as pregnancy progresses and is very resilient to touch compared with the uterus of the open cow.

**Foetal membrane Slip:** Gently grasping the uterine wall between the thumb and forefinger and lifting slightly can detect the chorionic membrane. With some practice one can feel the membrane slip from between the thumb and finger. Thus the term “slipping of the foetal membrane” has been used to describe this procedure. By 120 days (4 months) the placentomes are large enough to palpate through the uterine wall.
The contents of the uterus are the most positive diagnostic structures to be palpated. After 90 days, the foetus can be palpated except during a period from 170-230 days (6-7 months) when it is too deep in the abdominal cavity to reach in large cows.

**Amniotic Vesicle:** From approximately 30 to 65 days gestation, the amniotic vesicle can be detected as a movable oval object within the uterine lumen. The vesicle is turgid early in pregnancy but becomes flaccid with advancing pregnancy until days 65 to 70 when it is difficult to detect at all.

**Placentomes:** The presence of placentomes is another positive sign of pregnancy and is detectable from about 75 days to term. Since there is great variation in size among individual placentomes (those nearest the foetus are the largest), usefulness in aging a pregnancy is limited. In general, they can be detected as soft, thickened lumps in the uterine wall and are more easily detached as pregnancy advances.

**Palpation of the Foetus:** Of course, the presence of the foetus itself is a sign of pregnancy. Depending on the skill of the examiner and the location of the foetus, the foetus can be palpated from the time of amniotic softening (65 to 70 days) to term. Foetal growth is quite uniform up to about the sixth month, so that foetal size can be used to estimate foetal age accurately.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Size</th>
<th>Gestation age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foetus</td>
<td>Mouse</td>
<td>2 months</td>
</tr>
<tr>
<td></td>
<td>Rat</td>
<td>3 months</td>
</tr>
<tr>
<td></td>
<td>Small cat</td>
<td>4 months</td>
</tr>
<tr>
<td></td>
<td>Large cat</td>
<td>5 months</td>
</tr>
<tr>
<td></td>
<td>Beagle dog</td>
<td>6 months</td>
</tr>
<tr>
<td>Fremitus in uterine artery</td>
<td>Unilateral</td>
<td>120 + days</td>
</tr>
<tr>
<td>Amniotic vesicle</td>
<td>1 (finger width)</td>
<td>42 (days)</td>
</tr>
<tr>
<td></td>
<td>1.5 cm</td>
<td></td>
</tr>
<tr>
<td>Stage</td>
<td>Width (cm)</td>
<td>Days</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>------</td>
</tr>
<tr>
<td>2</td>
<td>3.5</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>5.5</td>
<td>52</td>
</tr>
<tr>
<td>4</td>
<td>7.5</td>
<td>58</td>
</tr>
<tr>
<td>4 **</td>
<td>9.0</td>
<td>62</td>
</tr>
<tr>
<td>5</td>
<td>10.5</td>
<td>65</td>
</tr>
</tbody>
</table>

** Width of the hand minus the thumb.

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**Ovaries:** The ovaries can be palpated up to about 120 days. Structures on the ovary can help confirm either a positive or a negative diagnosis. Pregnancy is always accompanied by corpus luteum. However, one must remember that a corpus luteum is not always accompanied by pregnancy.

**Pulse of pregnancy (Fremitus):** can be helpful in confirming a diagnosis and also confirming the viability of calf, particularly at certain stages of pregnancy. This pulse is felt in the middle uterine artery, which supplies blood to foetus. By 120 days of pregnancy the middle uterine artery will have enlarged sufficiently to be used as a differential diagnosis in pregnancy determination by rectal palpation.

The major supply of blood for the gravid uterus arrives via the uterine arteries, which enlarge considerably as pregnancy progresses. These bilateral vessels travel in the broad ligaments, just below and anterior to the iliac shaft, reflecting in a cranioventral direction. The uterine arteries branch from the pudendal artery at the level of the iliac shaft, extending ventrally at right angles from the pudendal artery, to course in the broad ligaments. Because of their location in the broad ligaments, they are freely moveable, thus differentiating them from the external iliac arteries, which are tightly applied to the medial shaft of each ilium. Enlargement of the uterine artery ipsilateral to the pregnant horn is detectable after 80 to 90 days of gestation. By approximately 130 days, the blood flow within the ipsilateral uterine artery has increased to the point at which turbulence is palpable as a buzzing sensation, also referred to as a thrill or fremitus. Initially, it may be necessary to place very slight pressure on the artery to elicit the fremitus, but as pregnancy progresses, the buzzing becomes obvious without pressure. By about 7 to 8 months, fremitus is often palpable in the contra-lateral uterine artery as well. Individuals in which true fremitus occurs in the absence of a pregnancy are rare, so its
detection can be considered a positive sign of pregnancy in nearly all cases.

**Palpation at 35 to 40 days:**

This stage of pregnancy requires more skill than later stages.

The following features should be identified:

- Uterus on the floor of the pelvis, except in large cows with elongated reproductive tracts. Slight enlargement of one horn with detectable dorsal bulging.
- Foetal membrane slip
- Palpation of corpus luteum on the ovary adjacent to gravid horn.

### Table 1.
Diameter of pregnant bovine uterine horn at different stages of pregnancy:

<table>
<thead>
<tr>
<th>Stage in days</th>
<th>Diameter in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Slight enlargement &amp; dorsal bulging</td>
</tr>
<tr>
<td>60</td>
<td>7</td>
</tr>
<tr>
<td>90</td>
<td>8</td>
</tr>
<tr>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>150</td>
<td>18</td>
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</table>

**Palpation at 45 to 50 days:**

- Uterus still on pelvic floor. Slightly greater difference in size
- Foetal membrane slip
- Palpation of corpus luteum on the ovary adjacent to gravid horn.

**Palpation at 60 days: (2 months)**

- The gravid uterine horn will be dropping slightly over the brim of the pelvis and feels like balloon filled water.
- Foetal membrane slip
- Corpus luteum on the ovary adjacent to gravid horn.

### Table 2.
Average size of bovine conceptus at different ages; variation occurs between breeds and within breeds.

<table>
<thead>
<tr>
<th>Age/days</th>
<th>Crown/Rump length in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>60</td>
<td>5</td>
</tr>
</tbody>
</table>
Palpation at 90 days: (3 months)

- The uterus will be pulled well over the pelvic brim and will be 8 to 10 cm in diameter
- The foetus will be 10 to 15 cm long and easily palpated.
- Corpus luteum on the ovary adjacent to gravid horn.

Palpation at 120 days: (4 months)

- The uterus will be well over the brim of the pelvis with the cervix pulled almost to the pelvic brim.
- The foetus can be easily palpated and will be from 25 to 30 cm long.
- Small placentomes can be identified
- The ovaries may be difficult to reach, but a corpus luteum will be present on the ovary adjacent to the gravid horn.

Palpation at 150 days: (5 months)

- The uterus will be pulled well into the abdominal cavity and the cervix will be located at the brim of the pelvis

Distinct placentomes about the size of ovaries can be identified.

- The foetus is well formed and will be 35 to 40 cm in length but may be difficult to reach in larger cows.
- The pulse of pregnancy (fremitus) will be quite distinct with the artery being 6 mm to 1.25 cm in diameter.

Palpation at 170 to 230 days: 5.5 to 7.5 months

- Cervix will be at the brim of the pelvis and may be bent over the edge.
- The dorsal wall of the uterus will be tight and difficult to palpate.
- The placentomes will vary in size and may be difficult to palpate because of the tight uterine wall.
- The foetus will be difficult to palpate particularly in larger cows due to the depth of the abdominal cavity.
- There will be strong pulse of pregnancy (fremitus) and the artery will be 1.25 to 1.4 cm in diameter.
Palpation at 230 days to 280 days: (7.5 to 9 months)

- The foetus will be large enough to extend back within range of the hand. The head and front feet are usually the structures palpated.
- Movement of the foetus can frequently be detected.

Errors in Pregnancy Diagnosis.

False positive diagnosis can result in:

a. Early Embryonic Death
b. Incomplete uterine involution
c. Pyometra
d. Mucometra
e. Hydrometra

Differential Diagnosis:

Pyometra:

It is a condition characterized by an accumulation of pus in a sealed uterus. The condition occurs when an infectious organism enters the uterus at the time of or prior to the onset of pregnancy. The organism allows pregnancy to be initiated but after a variable period of time causes death of the embryo or early foetal death. The conceptus is not expelled and degenerates in the sealed uterus accompanied by the formation of pus. The amount of pus may vary from a relatively small amount to several litres. In cases of this sort, the contents of the uterus prevent the release of PGF2, which in turn results in the corpus luteum remaining functional. The condition may remain status quo for an extended period of time.

Pyometra differs from pregnancy in that the uterine wall is thicker, spongy and less resilient. In addition, the pus is more viscous than the fluid of pregnancy and frequently can be moved from one horn to the other. Of course there is no foetus to palpate. The stages of pregnancy, which need to be differentiated from pyometra, are 45 days through 120 days. Failure of oestrus may be confused with pregnancy. The uterine wall is thick and heavy and lacks tonicity. Uterine horns are unequal. The fluid in the uterus may be thick or watery. Thrill/Fremitus is absent and the horn size does not increase with time as in pregnancy.

Mummified foetus:

It is a condition in which the foetus dies and the fluids and soft tissues are reabsorbed. Depending on the stage at which the condition is detected, the mass may range from a semisolid to a solid ball. It is not difficult to differentiate between a mummified foetus and normal pregnancy at 90-120 day period. However, with a casual palpation one might feel the mummified foetus and misinterpret it for a normal foetus. Additional palpation would reveal the absence of fluid surrounding the mass and provide the differential diagnosis.

Death of conceptus from 3 - 8 months of gestation, failure of abortion, absence of oestrus,
absorption of foetal or placental fluids, contraction and thickening of uterine walls, reabsorption of placentomes and presence of hard firm foetus in the closely applied uterine horn.

**Characteristic features in mummification are:**

- Failure of udder development
- Failure of abdominal enlargement
- Failure of parturition
- Absence of placentomes and foetal fluids
- Hard and firm foetus
- Absence of fremitus
- Presence of corpus luteum

**3. Metritis:**
It is a non-specific infection of the uterus characterized by the presence of visible pus. The pus may be seen on the lips of the vulva and on the tail where it rubs across the vulva. The pus may also be seen in oestrus mucus as cloudiness or yellow or white flakes. The uterine wall is thickened and spongy to feel. The condition might be confused with the 35 to 40 day stage of pregnancy.

**4. Maceration:**
Similar to pyometra. On rectal examination the bones can be palpated.

**5. Mucometra and Hydrometra:**
No oestrus, which confuses with pregnancy. Absence of foetus and placentomes. Failure of progressive development of foetus.

**6. Early Embryonic Death:**
Death of embryo prior to 70 - 90 days may result in abortion or absorption of foetus. In case the foetus is aborted it may go unnoticed and the owner may still hope the animal is pregnant. To ascertain it is advisable to re-examine the animal after three months.

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**Summary of Recommendation Concerning Pregnancy Examination**

- Pregnancy examination should always represent the first step of genital examination
- No animal should be pronounced nonpregnant unless the uterus has been retracted and both horns of the uterus have been palpated carefully throughout their entire length.
- A diagnosis of pregnancy should never be made unless the positive signs of pregnancy have been detected and recognised beyond doubt.
- Breeding history should serve as supplementary information. It is rarely 100% correct in all animals.
- Records should be kept in all diagnoses and findings, with use of the best possible means of identification of animals.
- There are certain animals and certain stages of pregnancy when positive diagnosis is impossible even for an experienced operator.
• The “golden rule advises one to admit that a diagnosis cannot be made and to recommend re-examination.