BOVINE PREGNANCY AND ITS DIAGNOSIS

Indication
The purpose of examining cows for pregnancy is to detect those that are not pregnant so that they can be inseminated again or culled from the herd.

For profitable production, dairy cows should calve for the 1st time at approximately 24 months of age and subsequent calving at intervals of approximately 13-13.5 months. The implication is thus that dairy cows should conceive within approximately four months or less of calving.

There is no ideal test that would accurately detect pregnancy before the 1st expected estrus after insemination (about 21 days) in practice. Most tests are capable of detecting pregnancy between 25 and 40 days after conception.

The frequency of embryonic death in cattle is high during the 1st months of pregnancy perhaps because of loss of abnormal embryos or failure of maternal recognition of pregnancy. Thus, cows that are diagnosed as pregnant soon after insemination are more likely to suffer embryonic death and return to estrus, to be found not pregnant at a subsequent examination or fail to deliver a calf at the expected time than are cows in which the pregnancy is diagnosed later.

After approximately 60 days, foetal death rates are low, and in most cows found to be pregnant after this time, the pregnancy proceeds to term. Beef cows usually are examined for pregnancy when their calves are weaned at 6-7 months of age.

Pregnancy diagnosis
There are various methods used to diagnose Bovine pregnancy. These have been grouped under the following sub-headings:

1. Management
2. Chemical or Laboratory Method
3. Clinical Examination
4. Ultrasonography

MANAGEMENT
Some herdsmen rely on the history, or on observed clinical signs for a tentative diagnosis of pregnancy. These include:

(a) Failure to return to oestrus and persistence of the corpus luteum or cessation of the oestrous cycle. Reliability of this method is dependent on the efficiency and accuracy of oestrus detection.

(b) Exposure to a bull or A.I: History of cohabitation with a bull is often taken by some herdsmen as evidence of pregnancy. This is not reliable and may be deceptive.

(c) Mammary gland development: this is useful only in primigravida.
(d) Abdominal Ballottment: Possible as early as 7 months of gestation in small breeds such as the jersey.

CHEMICAL OR LABORATORY METHOD

This involves the following:

(a) **Identification of early pregnancy factor/early conception factor (EPF/ECF):** This is an immunosuppressive glycoprotein that is associated with pregnancy. It was first identified in the mouse and subsequently in a large number of domestic species. Test kits are commercially available which use the “dip stick” principle which can detect ECF in serum and milk as early as 3 days after A.I or mating; though more accurate results are obtained if samples are taken later at 7-8 days.

(b) **Progesterone concentration in plasma and milk:** Since the corpus luteum is persistent as a result of pregnancy, if a blood sample is taken at about 21 days post previous oestrus, progesterone levels remain high. But it is low when the cow is not pregnant and is close to or at oestrus. This method is valid and reliable the only disadvantage being that it requires blood collection. The concentration determination can be achieved by using RIA or ELISA.

(c) **Assay of pregnancy-specific Protein B:** RIA is used to measure the concentration of the protein which is identifiable in the maternal serum of cows from 24 days of gestation. Also, because of the good correlation established between this protein in peripheral plasma concentrations and foetal number, the method is a good tool to identify twins.

(d) **Oestrone sulphate in milk:** Oestrone sulphate is quantitatively one of the major oestrogens in the milk of pregnant lactating cows. The concentration increases gradually during gestation. It is a very reliable method of pregnancy diagnosis. And unlike progesterone assays, the precise date of sampling is not required. It’s only disadvantage is lateness of the time.

CLINICAL METHODS

It includes the following:

1. **TRANSRECTAL PALPATION:** Palpation of the uterine contents rectally is probably the most commonly used method for pregnancy diagnosis. Pregnancy diagnosis after insemination can be conducted as early as 30 days in heifers and 35 days in cows, although much practice is necessary in order to determine pregnancy at that stage. Several palpable structures are indicative of pregnancy. Due to accumulation of fluids within the pregnant uterine horn, one of the initial signs of pregnancy is a difference in size of uterine horns (uterine asymmetry). Also, it is possible to feel the slipping of the fetal membrane along the greater curvature within the uterus (membrane/fetal slip). There is a rule of thumb that is quite useful in estimating fetal age based on the size of the fetus in relationship to the size of some well known animals. This rule of thumb is detailed in the following Table 1.
Table 1: Calf foetal size at various stages of pregnancy in relation to the size of some commonly known adult animals.

<table>
<thead>
<tr>
<th>Stage of pregnancy</th>
<th>Calf foetal size in relation of the size of commonly known adult animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 months</td>
<td>Mouse</td>
</tr>
<tr>
<td>3 months</td>
<td>Rat</td>
</tr>
<tr>
<td>4 months</td>
<td>Small cat</td>
</tr>
<tr>
<td>5 months</td>
<td>Large cat</td>
</tr>
<tr>
<td>6 months</td>
<td>Beagle dog</td>
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</tbody>
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Table- 2 presents the uterine position and diameter, as well as structures felt at palpation according to stage of pregnancy. The following describes when specific structures can first be palpated: Membrane Slip - 30-35 days, Amniotic vesicle - 35-60 days and the Foetus – 65+ days.

Rectal palpation has the advantage of being an accurate, fast, relatively cheap method that is less labour intensive as compared to the previous methods. Nonetheless, training is necessary. The main disadvantage of rectal palpation is that it cannot be performed until later in gestation than some other methods. Some veterinarians are able to determine pregnancy by palpation as early as 35 days after insemination, but usually rectal examinations take place between 45 and 60 days after insemination to increase the accuracy of the exam.

Table 2: Uterine position/diameter and structures during pregnancy.

<table>
<thead>
<tr>
<th>Stages of Pregnancy (days of gestation)</th>
<th>Uterine position</th>
<th>Uterine diameter</th>
<th>Palpable structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-40</td>
<td>Pelvic floor</td>
<td>Slightly enlarged</td>
<td>Uterine asymmetry/foetal slip</td>
</tr>
<tr>
<td>45-50</td>
<td>Pelvic floor</td>
<td>5.0-6.5cm</td>
<td>Uterine asymmetry/foetal slip</td>
</tr>
<tr>
<td>60</td>
<td>Pelvis/abdomen</td>
<td>6.5-7.0cm</td>
<td>Membrane slip</td>
</tr>
<tr>
<td>90</td>
<td>Abdomen</td>
<td>8.0-10.0cm</td>
<td>Small placentomes/foetus (10-15cm long)</td>
</tr>
<tr>
<td>120</td>
<td>Abdomen</td>
<td>12cm</td>
<td>Placentomes/foetus (25-30cm long)/fremitus</td>
</tr>
<tr>
<td>150</td>
<td>Abdomen</td>
<td>18cm</td>
<td>Placentomes/foetus (35-40cm long)/fremitus</td>
</tr>
</tbody>
</table>

2. **VAGINAL EXAMINATION** – This can be done through manual or visual approach. **Visual examination** involves the use of illuminated vaginal speculum that is focused on the external
os of the cervix. During pregnancy, the secretion from the cervical glands become gelatinous and tough thereby forming a plug for sealing the canal. In many cases, the seal covers from the external os. The seal is light brown in colour covering the os.

**Manual examination** of the vagina is done by pressing the finger directly on the os to detect an adhesive tenacious secretion which is a strong evidence of pregnancy.

**ULTRASONOGRAPHY**

In this method, using the ultrasonic foetal pulse detector that employs the Doppler principle, it is possible to identify the foetal heart from 6-7 weeks using a rectal probe.

Ultrasound depth analysers (A-mode) have been used to detect pregnancy as early as 40 days but the degree of accuracy is questionable. Meanwhile, Realtime B-mode grey-scale ultrasound scanning is the method of choice for the early diagnosis of pregnancy in the cow. The uterus is imaged transrectally; for early pregnancies, a 7.5MHz linear transducer is required, whereas a 3.5MHz transducer is preferable for late pregnancies.

Ultrasoundography can be used to estimate foetal age up to 140 days of gestation following the measurement of a number of different foetal dimensions; of these, the crown-rump length was least frequently capable of being measured, whereas the trunk diameter was the most readily assessed. In addition, it can also be used to determine the sex of the foetus by assessing the relationship between the genital tubercle and surrounding structures. Thus in the male, the genital tubercle migrates towards the umbilicus whereas in the female it migrates towards the tail.

**NORMAL BIRTH IN THE COW**

Normal birth (≡ Eutocia) in the cow is a result of series of events that emanates from the initiation of parturition. The gestation length is about 290 days.

**PREPARATORY CHANGES:**

The most important external changes are seen in the udder, vulva and pelvic ligaments. Towards the end of pregnancy, the udder becomes enlarged and tense with the presence of colostrums in the teats that gradually changes in consistency with the colour being yellow.

In heifers, subcutaneous oedema may develop in front of and behind the udder. This disperses normally within few days of calving. As birth approaches, the vulva lengthens and might become slightly tumefied and oedematous. In some animals, these changes may not be visible. 24-48 hours prior to calving, a clear vaginal mucus might be seen. Body temperature drops before calving. There would be relaxation of the pelvic ligament during the late pregnancy and becomes pronounced as birth approaches. This is the most reliable sign of impending parturition in cattle. Consequent upon this, the cows tail head might appear to be raised and the gluteal muscles sunken.
These signs might be less obvious in fat/obese cows but ligament relaxation can be detected internally via rectal examination. The muscular tone of the tail is reduced 24 hours before calving. On rectal examination, the foetal limbs and head are palpable in the maternal pelvis or immediately in front of it. And evidence of foetal life can be detected by spontaneous movement or by response to a gentle pressure. On vaginal examination, some slight softening of the cervix can occur.

EVENTS OF THE THREE STAGES OF LABOUR
The process of parturition has been divided into 3 separate stages which pass gradually from one to the other.

FIRST STAGE – CERVICAL DILATION
The changes that occur are not visible externally but are important because they prepare the birth canal and the foetus for expulsion. In the cow, there is initially wide dilatation of the external os, whose perimeter is palpable as a frill at the cranial end of the vagina. The cone-shaped cervix then undergoes a shortening simultaneously before the internal os dilates, and once this has occurred, the vagina and uterus form a continuous canal which becomes tightly engaged by the distended allantochorion. The first stage of labour is also characterized by the onset of myometrial contractions which show a transition from isolated, uncoordinated waves during late pregnancy to a regular coordinated peristaltic type nearer to expulsion of the calf. The uterine contraction forces the uterine membranes and fluid against the relaxed cervix. The cervix begins to dilate from the internal os and the foetus assumes the proper position which is usually Dorso-sacral in cattle. With this contraction of the uterus, the bag (= chorioallantois) ruptures and marks the end of the 1st stage, whose length is 3-8 hours in the cow and may last up to 24 hours in heifers. Usually, the cardinal external sign that is associated with the 1st stage is RESTLESSNESS.

SECOND STAGE OF LABOUR (FOETAL DELIVERY)
The foetus is delivered during this stage and is characterized by entrance of the foetus into the dilated birth canal. This is followed by an increase in abdominal contraction which allows the foetus to be expelled. When this is occurring, the dam usually lie down on lateral recumbency. And as the dam is straining there are three areas where it makes the greatest effort - head, chest and pelvic areas or hip. The dam’s effort is needed to deliver the head but gravitational force is required to deliver the hip. After each area, the dam rests for a while. The average duration of the second stage in pluriparous cows is 2-4 hours but much longer in the heifers because more effort is required to dilate the tissues of the birth canal.

THIRD STAGE OF LABOUR (EXPULSION OF THE PLACENTA)
The 3rd stage is characterized by detachment and expulsion of the cotyledonary placenta. During the last few days of pregnancy, there begins degeneration of the uterine epithelium and foetal membrane.
At birth, the vessels of placenta collapse and the interdigitating villi collapse or shrink. The uterus continues to contract (myometrial contractions) thereby preventing haemorrhages and helping to expel the foetal membrane. The time required for expulsion of the placenta averages 8 hours but can range from a few minutes up to 12 hours without being considered abnormal.

**BOVINE DYSTOCIA**

This is difficult or abnormal birth in the cow.

**AETIOLOGY:** The causes of dystocia are multifaceted and include defects in the dam or the foetus and management factors, or a combination. For ease of comprehension, it is more convenient to divide the cause of dystocia into those of maternal origin and those of foetal origin. However, clinical case may result from multiple underlying disorders. The incidence of dystocia depends on the breed, immaturity of the dam at breeding and calving, use of inappropriate sire either without or within the breed.

**MATERNAL CAUSES OF DYSTOCIA (DAM RELATED)**

Problems with the dam that impede or prevent easy delivery include a lack of expulsive force and abnormalities of the birth canal. These may include:-

(i) **Primary uterine inertia** – this is characterized by failure of the myometrium to contract normally and bring the foetus into the cervical canal. This is occasionally encountered in cows and suggested causes include overstretching of the uterus by multiple or abnormal fetuses, a defect in the myometrium that renders its contraction impossible; a hormonal defect and periparturient hypocalcaemia. The dam may exhibit a few weak abdominal contractions which fails to progress to the 2\(^{nd}\) stage. On examination, the cervix is found to be dilated with no foetus in the birth canal. Calves are usually delivered by gentle traction after correction of any defects in posture or position.

(ii) **Secondary Uterine inertia**- this is consequent upon the exhaustion of the myometrium after prolonged labour. This is treated by removing the impediment. Sequelae of secondary uterine inertia include retained placenta, delayed uterine involution and uterine prolapse.

(iii) **Abnormalities of the birth canal** – Foetal delivery may be inhibited by inadequate size of the maternal pelvis, pelvic deformities or exostoses, incomplete dilatation of the cervix, vaginal cystocele, neoplasms of the vulva and vagina, remnants of the mullerian ducts persisting as bands of tissue from the dorsal to ventral walls of the vagina immediately caudal to the cervix, and uterine torsion. Stenosis of the vulva and vestibule may be the result of immaturity or may be a heritable defect as in some breeds.

**FOETAL CAUSES OF DYSTOCIA (FOETUS RELATED)**

The foetal causes of dystocia in cattle can be divided into those caused by abnormalities of the foetus (i.e defects in foetal disposition and various forms of maldevelopment resulting in foetal monsters) and those caused by excessive foetal size relative to the maternal pelvis (foetopelvic disproportion).
(i) Abnormal foetal presentation, position and posture. For normal delivery in cattle, the foetus is in cranial longitudinal presentation and in dorsosacral position, with the head, neck and forelimbs extended. Other forms of presentations are considered abnormal though caudal with hindlimbs extended may be delivered unaided and spontaneous delivery possible only when the foetus is quite small or the dam’s pelvis is unusually large.

(ii) Foetal monsters: A variety of malformations resulting in specific foetal phenotypes and conjoined twins have been described as sporadic causes of dystocia in cattle. The most commonly encountered are:

(a) **Schistosomia reflexus**: characterised by extreme ventral curvature of the spine with the head positioned near the sacrum, the abdominal and thoracic walls are not closed with the viscera being exposed. The limbs of the affected foetus are frequently rigid because of ankylosis of the joints.

(b) **Perosomus elumbus**: characterised by a nearly normal foetal fore part but flexure and ankylosis of the hindlimbs with absence of the vertebrae caudal to the thorax, and the pelvis is deformed and flattened.

(iii) **Foetal Oversize**: is the most common cause of dystocia in cattle due to foetopelvic disproportion. It is common in heifers where the foetus is of normal size for its breed but the maternal pelvis is of insufficient size (relative oversize) or the foetus may be unusually large and cannot be delivered through a pelvic canal of normal size.

**INCIDENCE OF BOVINE DYSTOCIA**

The incidence of Bovine dystocia has been widely studied because of its effects on productivity. It is absolutely difficult to provide a single figure for the incidence of dystocia in cattle because there are a large number of dependent variables such as breed, age of dam, body weight of dam, sex of calf, singleton or twins, breed of sire, body condition of dam. It is less common in dairy than in beef cattle. The overall incidence is within the range 3-10% of all calvings but can be very much higher.

**CLINICAL MANAGEMENT OF DYSTOCIA IN THE COW**

The diagnosis of dystocia usually is made by the herdsman or the manager of the animal, which may decide to seek veterinary assistance early during labour or very late when it might have been prolonged. The following are some of the steps that could be taken to manage a case of dystocia in the cow:

(a) Take a complete history such as breeding history, gestation length, previous occurrences, and attendant signs, length and intensity of labour, has the water bath ruptured, or not, has it been tampered with by the other personnel before being brought, is the foetus dead or alive?

(b) Restrain the animal for examination.
(c) Use protective clothing

(d) Get to the animal and carry out the examination in the following order:

(i) Do general examination by noting the general condition of the patient and identify abnormalities that may potentially influence the selection of a method to relieve the dystocia or have an impact on the prognosis. Recumbent animals should be examined for possibility of exhaustion, calving paralysis or hypocalcaemia. Check the mucous membrane–palour may indicate internal haemorrhage from large vessels. Note the character of the discharge from the birth canal or any exposed portion of the foetus or membranes.

(ii) Carry out the specific examination of the reproductive organs via palpation per rectum. It is most commonly indicated to confirm uterine torsion when stenosis of the cranial vagina is detected. The best position of the animal patient for examination is while standing. Vaginal examination may involve the use for epidural anaesthesia. The obstetrician (clinician) must as a matter of routine, cleanse and lubricate the arms and hands. Wearing of shoulder length gloves is at the discretion of the clinician because some opined that the use of such materials reduces sensitivity thereby interfering with a thorough examination. Before entering the birth canal, the vulva and perineal area and any protruding foetal parts should be washed with surgical soap and water. On entering the birth canal, determine the state of relaxation of the vulva and relaxation of the pelvic canal and the pelvic ligaments; state of lubrication of the vulva, note any damage to the pelvic canal, determine the degree of relaxation of the cervix. Determine position, presentation and posture of the foetus and also if dead, determine the degree of decomposition.

(e) From the information gotten from the above, have a diagnosis whether dystocia or not and its type.

(f) Then formulate a plan for the resolution of the dystocia.

(g) Always give a guarded prognosis.

**INDICATIONS FOR CAESARIAN SECTION**

Caesarian section (≡ Laparohysterotomy) is indicated for the treatment of dystocia cases that cannot be resolved par vaginum most especially when it would be unsafe for the dam or foetus and foetotomy is not a viable option because the foetus is alive or there is inadequate room to place the foetotome.

Caesarian section may be performed through the paralumbar fossa (most commonly on the left side), a low flank or ventrolateral incision (most commonly on the left), a lateral oblique incision, a paramedian incision (commonly on the right) or ventral midline laparotomy. The paralumbar fossa
and the lateral oblique laparohysterotomy procedures usually are performed with the cow standing while all other procedures are performed with the cow recumbent.

The left paralumbar fossa approach is arguably the most commonly used approach especially when the foetus is alive. With this approach, no or only mild sedation is required. The greatest disadvantage being reduced uterine exposure thereby increasing the risk of abdominal contamination from leakage of uterine contents which is of concern in case the foetus has been dead for more than 12 hours. This approach is not recommended for the removal of emphysematous foetuses.

**TECHNIQUE:** To achieve local analgesia, do inverted ‘L’ nerve block in the upper paralumbar fossa.

With the animal standing, upper flank incision of about 30-45cm in length is made and this is directed in until the rumen is reached. The rumen should be pushed forward so that the uterus lying behind it could be brought out. Through palpating the foetus, the gravid horn would be brought out. Having exteriorized the uterus, make another incision along the greater curvature to avoid the cotyledons. The incision length should be sufficient enough to allow the removal of the foetus. Pull the foetus until the cord ruptures on its own. Bring the foetus out and institute the necessary neonatal care. Try to remove the foetal membranes. If it is not easily removed, then leave it. Infuse the uterus with antimicrobial agent, clean the wound and then suture back by invaginating the ends and using interrupted suture pattern on the serosal surface. Repeat this for the second time to prevent leakage so that there are two folds. Thereafter, return the uterus back into the abdominal cavity. And resuture back the peritoneum using chromium catgut. Suture all muscles together since there is no pressure using absorbable suture material. Do subcuticular suturing, then suture the skin using non-absorbable suture material e.g. nylon (monofilament), silk, wire etc. Then administer parenteral antibiotic for about 5 days. The stitches should be removed at about 14 days.

Furthermore, caesarian section is indicated in any of the conditions listed below:

a) To deliver a live foetus when other methods may not permit life delivery.

b) For delivering excessively large foetus.

c) For delivering a foetus from an immature heifers.

d) When there is incomplete dilation of the cervix and uterine inertia.

e) Existence of a small, poorly dilated birth canal.

f) To deliver some monsters.

g) Uncorrectable position, posture and presentation.

**OBSTETRICAL PROCEDURES**

The main obstetrical procedures can be divided into 4 groups notably *viz.*:

1. Mutation
2. Forced Traction
3. Embryotomy
4. Caesarian Section

1. **MUTATION**: These are manipulations and procedures used to return a foetus to normal P.P.P. These include:
   
   (a) **Repulsion** – this is the act of pushing the foetus that is lodged in pelvis or birth canal out into the abdominal cavity in order to allow for space to correct malpositioning. It requires epidural anaesthesia; a repeller or the operator’s hand as well as elevation of the hind quarters.
   
   (b) **Rotation** – The turning of the foetus in its long axis to bring it into a dorso-sacral position.
   
   (c) **Eversion** is the rotation of the foetus that is presented transversely into an anterior or posterior presentation.
   
   (d) **Extension or adjustment of the extremities** – This is the correction of abnormal postures.

2. **FORCED TRACTION**

   This is the use of an external force to pull out the foetus. This can be achieved via the surgeon’s hand, or assistance. Materials required include, chains, eye hooks, ropes, foetal extractors etc. Forced traction is indicated under the following conditions:
   
   (i) Uterine inertia,
   
   (ii) Epidural anaesthetic induction to correct malpresentation,
   
   (iii) Foetal oversize
   
   (iv) Multiple births
   
   (v) Posterior presentation of the foetus or any condition which contraindicate embryotomy or Caesarian section.

   It should however, be noted that excessive force could be dangerous to both the dam and the foetus.

3. **EMBRYOTOMY**: It is the cutting of the foetus to reduce its size particularly when it is dead *in utero* and monstrosity. It is indicated for the delivery of a dead foetus; dam in a poor state with the other procedures being contraindicated. Its advantages include avoidance of Caesarian section, minimal assistance is required and there is prevention of injury to the dam. The disadvantages include sharp bones are produced, it is laborious.

   Post embryotomy requires close examination of the birth canal and uterus to check for laceration and ruptures so that they can be treated. Delivery of the foetus via this procedure results in placental retention. Hence, give 60IU of posterior oxytotic principle to aid the uterine involution, administer any broadspectrum antibiotic to prevent infection and finally urge the animal to rise after some suitable rest. The operator should cleanse himself.

4. **CAESARIAN SECTION**

   The use of this procedure is indicated in the following conditions:-
(a) Delivery of a live foetus when other methods are not available.
(b) Delivery of foetal oversize.
(c) Delivery of a foetus from a small-sized/immature dam.
(d) Incomplete cervical dilation and uterine inertia.
(e) Small poorly dilated birth canal.
(f) Uncorrectable Presentation, Position and Posture.
(g) Delivery of foetal monsters.

NORMAL BIRTH IN SHEEP AND GOAT

SHEEP

Parturition in ovine specie is referred to as LAMBING. The gestational length (GL) varies considerably with breed, and also within breed with the number of foetuses being carried, for instance, triplet-bearing ewes lamb before single-bearing ewes bred on the same day. On the average, the GL for sheep is 145 days (i.e. 140-150 days). At about 1 week before the expected lambing dates the ewe should be put on observation every 4-6 hours to check for signs of certain diseases like pregnancy toxaemia, hypocalcaemia, vaginal prolapse, abortion, mastitis and rupture of the prepubic tendon. This becomes expedient in order to institute prompt treatment in case of the occurrence of any of the afore-stated disease conditions.

STAGES OF LABOUR

1st Stage:
The signs of the 1st stage of labour include udder enlargement and engorgement with colostrum, relaxation of the pelvic ligaments, and vulva swelling. The ewe will isolate herself from the flock to begin nesting. She will circle, paw at the straw, and bleat in a low voice. She will stop to smell any uterine or vaginal discharge. She may lie down repeatedly and strain with the head raised as the uterine contractions become stronger and the foetus moves up into the pelvis.

2nd Stage:
Takes less time (< 1 hr) from the start of intense straining, to the delivery of the lamb and varies with the number of foetus carried. Normal presentation of the lamb is anterior dorsosacral with front limbs extended and proceeding the nose by approximately 6cm. Posterior dorsosacral presentation of the lamb with hind limbs extended is equally normal but it is associated with greater risk to the safe delivery. After delivery of the lamb, the ewe stands thereby causing the rupture of the umbilicus. The ewe, then turns, and begin to nuzzle and lick the lamb to stimulate breathing and to clean it off.
GOAT
Parturition in pregnant does is signalled by a series of events. This is consequent to the relaxation of the pelvic ligaments engendered by an increase in circulating oestrogen levels in late gestation. At about this time, the vulva enlarges and may become slightly longer. Most goats respond by showing rapid enlargement and engorgement of the udder especially in the 1\textsuperscript{st} freshners, the accuracy of which is still debatable. Parturition is divided into 3 stages \textit{viz.}:

1\textsuperscript{st} Stage: Initiation of myometrial contractions brought about by the interplay between progesterone and oestrogen. It may last 2-12 hours in the first freshners whereas it may last only few hours in pluriparous does. Other associated signs include restlessness and most signs are reflective of abdominal discomfort. The cervix relaxes during this period to release the cervical seal (thick, tenacious, yellowish brown mucus seen at the vulva). The contracting uterus pushes the placenta, foetus and foetal fluids towards the cervix thereby causing further dilation.

2\textsuperscript{nd} Stage: Initiated by the full dilation of the cervix with the concomitant abdominal press characteristics of active labour. It lasts 1-3 hours depending on the number of foetuses. Does typically are in lateral recumbency during stage 2, though some older experienced does may remain standing. After the placenta reaches the vagina, the choriallantois ruptures and lubricate the vaginal canal and the amnion is partially delivered through the vulval opening which also ruptures to deliver the kid.

3\textsuperscript{rd} Stage: This is characterised by delivery of the placenta and involution of the uterus. In the goat, placenta is usually delivered within 1 hour of kidding and is considered retained if not expelled by 12 hours. Lochia is normally discharged for up to 3 weeks.

CAUSES AND MANAGEMENT OF DYSTOCIA IN SHEEP AND GOAT
GOAT
Normally, delivery is uneventful in goats. Dystocia is considered to exist if the doe has been in active labour for 30 minutes or longer and is not making progress toward delivery of the kids. Most kids are born in cranial, longitudinal presentation, dorso-sacral position with extremities extended, like cattle. Though, some of the kids are born in caudal, longitudinal presentation, the incidence of dystocia is higher for births in caudal presentation.

Aetiology: Most common dystocia arises when more than one foetus tries to exit the vaginal canal at the same time. Other causes are deviations from normal Presentation, Position or Posture, foetomaternal disproportion, failure of cervical dilation (≡ Ring womb), vaginal prolapse, uterine torsion and uterine inertia.
MANAGEMENT

The diagnosis of dystocia is based on the owner’s observation of the kidding process which may include failure of active labour to be initiated after an appropriate time span, prolonged labour, abrupt cessation of parturition, prolapse of portions of the reproductive tract etc. The observations should be supplemented with detailed history. For instance, the length of time that the does is in labour is very important in that the cervical canal tend to dilate for a much shorten time period so that if delivery has not been accomplished within 2-3 hours, the cervix starts to close. And this would warrant caesarian section.

Examination of the does and all manipulative procedures should always follows the general principles of cleanliness, lubrication and gentleness. Appropriate restraint technique(s) can be used. The perineal area should be cleaned with soap and water. Epidural anaesthesia may be beneficial to reduce straining. The reproductive tract may be difficult to examine due to the small size of the animal. In any event, extreme care must be exercised due to the fragile nature of the uterus and vagina to prevent being ruptured. After visual and physical examination, a diagnosis of the cause of dystocia can be made and thereafter formulate a plan to relief it. The relief of dystocia includes untangling multiple kids, mutation of maldispositions, traction, partial foetotomy and caesarian section.

DYSTOCIA IN SHEEP

AETIOLOGY: Causes of dystocia in ewe may include the following:

(a) Malpresentation of the lamb (or lambs):- Manifestations may include limb retention, head retroflexion, true breech presentation (≡lamb in posterior dorsosacral position with the forward flexion of the hind limbs, dorsopubic or dorsoiliac position, multiple birth≡ presence of limbs or heads in the pelvis simultaneously).

(b) Maternofoetal disproportion: Too well fed ewes in late gestation.

(c) Poor cervical dilation may be due to vaginal prolapse, improper P.P.P.

(d) Uterine torsion.

(e) Uterine inertia 1o or 2o – exhaustion from prolonged labour.

Correction: this can be done through mutation, gentle traction, Caesarian section and foetotomy.

INFECTIOUS CAUSES OF ABORTION

Goats tend to have a high incidence of abortion when compared with other livestock species. Infectious causes of abortion play an important role and indeed a major source of economic loss in a goat herd. In spite of this fact, the safest approach in an abortion outbreak is to assume an all or none principle i.e. all causes of abortion are infectious in nature.
Several microorganisms have been implicated as causes of abortion in goat. The most common ones include *Chlamydia psittaci, Toxoplasma gondii, Campylobacter spp, Mycoplasma spp, Coxiella burnetii and Brucella melitensis*.

Many of the organisms that cause abortion in goats also cause abortions in sheep. The common lesion in all cases of infectious abortion is placentitis because of which the foetus either dies due to inability to exchange nutrients through the placenta or becomes infected and dies. This is a great economic loss because the foetuses are lost and the unproductive female has to be maintained until the next breeding season or sold at a loss. Sequel to this, are prolonged period of uterine disease and infertility. The disease may threaten the rest of the herd. The most common infectious causes of foetal loss in the goat includes:-

**CHLAMYDIOSIS**

It is the most common cause of infectious abortion in goats and sheep.

**Aetiology – Chlamydia psittaci**

The antigenic strains found in goats appear to be closely related to those in sheep. Antigenic type 1 is implicated in abortion, birth of stillborn or weak kids and in neonatal chlamydial pneumonia while type 2 isolates cause polyarthritis and conjunctivitis in adult goats. There is no cross protection between the 2 antigenic types. Type 2 is recently reported to be an abortion inducing strain in ruminants.

**Epidemiology and Pathogenesis:**

Certain avian species serve as reservoirs for the organisms e.g. sparrows and pigeons. Ticks or insects may play a role in transmission of the disease. Aborting does shed large number of organism from the uterine discharge, foetus and placenta.

**Clinical signs** – include abortion usually during the last month of gestation. Does may show bloody vaginal discharge 2-3 days prior to abortion. The foetus may be autolyzed or fresh. Pathologic changes in the foetus are non-specific. The placenta shows regional to generalized placentitis involving the cotyledons and intercotyledonary space.

**Diagnosis** – based on the history of abortion along with clinical signs of demonstration of characteristic feature (inclusion bodies) in impression smears of placenta, foetal tissue or uterine discharge. Definitive (confirmatory) diagnosis can be achieved by culture and serology.

**Treatment:** Limited success using oral tetracyclines (400 – 500mg/head/day) for 2 weeks.

**Control:** By vaccination which helps to prevent abortion but does not rule out infection. Hence, isolate the aborting animal and burn/bury the tissue (proper disposal).

**Zoonotic Potential:** contagious to humans.
TOXOPLASMOSIS

It is known to cause reproductive losses in goats and sheep.

**Aetiology:** a protozoan, *Toxoplasma gondii*. It causes abortion, mummification, stillbirth and birth of weak kids and lambs.

**Epidemiology and Pathogenesis**

Cats are pivotal in the transmission of *T. gondii*. The cats become infected through ingestion of infected rodents and birds. They later shed the oocysts into the environment through defeacation. Does and Ewes become infected by ingestion of contaminated food and water. Thus, the organism enters the blood and later spread to other tissues within 2 weeks of ingestion of oocysts. In pregnant does, toxoplasmas can invade and multiply in the placenta and then spread to the foetus to cause abortion, foetal death etc.

**Clinical signs:** The classical sign is abortion. Goats appear more to be susceptible than sheep. Abortion occurs in does of all ages, though, it occurs primarily in does that acquired the infection during pregnancy.

**Diagnosis:** Presumptive diagnosis is made from the placental lesions which may not be available due to decomposition. The preferred diagnostic procedure is the determination of *T. gondii* antibody in foetal fluids or presuckling serum. Their presence is indicative of transplacental toxoplasma infection. The modified agglutination test is more effective and sensitive to detect the antibody in foetal and maternal sera. Also, ELISA and indirect FAT can be used. Positive diagnosis requires isolation of the organism from the placenta, or foetal brain, lung and muscles.

**Treatment and control:** Present exposure to cat faeces. Bury foetal membranes and dead foetuses. Vaccination could be done.

**Zoonotic Potential** – Handle the infection with caution to prevent spread to human personnel. Do not drink unpasteurized goat milk.

Q – FEVER

It is a zoonotic infection affecting a variety of animal species and human beings. It can cause abortion in sheep and goats.

**Aetiology –** *C. burnetii* (a rikettsiae)

**Epidemiology and Pathogenesis**

Cattle, sheep, goats and wildlife are the reservoir host of the organism which is shed in large numbers in placentas, uterine fluids, colostrum and milk. Therefore, cows and sheep may be a source of infection for goats when they graze together.

**Clinical Signs:** Not apparent, though occasional abortion outbreaks is reported.
**Diagnosis**: Based on placental findings, serology and isolation of the organism. The diagnosis is not usually feasible because of the zoonotic importance of the disease. FAT can be used to identify the organism in frozen sections of placenta.

Rapid presumptive diagnosis of *C. burnetii* is possible by identification of large number of organisms and elimination of other causes of placentitis such as *Brucella, Campylobacter and Chlamydia spp.*

**Treatment and Control**: Oral / injectable long-acting chlortetracyclines have been used to stop abortion in outbreak of Q. fever.

**Zoonotic Potential**: Pasteurization of milk kills the organism.

**LISTERIOSIS**

It causes meningoencephalitis, abortion and septicaemia in goats.

**Aetiology**: *Listeria monocytogenes*. Often serotype 1

**Epidemiology and Pathogenesis**: The causative organism may be found in soil, water, plant litter, silage and the digestive tract of ruminants and humans.

**Clinical Signs**: Abortion is consequent upon infection in early gestation, later infection results in still birth or weak kids. Abortion occurs in the last 2 months of pregnancy preceeded by septicaemia with the signs including fever, decreased appetite and reduced milk production.

**Diagnosis**: Based on culture of the organism from the placenta, aborted foetal tissue and vaginal discharge.

**Treatment and Control**: Vaccination, prevention of feeding of spoiled silage.

**LEPTOSPIROSIS**

**Aetiology** – several serotypes of *Leptospira interrogans* causes abortion in goats. Goats are more susceptible than sheep.

**Epidemiology**: Contaminated environment

**Clinical Signs**: anorexia, fever, marked jaundice, haemoglobinuria, anaemia, nervous signs and abortion.

**Diagnosis and Control**: Dark field microscopy, immunoflorescence testing and silver stains of placenta and foetal tissue and fluids are used to confirm the diagnosis. Paired sera samples from does that have aborted with increase titre value, would be suggestive of abortion associated with leptospirosis. Vaccination is recommended. Separation of animal species, rodent control and maintaining a clean water supply are also necessary.

**Other infectious causes of abortion**

Any systemic infection that induces a febrile response, such as septicaemia and toxaemia may cause abortion in does. They include:

(a) Mycoplasmosis

(b) Campylobacteriosis
Non-infectious causes of abortion

1. Early Embryonic Death: probably due to physiologic or environmental factors e.g. chromosomal abnormalities, inadequate maternal environment, Hormonal imbalance etc. Predisposing factors include nutrition, stress, ovulation rate, heat etc.

2. Genetic Disorders – Habitual abortion may be an inherited disorder in some breeds e.g. older Angora does. Does running with rams during breeding season may breed with the rams unknowingly leading to sheep hybrid with abnormal chromosomes.

3. Nutritional factors: Deficiencies of energy and protein have been implicated energy deficiency leads to Pregnancy toxaemia especially in the late gestation.

4. Toxic plants and pharmaceuticals: Teratogenic changes or abortion have been associated with several plant species. E.g. Lupinus formosus; Conium maculatum, Nicotiana tabacum and Veratrum californicum, Nitrate poisoning; phytoestrogens etc are possible causes of abortion. Various pharmaceuticals have proved to be abortifacients e.g Anthelminthics, Phenothiazine, hormones (corticosteroids oestrogens and PG’s) etc.

POSTPARTUM DISEASES

1. UTERINE PROLAPSE: It occurs in all the large animal species. Most commonly seen in the cow and ewe, less common in the sow and doe but rare in the mare.

Aetiology: Factors involved include the following:

i) Poor uterine tone (uterine inertia): In cow, hypocalcaemia may predispose which allows the uterus to fold in and permit part of the wall to move towards the pelvic inlet thereby causing straining to push the organ through the vagina.

ii) Increased straining consequent upon pain or discomfort after parturition.

iii) Other causes of increased intra-abdominal pressure like tympany and recumbency.

(iv) Excessive traction at assisted parturition and the weight of retained foetal membranes.

Clinical Signs:

Cow: The patient is usually found with her uterus prolapsed. One or both horns may be visible. The mucosal surface and its cotyledons are visible and part of the choriallantois may still be attached. The
animal may be standing or recumbent. The uterus may be contaminated with beddings and faeces. May be lacerated, engorged and oedematous. If it is recent, it may be warm to touch but later becomes cold and discoloured. Occasionally, the cow may be found dead.

Prognosis depends on:

(a) duration
(b) degree of damage and contamination
(c) degree of shock
(d) position and accessibility of the patient.

It is good if the condition is observed very early and the animal is standing. It is guarded or poor if there is internal haemorrhage or the animal is in a state of shock or trauma and oedema of the uterus or if the intestines are involved or if there is concurrent milk fever. Future reproductive capacity is reduced and may sequel to repeat breeding abortion and retained placenta. Prognosis is poor if the uterus cannot be replaced.

Treatment: On receiving a call, give advice on first aid care. The uterus should be protected from further damage, wrapped in a clean moist sheet and if possible held above the level of the vulva.

On arrival at the farm, the following treatment sequence should be followed:

(i) Assess the general condition of the cow.
(ii) Assess the position whether suitable for Caesarian section to allow for gravity.
(iii) Administer an epidural anaesthesia.
(iv) Position the cow.
(v) Remove debris from the prolapsed organ by washing with saline or a mild antiseptic.
(vi) Remove the placenta or its remnants from the cotyledons if possible.
(vii) Repair any gross damage.
(viii) Reduce the size of the prolapse though not necessary.
(ix) Raise the prolapsed uterus above the level of the vulva and ease back through the vagina with the body of uterus firstly pushed, followed by the horns. Handling may be aided by wrapping and lubrication.
(x) The cow should be released from the sternal position and encouraged to rise if possible. The horns should then be fully pushed back into position aided (if necessary) by a clean bottle to fully invert each horn.
(xi) As soon as the replacement is achieved, oxytocin (20-30 IU) should be administered intramuscularly to cause involution of the uterus and reduce the risk of the recurrence.
(xii) Suturing of vulva lips depends on the choice of the obstetrician (discretion).
(xiii) After care – good nursing, a light diet and moderate exercise are required. Antibiotic cover is recommended. The vulval sutures are removed after 10 days.
NB: If replacement is impossible, amputation may be attempted, although the prognosis for survival must be guarded. The amputation is achieved by opening the prolapse closed to the vulva to reveal the uterine vessels lying within the tense mesometrium. They are each ligated in two places and the mesometrium severed between the ligatures. The vagina is thus ligated while ensuring that the external urethral orifice is avoided and the uterus and cervix are both removed.

**Mare:**

**Incidence** – quite uncommon

**Aetiology** – same as in the cow but may be predisposed by a retained placenta especially when the tone is low. Folds of uterine wall may be seen folding inwards towards the cervix when such a mare is examined per vaginum.

**Clinical Signs:** Sudden eversion of the uterus should not be confused with the bladder or the allantoic surface of the placenta because of absence of cotyledons on the equine placenta and the smooth surface of the endometrium.

**Treatment:** Manual replacement following epidural anaesthesia. It is easy to achieve than the cow.

**Ewe/Doe**

**Incidence** – More common in Ewe (≡may be higher) but less commonly seen in does.

**Clinical Signs** – The ewe is usually discovered with the prolapsed uterus a few hours after lambing. Post parturient discomfort and straining may predispose. The prolapsed organ is usually fragile and may be contaminated with straw and faeces.

**Treatment** – Administer epidural anaesthesia and raise the hindquarters to aid replacement. Enclose the prolapsed organ in a plastic glove for safe manipulation and to reduce the risk of damage.

**Sow:**

**Incidence** – It is quite common with the prognosis for successful treatment being guarded unless treatment is effected shortly after the prolapse occurs. It may involve one or both horns.

**Clinical Signs:** Most of the time, the sow with the uterus prolapsed is found dead. The carcass is pale with haemorrhage being the cause of death resulting from damage to the ovarian or uterine arteries. In very recent cases, the sow may appear unconcerned but in most cases, a degree of shock is present.

**Treatment:** It is complicated by the length of the horns. It is difficult too. General anaesthesia or heavy sedation will be found helpful. The rear end of the cow is raised with the head and neck ventrally flexed so as not to compromise the breathing. The uterine body is eased back into the vagina manually and warm water or saline can be introduced into the horns to aid complete inversion.

If the above could not be achieved, the prolapsed uterus can be replaced through a flank laparotomy wound. In severe case of shock, euthanasia may be considered.
2. VAGINAL PROLAPSE

**Incidence:** Occurs in all species. It is more common in the ewe and sow, and less common in the cow and rare in the mare. In sows, it may be accompanied by rectal prolapse. Post parturient vaginal prolapse may occur as a recurrence of a preparturient problem or less commonly, may arise as a new entity. The prognosis is usual good.

**Clinical Signs:** As in the preparturient animal.

**Treatment:** The prolapse should be identified, cleaned, lubricated and replaced under epidural anaesthesia. Xylazine addition potentiates the effect of the epidural anaesthesia and can be used to reduce post-replacement straining. The vulval lips are sutured to be removed after 7-10 days.

(3) ACUTE SEPTIC METRITIS (≡PUERPERAL METRITIS)

**Incidence:**
It occurs in all species but high in cattle and sheep. It is sporadic in nature but outbreaks may be seen especially where hygiene standards have fallen.

**Aetiology:** The disease usually follows abnormality of parturition (though not always) e.g. dystocia, poor uterine involution, or uterine prolapse. Infection is usually by organisms such as E.coli, Streptococci, Arcanobacter pyogenes and occasionally Clostridia. Poor local immune response and parenterally is probably involved.

**Cow:**

**Clinical Signs:** The cow is noticed to be ill 24-72 hours post partum. There is dullness, pyrexia (usually 1-2°C above normal) and anorexia, ruminal atony, signs of toxaemia and a bloody, foetid vaginal discharge. The animal may strain and walk with elevated tail. There may be diarrhoea sequel to toxaemia and septicaemia. The placenta, if present, is tightly attached with a “stringy appearance”. Rectal examination revealed poorly involuted uterus which is hard to touch. There is inflammation of the vaginal mucosa that is thickened with partial opening of the cervix. If untreated, the cow becomes recumbent within a few hours. A full clinical examination must always be performed to eliminate the presence of other problems such as acute mastitis.

**Prognosis:** must always be guarded. Clostridial infection has a poor prognosis.

**Treatment:** (i) institute intravenous antibiotic therapy immediately e.g. Oxytetracyclines, ampicillin, trimethoprin/sulfonamide, or enrofloxacin. Give intravenous non-steroidal anti-inflammatory drugs e.g. flunixin.

(ii) Fluid therapy should be instituted (oral / i.v) to take care of dehydration, toxaemia and uraemia. Good nursing is equally essential with some quantities of good food and water provided *ad libitum.*

N.B. Use of intrauterine therapy during acute illness is contraindicated. If the placenta is still attached, do not remove until the infection is under control with animal starting to show improvement.
**Mare:** Acute metritis is rare in horses but may be complicated by laminitis and in some areas tetanus. Treatment is the same as above.

**Ewe:** Outbreaks of septic metritis are occasionally encountered in flocks where hygiene is poor. Treatment is the same. Fluid therapy should be used with caution because of pulmonary oedema. Other oral fluid replacement therapy can readily be given via nasogastric tube.

**Sow:** Mild metritis is commonly seen as part of the mastitis – metritis – agalactia syndrome. Acute septic metritis may be associated with the presence of dead pigs *in utero*

Prognosis is very guarded with fatal toxaemia. The sow is weak, reluctant to rise, may have purple patches on the skin associated with septicaemia.

**Treatment:** Gentle attempt should be made to remove any piglets discovered within the uterus. Give intravenous antibiotic and supportive therapy with intensive nursing care.

(4) **MASTITIS**

This is the inflammation of the mammary gland. It is particularly important in the immediate neonatal period in cattle. It is one of the major causes of the failure of the milk supply in domestic livestock.

The aetiological agents include *E.coli* and *Streptococcus uberis* in cattle where they cause acute environmental mastitis. In the ewe, and other species, mastitis occurs a little later during post partum. There can be complication by other organisms.

**Treatment:** Requires the use of both parenteral and local antibiotic therapy. Inflammatory changes and toxaemia are treated with non-steroidal anti-inflammatory drugs e.g. flunixin: intravenous or oral fluid therapy is essential.

**Clinical Signs:** The udder is extremely hard and signs of toxaemia rapidly develop with dark red spots appearing on the skin and caudal aspects of the hind limbs.

**ACUTE MASTITIS IN THE COW**

This condition is associated with *E.coli* or *Strept. uberis* especially in the form of environmental mastitis. It may develop immediately before, during or after calving. Its occurrence may be so sudden that the animal is unable to rise (hyperacute). One or more quarters may be affected and become hard to touch. The milk is thin, watery and may be green or brown instead of normal cream colour of the colostrum.

In the very early stages, the body temperature may be elevated but as toxemia develops it falls rapidly to normal or below. Diarrhoea may be present in severe cases and renal failure may also occur.

**Treatment:** Requires prompt intravenous antibiotic therapy, non-steroidal anti-inflammatory drugs and fluids. Frequent stripping of the affected quarter is also beneficial.

(5) **RETAINED PLACENTA**

During the third stage of labour, the foetal membranes are expelled. Thus, the membranes are said to be retained whenever there is prolongation of the stage beyond its normal duration. Placental
Retention occurs in all species. It is particularly common in dairy cows but the sequelae of retention might be most serious in the mare. In the polytocous species such as the sow, bitch and queen, retention of the membranes may be associated with retention of one or more foetuses.

Causes of membrane retention are complex. Three main factors are involved:

1. Insufficient expulsive efforts by the myometrium.
2. Failure of the placenta to separate from the endometrium which may be caused by inflammatory changes, placental immaturity, hormone imbalances, a neutropenia, a lack of polymorph migration to the sites of attachment, and possibly immune deficiencies.
3. Mechanical obstruction including partial closure of the cervix.

**The Cow**

**Incidence** – It is much higher after conditions in which uterine distension and/or poor uterine tone occur. The incidence may rise up to at least 50% in cases of twin gestation, uterine hydrops or uterine inertia, dystocia of any aetiology, mineral and vitamin deficiencies (Vit. A & E, selenium, cobalt and copper); after premature birth including induced birth and abortion.

**Clinical signs**: the membranes are seen hanging from the vulva. They become progressively more decomposed, have a foetid odour and often contaminated with faeces and bedding. In twin calving, the membranes are not visible but encountered only during a vaginal examination. The cow is apparently normal, though appetite and milk yield may be marginally reduced. In severe, superimposed uterine infection, the cow may become dangerously ill.

**Subsequent fertility** – the incidence of endometritis is higher with delay in return to oestrus post calving after retention of the foetal membranes. It is a reversible phenomenon because permanent damage is unlikely.

**Treatment**: There is some controversy on manual removal. Prevention can be achieved via PGF2α or oxytocin injection. The manual removal is attempted 72 hours after calving. The obstetrician should set a time limit for removal. If the membranes cannot be removed within 10 minutes, they should be left for a further 48 hours before further attempt at removal is made. During physical removal of the membranes they are separated at their cotyledonary attachments from the uterine caruncles. The points of attachment involve both the pregnant and the non-pregnant horns. The procedure requires strict hygiene, wearing of protective clothing, disinfection and washing of the perineal area.

After removal of the placenta, administer antibiotic into the uterus. If there is much debris in the uterus, it may be lavaged with warm saline and the contents siphoned out with a stomach tube.

If the cervix is partially closed, the retained membranes should be left to separate naturally. Evidence of active infection should be treated with parenteral antibiotic therapy.
FOETOTOMY (≡ EMBRYOTOMY)
This is the term used to describe method of dividing a foetus, which cannot be delivered normally, into small pieces that will more readily pass through the birth canal. The technique is employed when it is ascertained that the foetus is dead in utero. It is most commonly used in cattle, occasionally in horses, rarely in sheep and goats, and almost never in pigs and small animals. Foetotomy is classified into two:
a. Complete foetotomy – when a whole dead foetus is divided into smaller pieces.
b. Partial foetotomy – when a small part of the foetus such as leg is removed.

There are available two techniques of foetotomy viz.
(i) Percutaneous foetotomy – in this technique, a tubular embryotome is used, through which a flexible wire saw is passed. The wire saw is used to cut through the foetus while the embryotome protects the maternal tissues from damage.
(ii) Subcutaneous foetotomy – parts of the foetus are dissected out from within its skin, thus reducing foetal bulk and allowing delivery of the remainder mass through the birth canal.

NB: Percutaneous foetotomy is the preferred method unless the foetus has decomposed.

Indications:
(a) Relief of dystocia caused by foetal maldisposition that cannot be corrected by manipulation.
(b) Relief of dystocia caused by foetopelvic disproportion in which the foetus is dead and cannot be removed by traction. The foetus may be normal but oversized, or it may be abnormal as a foetal monster.
(c) The relief of dystocia caused by the foetus becoming stuck during delivery e.g. Stifle lock (hip lock).
(d) During Caesarian Section when the dead foetus is either too large, or deformed or in an uncorrectable maldisposition

Partial foetotomy is indicated under the following conditions:
(i) Deviation of the head
(ii) Shoulder flexion
(iii) Breech presentation (bilateral hip flexion)
(iv) Posterior presentation – hock flexion
(v) Foetal monsters

Care of the dam following foetotomy includes the following:
- Manual examination of the vagina and uterus to detect soft tissue damage.
- Administration of local and parenteral antibiotics.
- Non-steroidal anti-inflammatory therapy
- Careful removal of the placenta from the caruncles
- Careful nursing for a few days.