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PRACTICAL MANUAL ON VETERINARY OBSTETRICS (VGO - UNIT II)

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Kanpur

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Practical Manual
On
Veterinary Obstetrics
(VGO- UNIT II)

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Preface

After the introduction of Veterinary Council of India's syllabus in the Under Graduate teaching programme of the Faculty of Veterinary Science it becomes mandatory to have practical manual in all the practical courses. The need of practical manual was felt more seriously for maintaining uniformity in teaching when different teachers conducted practical classes of the students. At last the long felt need has been finally fulfilled – the "Practical Manual on Veterinary Obstetrics" part is ready. The manual comprises 11 numbers of practicals covering the entire syllabus of course No. VGO- Unit II. In most of the practicals a little bit of theory is included for the benefit of the students. It is expected that the manual caters to the needs of B.V.Sc. & A.H. students in the discipline of Animal Reproduction, Gynaecology and Obstetrics.

Dr. Purabi Barman
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PRACTICAL NO.- 1

Study of Pelvis and Pelvimetry

Objectives

1. The bony and ligamentous structures comprising the pelvis are particular interest in obstetrics because the maternal pelvic size is a factor in bovine dystocia. The best criterion of pelvic capacity is the "Pelvic area" which is the product of the dorsoventral and the widest bisiliac dimensions of the pelvic inlet.
2. The study of pelvimetry is warranted selective breeding and crossbreeding since the relationship between various diameters allow one to form an idea of shape, size and position of pelvis and also the birth canal. Moreover, it helps in culling undesired type of animals with narrow defective pelvis which would reduce the incidence of dystocia due to foetopelvic disproportion.

The bony pelvis is composed of the sacrum, the first to third coccygeal vertebrae, and the two os coxae, each formed by the ilium, ischium and pubis. The lateral walls and floor of the pelvis is formed by the two os coxae (hip bones) and the roof is formed by sacrum and first two or three caudal vertebrae.

Sacrum

The sacrum is composed of five fused vertebrae in the cow. It is somewhat triangular in form with the base articulating cranially with the last lumbar vertebra and caudally with the first coccygeal vertebra. The ventral surface is smooth and concave and the dorsal surface exhibits the sacral spines. The wing of the sacrum articulates or fuses with the ilium laterally.

Ilium

The ilium is the largest portion of the os coxae, irregularly triangular in shape and forms the lateral boundary of pelvis. The broad, flat, dorsal part is called the **wing** and the narrow ventral part is called the **shaft or body**. The external portion of the wing of the ilium is referred to as the tuber coxae, hip bone, or "**HOOK**" bone.

Ischium

The ischium forms the caudal part of the ventral floor of the pelvis and is thin, quadrilateral and curved. Caudal lateral portion of these bones are referred to as tuber ischii or "**PIN**" bones.

Pubis

The pubis is the smallest of the three bones of the os coxae and forms the cranial portion of the pelvic floor. It is wide and triangular in shape. Pelvic surface is smooth and is concave in female and convex in male.

Acetabulum

The **acetabulum** is a cotyloid cavity, formed by the fusion of the ilium, ischium and pubis, and meant for lodging and articulation with the head of femur.

Pelvic ligaments

There are three, single or paired pelvic ligaments that maintain the relationship of the pelvis to the spinal column:

1. **Dorsal and lateral sacroiliac ligaments–** attached to the medial wing of the ilium and lateral portion of the sacrum and the summits of the sacral spines.
2. **Sacrosciatic ligament–** An extensive quadrilateral ligamentous sheet that completes the lateral wall of the pelvic cavity. It extends from the lateral border of the sacrum and the transverse processes of the first coccygeal vertebrae to the ischiatic spine and tuber ischii. It provides attachment for large gluteal muscles and the vulva. In dog, this ligament is referred to as sacrotuberous ligament.

3. **Prepubic tendon –** Prepubic tendon is essentially the tendon of insertion of recti abdominis muscle and others, except the transverse abdominis muscle. It is attached strongly to the cranial medial border of the pubic bones. Its significance features is the fixing the sacro-iliac articulation and maintaining the bony pelvis in proper position.

In large domestic animals the cross section of the foetal chest or hips may be greater in diameter than the maternal pelvic inlet but birth is possible by the displacement and realignment of the foetal parts at the time of parturition. The caudal portion of the pelvic cavity is smaller than the cranial portion formed by the bony pelvis but the caudal portion dilates markedly at the time of parturition to allow the passage of the foetus. This ability to dilate is brought about by the relaxation of the pelvic ligaments especially the sacrosciatic ligament which is an obvious indication of approaching parturition in the cow.

Pelvic Cavity

The pelvic inlet is roughly oval in shape in all species,with the largest diameter being sacro-pubic. The size of the pelvic inlet varies greatly within a species due to breed, age and size. The sow and cow have the most elliptical pelvic inlets, while the mare some dogs have nearly round inlets.

Approximate diameters of the female bony pelvis		
Species	**Sacro-pubic (cm)**	**Bisiliac (cm)**
Cow	19.0 – 24.1	14.6 – 19.0
Mare	20.3 – 25.4	19.0 – 24.1
Sheep	7.6 – 10.8	5.7 – 8.9
Sow	9.5 – 15.2	6.3 – 10.2
Bitch	3.3 – 6.3	2.8 – 5.7

The pelvis of male differs distinctly from that of the female domestic animals, more noticeable in large animals. The distinct

features of pelvis of male are as follows:

1. Diameter of pelvic inlet is small
2. Ischiatic arch is narrow
3. Pelvic cavity is small and less roomy
4. Obturator foramen is small
5. Cranial floor of the pelvis is more apt to be convex
6. Bones of the pelvis is thick and heavy

Differences in the pelvices of domestic animals	
Species	**Characteristic features**
Mare	1. Sacro pubic and bisiliac diameters are nearly the same. Hence pelvic inlet is almost spherical 2. Coxal tuberosities are large and prominent. 3. Wing of the ilia are nearly perpendicular to the long axis of the body.
Cow	1. Ischial tuberosities are prominent and high. 2. Ilial and coxal tuberosities are smaller than in mare. 3. Pelvic inlet more elliptical.
Ewe	1. Shape of pelvic inlet similar to cow. 2. Wing of ilia are more nearly parallel to each other. 3. Tuber ischii relatively much smaller.
Sow	1. Pelvic inlet long and narrow. 2. Wings of ilia are not prominent and large as in cow and mare. 3. Pubic symphysis is thick and does not undergo complete ankylosis. 4. Tuber ischii are not completely ossified.
Dog	1. Wings of ilia are small and nearly parallel with the median plane 2. Ischium has a twisted appearance, since caudal part is nearly horizontal.

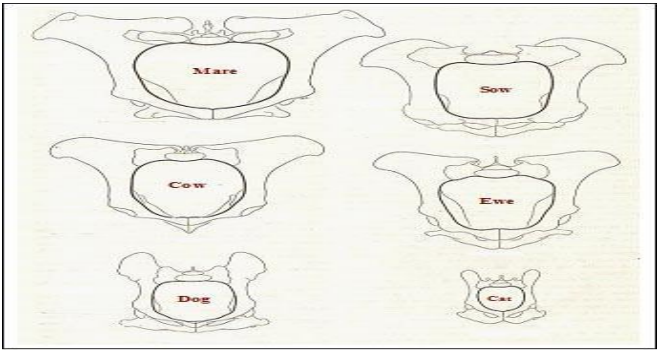
Cat	1. Similar to that of the dog. 2. Relatively larger obturator foramen.

Biometry of Pelvis

1. In all species, the pelvic cavity is moreover in the form of a cone, the base being cranially located.
2. **Sacro-pubic** diameter (in cm) is measured from the roof of the sacrum to the pubis (pelvic floor) at the pelvic inlet.
3. **Bisiliac** diameter (in cm) is measured between the shaft of the ilium.
4. The sacro-pubic diameter is the largest measurement.

Schematic representation:

Pelvic Inlet Of Domestic Animals:



Pelvimetry

It is the technique of measuring the diameter of the osseous pelvis from which the approximate pelvic area is calculated. The study of pelvimetry is important in the days of selective breeding and crossbreeding since the relationship between various diameter allow one to form an idea of shape, size and position of pelvis and also the birth canal. Moreover, it helps in culling undesired type of animals with narrow defective pelvis which would reduce the incidence of dystocia due to foetopelvic disproportion.

Materials required

1. Bony pelvis
2. Thread or a hinged or sliding graduated pelvic caliper.
3. Scale
4. Obstetrical lubricant or non-irritant soap, bucket of clean water with disinfectant.
5. Full arm rubber or disposable gloves.
6. Paper and pen for recording the observations

Bovine Pelvimetry

1. The ideal time for predicting dystocia in heifers is before they are bred as yearlings. Research has shown that yearling pelvic size is the most reliable yearling factor indicating potential difficulty since pelvic area growth was linear from 9 to 24 months of age in heifers calving at 2 years of age.
2. Studies on pelvic area**:** birth weight ratio has shown that a 600 pound yearling heifer with a pelvic area of 140 sq.cm. can usually deliver a 70 pound calf without major difficulty as a 2 year old. This pelvic area to birth weight ratio is 2 to 1. As the ratio decreases, the degree of calving difficulty increases and a caesarean section would generally be required with a pelvic area of 120 sq. cm. and a calf birth weight of 80 pounds which yields a ratio of 1.5 to 1.
3. Yearling pelvic areas **(heifer weight 550-700 lbs)** can be divided by a factor of 2 to estimate the calf birth weight a heifer can deliver as a 2-year old.
4. If pelvic measurements are taken at the time of pregnancy examination **(18 months old, weight 700-850 lbs.)** a factor of 2.5 can be used to estimate calf birth weight.
5. A factor of 3.1 can be used on pelvic areas taken before calving **(2 year old weight 800 to 950 pounds**). If yearling heifers weigh 750 to 850 pounds, a factor of 2.25 should be

used. These factors appear to be good indicators of dystocia, with an accuracy of about 80%.

6. Average pelvic area growth has been calculated to be 0.27 sq. cm/day from yearling to 2 year old heifers.
7. If pelvic measurements are obtained before breeding, problem heifers with a small pelvic size can be culled from the herd or mated to easy-calving bulls, while heifers with a larger pelvic diameter can be mated to average calving bulls. Since larger heavier heifers do not always have the largest pelvic size, heifers should be measured and mated according to pelvic size.
8. If heifers are measured at the time of pregnancy examination, problem heifers can be culled or aborted and sold as feeders. Heifers bred to produce a calf larger than can be delivered through their birth canal can also be marked for close observation at calving.

There are two methods used in determining the dimensions of the pelvic cavity:

1. **External or indirect pelvimetry** is carried out by calculating the pelvic diameter based on measurements taken between the angles of the ilia, the distance between the ischia and the height from the hip joint to highest point of the croup. In general, this method has been shown to be inaccurate and is no longer used.
2. **Internal or direct pelvimetry** refers to the measurement of the interior of the pelvis through the rectum with a pelvimeter.

Diameters of pelvic inlet

1. **Sacro- pubic/ superio-inferior diameter** or **conjugate diameter** is the distance between promontory and pubis.
2. **Dorsal bisiliac/superio-transverse diameter** is measured between upper third of pelvic cavity.
3. **Ventral bisiliac /inferio-transverse diameter** is the distance between the two psoas tubercles.

4. **Oblique/sacro-iliac diameter** is the distance from sacro-iliac joint through the center of pelvic cavity to the psoas tubercle of opposite side.
5. **Vertical diameter** is the perpendicular distance between pubic tubule and third/fourth sacral vertebra.

Diameters of pelvic outlet

1. **Superio-inferior diameter** is the distance between the body of the first coccygeal vertebra and summit of the ischial arch.
2. **Transverse diameter** is the distance between the two tuber ischii.

External Pelvimetry

This is arrived at by determining the diameters of pelvis from certain body measurements.

The following external pelvic measurements are taken :

Distance between the external angle of the ilium (cm) : A
Distance between the ischial tuberosity (cm) : B
Distance between the summit of the croup and the hip joint (cm) : C

Based on the measurements the pelvic area is calculated as follows-

Sl. No.	Measurement	Formula
1.	Transverse diameter of pelvic outlet	¼ (A + B)
2.	Vertical diameter of pelvic outlet	¾ x C
3.	Transverse diameter of pelvic inlet	12.2/10 x (Transverse diameter of pelvic outlet)
4.	Vertical diameter of pelvic inlet	13/10 x (Vertical diameter of pelvic outlet)

Internal Pelvimetry

This is done by direct manual examination of the interior of pelvis on rectal and vaginal examination. The distances between various parts of the pelvis can be approximately determined by calibrating the palm.

1. The general procedure is to restrain the animal in a chute or Travis.
2. A comfortable normal standing position is best.
3. Feces should be removed from the rectum and the instrument carefully carried into the rectum with the hand and arm to the pelvic inlet.
4. The width of the pelvic inlet is obtained at its widest point between the right and left shafts of the ilium. This is the horizontal **(bisiliac)** diameter of the pelvis.
5. The height of the pelvic inlet is obtained by measuring the distance between the dorsal pubic tubercle on the floor of the pelvic and the sacrum, dorsad. This is the vertical **(sacro-pubic)** diameter of the pelvis.

Calculation

The two measurements are read in centimeters and are multiplied to give the pelvic area in square centimeters.

PRACTICAL NO. 2.

Pregnancy Diagnosis

---

1. Pregnancy Characteristics in Bovine

45-60 Days

- Asymmetry of horn
- Feeling of fluid filled inside uterine horn
- Presence of CL on either ovary

3 months

- One horn larger (Football size)

4 months

- Gravid horn hanging on pelvic brim
- Fremitus present
- Cotyledons felt

5 months

- Uterus in abdominal cavity
- Cervix on pelvic brim
- Fremitus present

6 months

- Uterus in abdominal cavity
- Cervix on pelvic brim
- Fetal parts may or may not be palpable
- Intense fremitus

7 months

- Fetal parts palpable
- Intense fremitus

8 months

- Fetal extremities recognizable
- Intense fremitus

9 months

- Fetal extremities recognizable
- Intense fremitus
- Fetal reflex may be felt.

Ultrasonography characteristics of bovine pregnancy

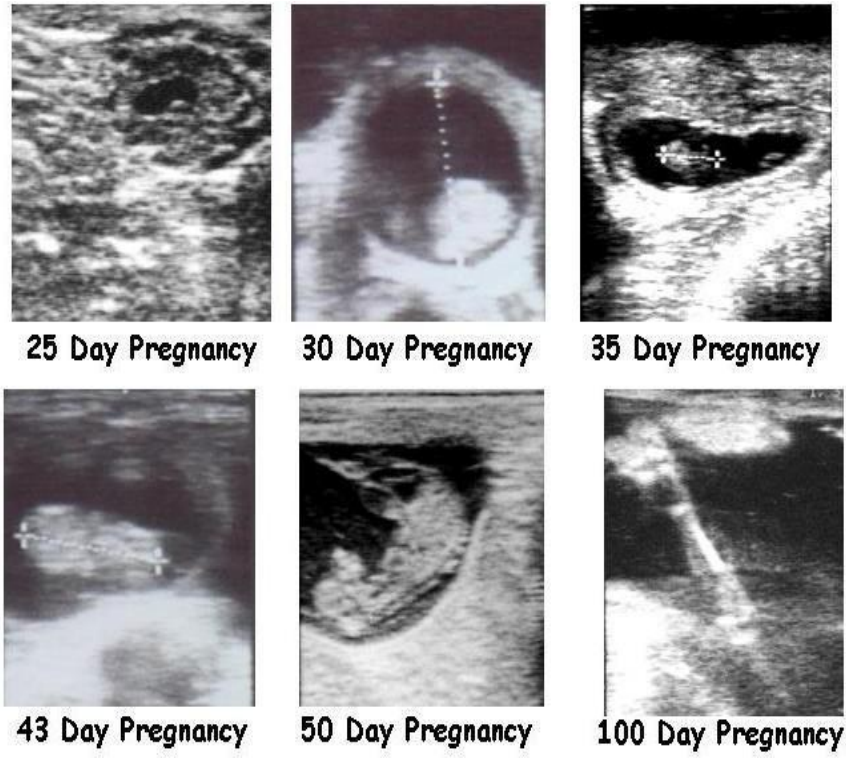


Fig: Detection of identifiable characteristics of bovine conceptus through ultrasound

Characteristic detected First day detected	Range (days)
Embryo proper	19 to 24
Heartbeat	19 to 24
Allantois	22 to 25
Spinal cord	26 to 33
Forelimb buds	28 to 31
Amnion	28 to 33
Eye orbit	29 to 33
Hindlimb buds	30 to 33
Placentomes	33 to 38
Split hooves	42 to 49
Fetal movement	42 to 50
Ribs	51 to 55

2. Pregnancy diagnosis in Mare

Ovaries

1. Both ovaries should be palpated although ovarian palpation contributes little to pregnancy diagnosis.
2. This is because both ovaries are usually enlarged from 18 to 40 days due to follicular development and the CL is not palpable.
3. From 40 to 120 days there is extensive ovarian activity with ovulations, luteinisation and development of secondary corpora lutea.
4. Follicular activity decreases from 120 days to term and the ovaries become small and inactive for the remainder of gestation.
5. The position of the ovaries up to 60 days of pregnancy is as for the non-pregnant mare. From then on they are drawn forward and medially but remain dorsal to the uterus.

6. From 5 months of pregnancy, the ovaries are not usually palpable.

Uterus

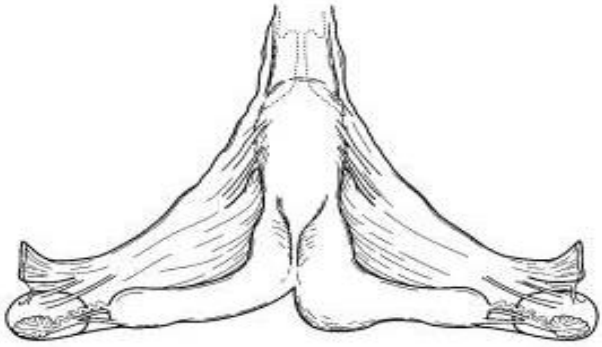
Both uterine horns and body should be palpated. Pregnancy diagnosis is based on tone and location of uterus and contents.

15 to 22 days

The uterus becomes more tubular and turgid from 15 to 22 days post- ovulation and is readily palpable. It can be difficult to feel the conceptual swelling except in maiden mares.

22 to 28 days

At about 22 days the conceptual swelling develops at the uterine horn/body junction. This corresponds to fixation, when the conceptus stops migration in the uterus and becomes fixed in position, prior to implantation. The swelling is 3 to 4 cm in diameter (about an egg size) and it bulges ventrally.



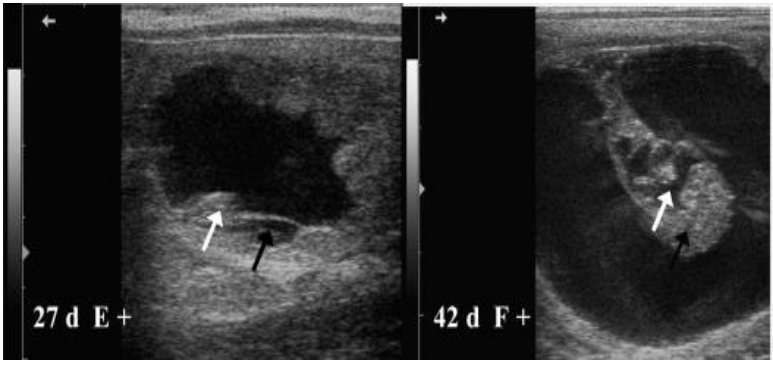
35 to 60 days

As the conceptus grows the swelling becomes larger and spherical and appears more as a fluid sac. By 42 days it is about 5 x 7 cm (the size of a tennis ball). The uterine tone around the bulge begins to decrease so that the swelling becomes less tense.

60 to 90 days

By 60 days the swelling is about 12 cm in diameter and fills the pregnant horn. After 60 days the pregnancy is like an elongated football and starts to involve the uterine body. One must be careful not to confuse it with the bladder or a case of pyometra. The uterus migrates cranially.

Between **days 60 and 100**, the uterus is low within the abdomen and the foetus can not usually be palpated From 7 months onward fetal parts can be palpated.



White arrow – Embryo proper
White arrow – amnios
Black arrow – Allantois
Black arrow - Fetus

Assessment of Fetal Age

One standard measure used to estimate fetal age is the crown-rump length (CRL). This type of measurement can be made in any animal but the conversion of the CRL to fetal age is species or even sometimes breed specific. The CRL of the fetus is related linearly with the age of the fetus.

Objective

To determine how old is the fetus.

Materials required

1. Freshly procured pregnant cow tract from slaughter house
2. Forceps
3. Scissors
4. Scalpel
5. Knife
6. Thread
7. Measuring scale

Procedure

The organ may be cut open to record the CRL of the fetus, which is the measurement from the vertex of the skull to the root of the tail.

Estimation of fetal age in cattle

Formula for estimating fetal age in days = 2.5 x (CRL cm + 21)

Thus if CRL = 10 cm

Fetal age in days = 2.5 x (10 + 21)

= 2.5x31

= 77.5 days

or, less accurately

Formula for estimating fetal age in months = 2 x CRL inch

Thus if CRL = 4.5 inch

Fetal age = 2 x 4.5

= 9

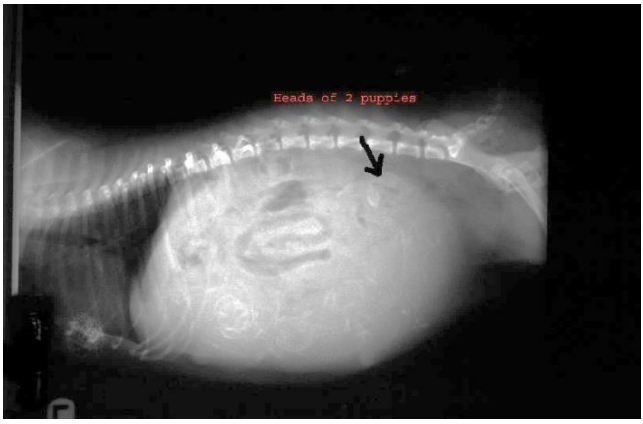
= 3 months

Pregnancy diagnosis in Dog

Canine pregnancy lasts for approximately 63 days, but ranges from 57 to 72 days from a single breeding. This is due to the variability in the ovulation timing and semen survival in the female dog. During this time hormonal and physical changes develop and are observed in the female. Pregnancy can be diagnosed in a variety of ways in the dog. These include abdominal palpation, ultrasonography, relaxin testing, and radiographs. Each method has its own specific time frame when it is most accurate in determination of pregnancy.

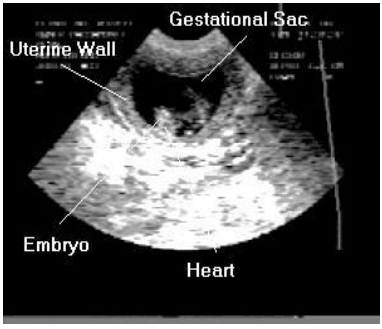
Abdominal palpation can be performed if the female is cooperative. Many times in a nervous female, the uterus cannot be felt due to a tense abdomen. Pregnancy is most accurately identified by this method at about days 28 to 30 after ovulation. It can also be difficult to palpate and determine pregnancy in large dogs and in dogs with just a few pups in the cranial part of the abdomen.

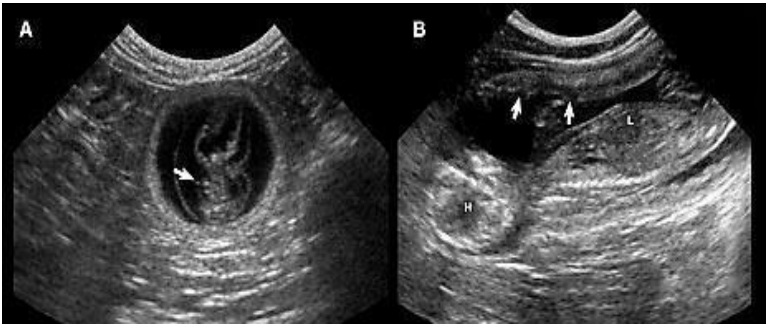
Radiographic diagnosis of pregnancy is first possible 42 to 50 days after first mating. It is usually recommended to wait until later in the pregnancy to obtain a puppy count with radiographs as it can be difficult to visualize all the puppies in early films. For the most accurate puppy numbers, radiographs should be taken at about day 55 post first breeding.



Relaxin canine pregnancy test can be used to diagnose pregnancy as early as day 21 to 28 post breeding. Relaxin is a pregnancy specific hormone that is produced primarily by the canine placenta. False negative can occur, and negative results should be confirmed by other testing or by repeating the test in 7 to 10 days.

Ultrasound pregnancy confirmation is possible as early as day 20-22 after breeding, but can be missed this early. Ultrasound at day 30 post breeding is a great diagnostic tool to confirm pregnancy. Ultrasound has the drawback of not being accurate to count puppies, but can determine heartbeats and also fetal age in the puppies.




A
B
L
H

PRACTICAL NO. 3.

Study of Foetal Membranes of Domestic and Pet Animals and Identification of Normal and Abnormal Foetal Membranes

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Objectives

1. To identify the different types of placenta in domestic animals.
2. To identify some of the common abnormalities/lesions in the placenta.
3. To demonstrate the knowledge of placental examination in bovines.

Placenta

It is a unique organ that develops in mammalians for the development of the fetus. It is an apposition of fetal membranes to the endometrium to permit physiological exchange between the fetus and the mother.

The placenta is composed of two parts -

1. The fetal placenta or allantois chorion.
2. The maternal placenta or endometrium.

Functions of fetal membranes

1. Gives protection to the fetus
2. A means of getting nutrients from the dam to the fetus
3. It takes care of fetal waste products.
4. Synthesis of enzymes and hormones

Components of fetal membranes

1. **Primitive yolk sac (vitelline sac)** developing early in the embryonic period from the entoderm and disappearing after a short period of time in ruminants and swine but persisting for 4-6 weeks in horses before becoming a remnant in the fetal membranes.
2. **Amnion** forms 13-16 days after conception in sheep, cow and horse and arises from a space in the inner cell mass as a double walled sac that completely surrounds the fetus except at the umbilical ring. When this sac is completed it is filled with amniotic fluid suspending the embryo and thus is a mechanical protection to the fetus.
3. **Allantois** arises around 2nd to 3rd week of gestation in bovine foetuses as an out pocket of the hindgut as soon as the latter is formed.
4. **Chorion or trophoblast :** The fetal membranes participate in the formation of the placenta either separately or in certain combinations and gives rise to **three basic types** of placentations which differ in regard to the identity of the foetal membranes involved viz **chorionic, chorioallantoic and yolk sac placentation. In farm animals placentation is chorioallantoic** characterised by presence of chorionic villi which protrudes into endometrial crypts.

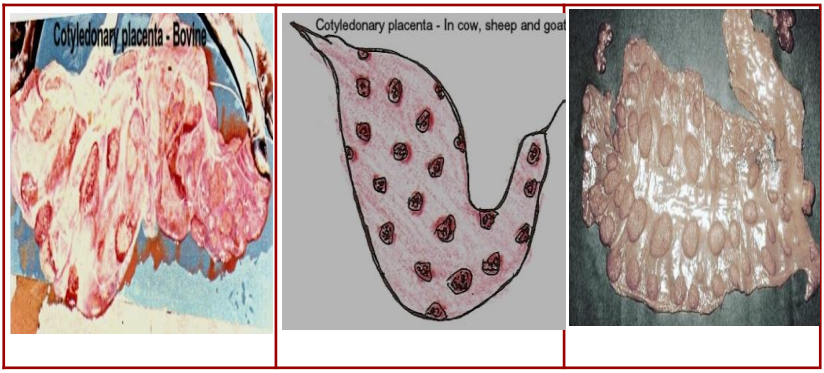
   The chorioallantoic or allantois chorion is formed by the fusion of the outer layer of vascular allantois and trophoblast/chorion. This structure richly supplied with blood vessels communicating with the fetus and in intimate contact with the endometrium is designed to carry on the metabolic inter-changes of gases, nutrients and wastes between the maternal and fetal circulation. Chorioallantoic placentas are of two types i.e. Deciduate and Nondeciduate based on loss of maternal tissue at birth.

A. Non-deciduate placenta

In this type of placenta, the connection of chorionic villi with the uterine mucosa is loose. At the time of birth the villi are removed without any loss of maternal tissue. The non-deciduate are of two types i.e. cotyledonary and diffuse.

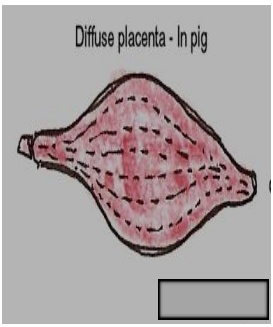
(i) Cotyledonary placenta

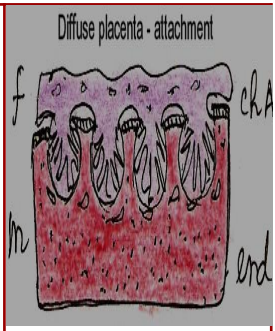
The chorionic villi are not uniformly distributed over the elongated blastocyst but occur in tufts or bunches called cotyledons. This type of placenta is found in **cattle, buffalo, sheep and goat**. The cotyledons fit into special uterine thicknenings called caruncles. The caruncles are the button like projects on the endometrium. The union of chorionic villi and caruncles forms the placentome. Histologically it is known as epitheliochorial placenta. Number of placentomes varies from 88 to 96 in ewes and does, and 70 to 120 in cows.



(ii) Diffuse placenta : The chorionic villi are uniformly distributed all over the surface except at the extreme ends of the blastodermic vesicle. It is found in **pig**. In **mare** it is diffuse and micro cotyledonary. Diffuse placenta is histologically known as epitheliochorial placenta.

Placenta of Horse



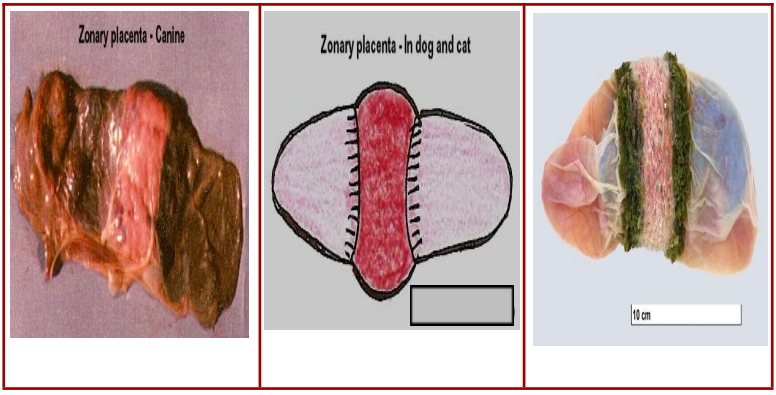


B. Deciduate placenta

In this type, the union between the chorionic and uterine wall is much more intimate. The chorionic villi penetrate the uterine mucosa and secrete certain enzymes that erode the uterine tissue, establishing an intimate relation between the villi and the maternal tissue. This result, at birth, loss of much of the superficial layer of the uterus called Decidua capsularis with the placenta. The deciduate placenta is of two types i.e. zonary and discoidal.

(i) Zonary placenta

In this type of placenta the elongated blastocyst is surrounded by two rows or zones of chorionic villi. The uterine wall is eroded. The villi branch profusely in the uterine tissue. This type of placenta is found in **dog** and **cat**. Loss of maternal tissue at birth is moderate. Histologically it is endotheliochorial placenta.



(ii) Discoid placenta

This type of placenta is found in primates including man and monkey. In this type of placentation, the syncytial trophoblast from the very beginning starts to erode the uterine wall resulting in disintegration of uterine epithelium, uterine connective tissue and the walls of maternal capillaries. The fetal connective tissue in the villi also disappear to a large extent. The maternal blood comes to circulation in the lacunae of the villi in the thickened trophoblast. The nutritive material difuses through the trophoblast and the wall of the foetal capillaries as the wall of the maternal blood capillaries are already lost. Histologically the discoid placenta is known as Haemochorial placenta. (Found in **Monkey, mouse, rats, rabbits etc. and also in human**)

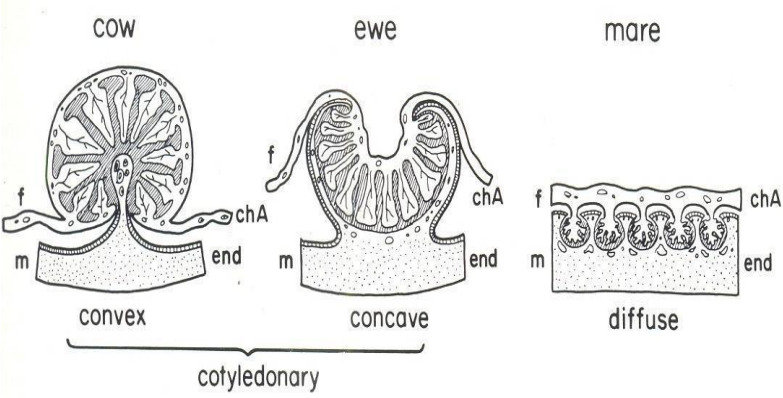


Fig.2. Epitheliochorial placenta of mare, ewe and cow. The placenta of mare is diffuse and micro cotyledonary, those of ewe and cow are cotyledonary

Ch A- Chorioallantois; end- endometrium; F- fetal; M- maternal

Examination of placenta

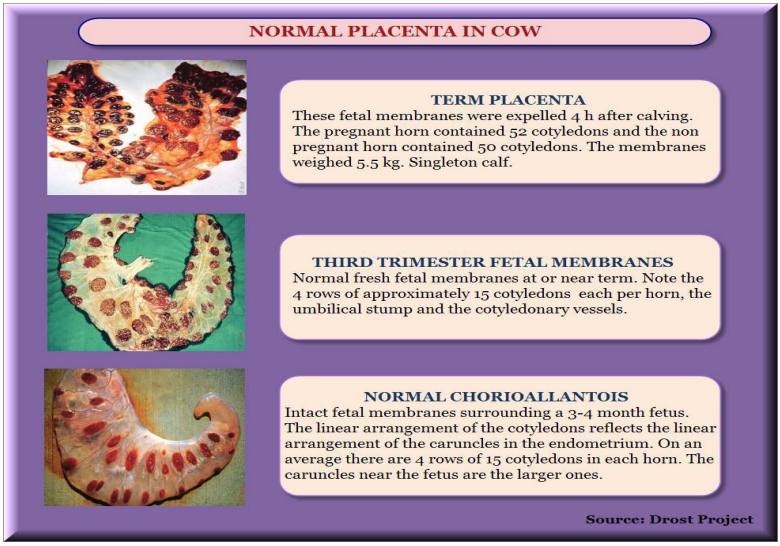
In cow, examination of placenta provides an accurate picture of the health of the endometrium of the uterus at the time of parturition.

1. Placenta should be examined as soon as possible after expulsion.
2. If it is retained an excessively long period, it is unsuitable for examination due to autolytic and putrefactive changes.
3. If it cannot be examined at once, it should be refrigerated.
4. If possible, the quantity, colour and nature of fetal fluids should be noted.

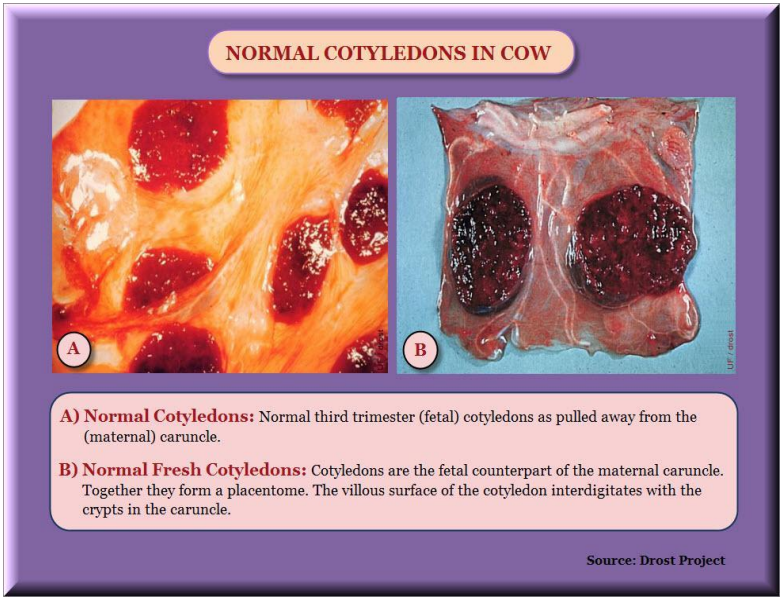
Examination Procedure

1. Fetal membranes should be weighed. In cow, it is about 4 – 8 kg. Placental weight would be 14% of calf's weight.
2. Spread out the membranes to see whether they are complete.

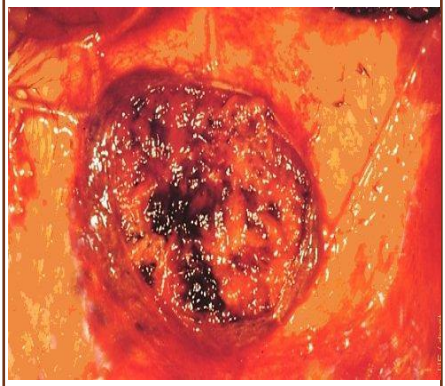
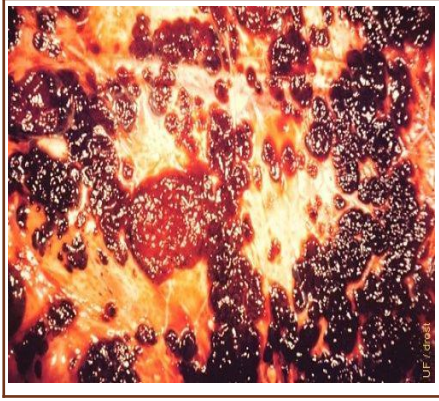
3. In cow, sometimes, the tip of the fetal placenta may be torn off and left within the uterus where it may act as a source of infection.
4. External surface of the placenta is to be examined for the presence of abnormal exudates or blood.
5. Blood may be old, dark, clotted, dried, or fresh.
6. Oedema or necrotic leathery areas of the allantois chorion should be noted.
7. The placenta should be cleaned with clean water and the size, nature, and the cotyledonary villi should be observed. Normal cotyledonary villi are uniform, smooth and velvety.
8. Evidence of clumping of villi, bare areas, necrosis, or calcification of villi is to be noted.
9. The bovine cotyledons should be incised and to be spread to see the uniformity of the size of cotyledons.
10. Presence of giant cotyledons, 15 cm in diameter, usually indicates a lack of placentomes or a lack of placental areas or caruncles for attachment.
11. The number of cotyledon in each horn is to be counted. Diameter of each placentome is to be noted and can be measured with the help of a measuring tape. In normal cases, a total of 75-120 cotyledons are present.
12. Cotyledons are smaller in size in the non-gravid horn than that of the gravid horn.
13. The presence, location, number, and extent of adventitious placentae in the cow should be noted.
14. The size of the necrotic tip should be noted.

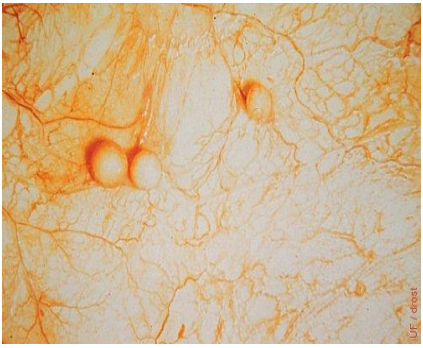

NORMAL PLACENTA IN COW
TERM PLACENTA
These fetal membranes were expelled 4 h after calving. The pregnant horn contained 52 cotyledons and the non pregnant horn contained 50 cotyledons. The membranes weighed 5.5 kg. Singleton calf.
THIRD TRIMESTER FETAL MEMBRANES
Normal fresh fetal membranes at or near term. Note the 4 rows of approximately 15 cotyledons each per horn, the umbilical stump and the cotyledonary vessels.
NORMAL CHORIOALLANTOIS
Intact fetal membranes surrounding a 3-4 month fetus. The linear arrangement of the cotyledons reflects the linear arrangement of the caruncles in the endometrium. On an average there are 4 rows of 15 cotyledons in each horn. The caruncles near the fetus are the larger ones.
Source: Drost Project

Cotyledons

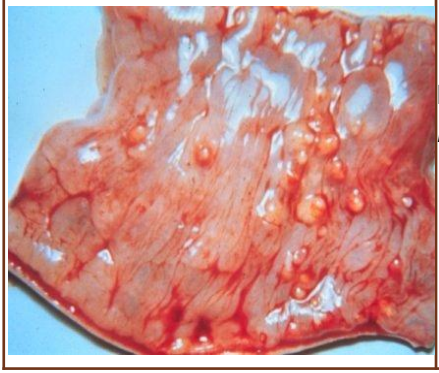

NORMAL COTYLEDONS IN COW
A
B
A) Normal Cotyledons: Normal third trimester (fetal) cotyledons as pulled away from the (maternal) caruncle.
B) Normal Fresh Cotyledons: Cotyledons are the fetal counterpart of the maternal caruncle. Together they form a placentome. The villous surface of the cotyledon interdigitates with the crypts in the caruncle.
Source: Drost Project

Abnormal Placenta in Bovine

ABNORMAL PLACENTA	DESCRIPTION
	**Early Necrosis** This cotyledon shows early evidence of hemorrhage and necrosis.
	**Severe Adventitious** Multiple random islets of cotyledonary tissue surround a normal cotyledon. Adventitious placentation can lead to placental dysfunction and result in hydrallantois.

	**Necrotic Adventitious** Necrotic adventitious caruncular tissue in a heifer. The caruncular tissue had lost its blood supply upon early termination of the pregnancy.
	**Small Amniotic Cysts** Small, incidental, epithelial cysts of the amnion. No known clinical significance.

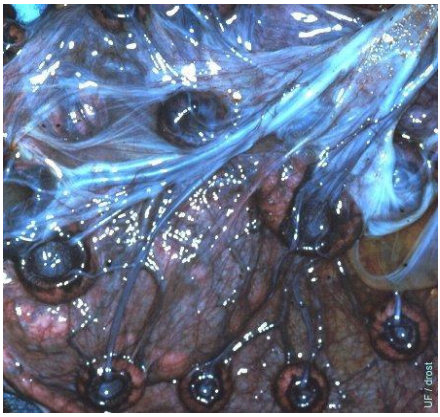
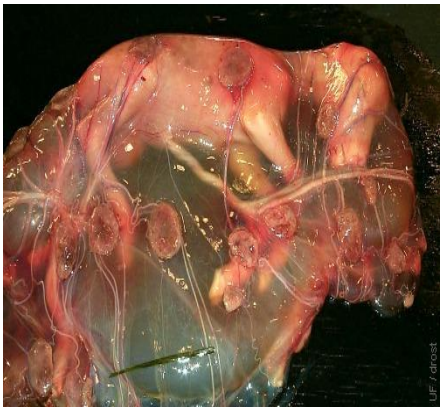
Normal and Abnormal Placenta in Porcine

NORMAL PLACENTA	DESCRIPTION
	**Normal Chorioallantoic Membrane** Blood on the right side is the result of the removal. The placental unit begins elongation at 10 to 11 days.
ABNORMAL PLACENTA	**DESCRIPTION**
	**Autolysing Placenta** The fetal membranes are degenerating. A pink 18-20 day embryo is present in the center.
	**Placentitis** Placental lesions due to *Brucella suis*.

Chorioallantois Cysts

The larger white areas are chorioallantoic cysts.

Normal and Abnormal Placenta in Sheep

NORMAL PLACENTA	DESCRIPTION
	**Sheep Placenta** The ewe has a cotyledonary type placenta. The caruncles are cup-shaped or concave in shape. The stage of development shown is that of a third-trimester placenta. There are 80 to 90 placentomes in the ewe.
	**Normal conceptus within Placenta** Normal 4-month old fetus within its membranes. This fetus is surrounded directly by its amnion, which in turn is contained in the allantois. Cotyledons are present on the external side of the chorioallantois.

	**Chorioallantoic Membranes** With the circumscribed areas that line the caruncular cups.
	**Triplet Palcentation** There are three amniotic vesicles. Cotyledons are arranged in rows. The normal total number of cotyledons is 90 to 100.

PRACTICAL NO. 4.

Obstetrical Instrument and Equipment

Objectives

1. In majority of obstetrical manoeuvres human strength in inadequate and recourse to instruments is necessary to supplement the forces of nature, rectify presentation or position or diminishing the size of fetus for affecting delivery.
2. The objective of the study is to be conversant with various obstetrical equipments that are essential for manoeuvring obstetrical operations.

Some of the equipments commonly used in obstetrics are as follows:

1. ***Obstetric hook (Krey – Schottler pattern)*:** It is a multijoint obstetrical hook used in case of dead fetus that may readily be applied to the orbits or other portions of the foetus when traction is desired during foetotomy operation. Due to its joints, when pulled from outside the two ends of the hook get tightened and closed. Krey's hook does not require guarding with the hands, as do other hooks that might pull out of the fetus and injure the birth canal or uterus.
2. ***Short and sharp obstetric hooks (Harm's pattern)* :** It is generally used to fix in the eye socket (medial canthus) of the dead fetus and traction can be given by fixing obstetrical rope

on the hook. They have an eye at their base, through which a cord is run. They can be readily carried into uterus guarded by the hand and moved about there, so as to be implanted in the most convenient part of the fetus. These may be applied singly but are generally inserted in pairs. The hooks can be inserted near, but opposite to each other on each side of the spine, pelvis, head, flanks, muscular tissues etc. The cord, when tightened brings the parts closer together, and help in concentrating the traction. It is only emergency cases that single hooks are used, and then a sharp one is preferable, even when the foetus is living. It is easier to apply and remains more firmly fixed, whereas a blunt one may easily slip out from the orbit.

3. ***Longs pointed obstetrical hook (Lindhorst pattern)*:** It is used to fix the eye socket of the dead foetus and traction can be given. It can be easily placed, one hand guiding the point through the passage, the other hand acting on the handle. In general, the long hooks are easier to apply because they can be turned or pushed from outside the vulva, but they occupy slightly more room than do the short hooks.
4. ***Robert's sharp pointed obstetrical hook*:** It is also used in the eye socket of the dead foetus to exert traction for expulsion of the foetus.
5. ***Calving rope/snare (cotton/nylon)*:** It is used to fix around the neck or extremities of a living or dead foetus to relieve dystocia.
6. ***Calving rope carrier (Sand pattern)* :** It is used to fix a rope or snare around the neck or extremities of a living or dead foetus which is ready for traction.

7. ***Obstetrical chain (Polsson pattern)*** **:** It is used to give traction by fixing it on live or dead foetus. Obstetrical chains are preferred to cotton cord because they may be recleaned and sterilized, provide easier attachment for handles than does cotton cord, and do not become stiff. They are more professional in appearance, strong, easily applied, and do not cause injury to the foetus or the genital tract of the dam.
8. ***Crutch repellar (William's or Kuhn's)*****:** It is used in case of dystocia to repell the foetus within the uterus in the pelvic and abdominal cavity. It is an indispensable aid for the correction of displacements particularly for the flexed position of the hook joints in calves. The repeller can be extended with the help of extended rod according to the need.
9. ***Thygesen's double barrel embryotome/foetotome, complete with two detachable handles and wire saw*** **:** It consists of two long metal tubes, firmly fixed together. The tubes are connected by three transverse bridges to give the instrument rigidity, and the posterior one carries a detachable handle attached to a steel wire saw. As a grip for sawing, Thygesen used a small, perforated metal handle, with a screw attachment for securing the wire. Other types of handle, in which the wire is held between broad metal plates, have proved to be more useful because they avoid the possibility of injury occurring through wire kinking.

This instrument is used to cut a dead foetus inside the uterus to reduce its volume, so that it can be taken out through the birth canal. While operating care should be taken so that the wire saw does not injure the hand of the operator and the

uterus. The accessory parts are –

i) **Wire saw introducer** : It is used to introduce the wire saw through the barrel of Thygesen‟s embryotome.

ii) **Wire saw handle** : It is used to pull the wire saw during foetotomy operation. Different types are available like Thygene‟s pattern (straight), Ball from, D-shaped or ring-shaped.

iii) **Spare wire holder-cum-handle (Palsson pattern)** : It is used to keep the wire and may also be used as handle during foetotomy operation.

10. ***Finger embryotomy knife*****:** It is used for giving incisions in the skin and muscles and also to cut the different parts of the dead foetus in order in reduce its size and bring it out. Difficulty is often experienced to manipulate them in uterus, but these are useful particularly for releasing fluid contents or gas from foetus.
11. ***Guarded fetotomy/ embryotomy knife*** **:** This is used to cut appendages of a dead foetus inside the uterus. The blade of the knife is hidden or concealed for easy handling inside the birth canal.
12. ***Vaginal clamp*** **:** It is used in the vulva to resist the force of prolapse of vagina, cervix and uterus.
13. ***Cervix dilator*** **:** It is used to dilate the cervix mostly in sows and cows suffering from dystocia due to improper dilation of cervix and also for examination and expulsion of foetus.
14. ***Parturition forceps for smaller animals (Whelping/Lambing/Farrowing/Delivery forceps)*** **:** They are used around the head for applying mild traction on the

living or dead foetus of bitch, ewe, sow or doe to relieve dystocia. A good plan to adopt the application of forceps is to have the foetus fixed at the entrance to the pelvis by abdominal manipulation of an assistant. Before applying traction, it is always necessary to examine with the finger to make certain that the foetus is included in the blades of the forceps.

15. ***Buhner needle*** **:** It is used to insert a sterile elastic loop of tape subcutaneously around the labia as deeply placed circumferential suture for retention of the prolapsed mass of genital tract.
16. ***Freiberger's blunt obstetrical hook*** **:** It is used to fix in the eye socket of the living foetus to pull out the foetus in dystocia cases.
17. ***Chisel (William's/Guard's)*****:** It is used to cut any part of the dead foetus.
18. ***Obermeyer's anal hook*****:** It is commonly fixed through the anal orifice of dead foetus for applying traction to relieve dystocia. On account of the curvature of its shaft and the relatively small hook it is most useful.
19. ***Calf Puller:*** It is used for applying traction to relieve dystocia in large animal.

PRACTICAL NO. 5.

Approaching Signs of Parturition - Stages of Parturition

Objectives

1. To understand the signs approaching to parturition
2. To record major events taking place during different stages of parturition.

Signs Approaching To Parturition

(A) Cattle and buffalo

1. Changes in the pelvis, genital organ & mammary glands along with changes in the behavior of animal occurs.
2. The pelvic ligament specially sacrosciatic ligament become progressively more relaxed, causing a sinking of croup ligaments and muscles and can also be noted by the elevation of tail head.
3. The vulva becomes progressively edematous and more flaccid. The udder becomes enlarged and edematous but in heifers the udder enlargement begins about 5^{th} month of gestation. Sometimes edema may extend forward on the abdominal floor to the xyphoid region.
4. Just prior to parturition changes to a turbid yellow opaque secretion known as “Colostrum”.
5. The animal may exhibit a tenacious, whitish stringy type of mucus coming out from the cranial part of the vagina at about 7 to 8 months of pregnancy.
6. During the last few hours before calving the animal may exhibit restlessness.

7. Heifer may show signs of abdominal pain as kicking at the abdomen, treading, switching their tails and lying down and rising up most frequently.

(B) Mare

1. The sinking of sacrosciatic ligament is not so pronounced in mare due to heavy croup muscles.
2. The vulva does not become as edematous as in cow but edema and flaccidity are noted in the last few weeks of gestation.
3. No discharge of vaginal mucus prior to foaling is noticed in mare.
4. The udder starts to develop noticeably about 3-6 weeks before foaling.
5. The oozing of colostrums from the teats called “Waxing”.
6. Within four hours of parturition slight sweating in the flank region and behind the elbows is frequently observed.
7. Mare becomes restless, anorexic shows slight colicy symptoms, switches her tail and lies down and gets up frequently.
8. Mare greatly prefers solitude and quiet at parturition and seems more able than other animals to control or suppress parturition until the night hours, when stable activities are at a minimum.

(C) Sheep and Goat

Signs are similar to the cows with an exception only udder development is not much more prominent.

(D) Sow, bitch and cat

1. Parturient animals become quiet as parturition approaches, the vulva becomes flaccid, enlarged and edematous.
2. The mammary glands become enlarged, edematous and milk

may be present in the udder several days before parturition.

3. Animal becomes restless and shows anorexia for a few days before delivery.
4. Environmental disturbances, specially those caused by other animal will delay or interrupt the birth process.

Observations To Be Recorded

1. Prediction of the exact time of parturition: calculated from the date of breeding or breeding history and length of gestation period.
2. Record the different sign and symptoms species wise.

Major Events During Different Stages of Parturition

(A) First stage

1. First stage is apparent for longer period in primiparous than pluriparous.
2. Active contractions of both longitudinal and circular muscle fibres of uterine wall, and the dilatation of the cervix. Maximum contractions are 1-2 hours before birth.
3. Cervix was not dilated by the allantois chorion but was pulled open by the contractions of longitudinal uterine muscles. A uterine contraction occurs about 10-15 minutes and lasts for 15-30 second in cattle.
4. In mare and bitch the foetus is rotating from its dorsopubic or dorso-lateral position into the dorsosacral position.
5. During the first stage of parturition which lasts about 1-4 hours, straining or labour is not exhibited in mare, but later part mare may roll back.
6. In the cow and ewe, the symptoms of abdominal pain or discomfort may not be evident specially in pluriparous.
7. In the bitch, cat and sow nervousness, anorexia and an increase in pulse and respiration may occur and result in

painting. This stage may lasts for 2 to 12 hours.

(B) Second stage

1. This stage is characterized by the entrance of the foetuse or fetuses into the dilated birth canal; rupture of the allantoic sac; abdominal contractions or labour and the expulsion of the foetus through the vulva.
2. In the cow, an abdominal contraction occurs only after the feet of the foetus in the cervix and may appear at vulva as a translucent distended membrane.
3. Uterine contractions occurred in cow about 4-8 times every 10 minutes and lasted 80-100 seconds.
4. Almost all animals, as soon as straining commences, lie down. Occasionally the calf or foal may be born with the dam standing.
5. The mare and sow usually lie out flat with the legs extended whereas the cow, bitch and ewe are more likely to lie on their sternum.
6. In the mare straining is usually characterized by several 2 to 5 strong expulsive efforts followed by 2-3 minutes of rest and this process is repeated at fairly regular intervals.
7. In the cow, straining is not as forceful as in mare and the second stage of birth is similar in ewe like that in cow.
8. In the bitch straining begins 0.5 to 1 hour or more and another pup is expelled. Although it may take 1 hour of labour for the first pup to be born, the period of straining for the second or third pups and usually progressive shorter. The rate of expulsion of the fetuses is very irregular.
9. During this stage the contracting and shortening uterine walls force and direct the foetus into the birth canal and pelvis and the abdominal contractions or labor drives the foetus through birth canal.

10. The time for the second stage of birth in the cow is from 0.5 to 3 or 4 hours depending upon breed of the animal in pluripara. This second stage requires 0.5 to 1 hour while primipara may take longer upto 3 hours or moreIn ewe and does range is 0.5 to 2 hours, in mares, 5 to 40 minutes with an average of 20 minutes. In bitch and 3 to 6 hours and in sow second stage is completed within 1 to 5 hours but occasionally may last upto 8 hours normally.
11. When the umbilical cord ruptures, the two umbilical arteries together with the urachus retract into the abdominal cavity of the foetus and by the contractions of the arteries into the body tissues provision is made for the prevention of bleeding from the naval. The umbilical vein collapses, the blood drains from it and the fluids in the umbilical cord drains out, often aided by the licking of the cord by the dam. The umbilical cord become necrotic dries up and drops away in 7 to 21 days.

(C) Third stage

The third and last stage of parturition is the expulsion of the fetal membranes and the involution of the uterus

(i) Expulsion of Fetal Membrane

1. The expulsion of fetal membrane is normally completed within few hours
2. After the expulsion of the fetus the uterus contracts strongly for 48 hours and less vigorously, but more frequently help shrinking of the villi and the dilatation of the maternal caruncular crypts probably play a major role in the preparation of the fetal trophoblast and cryptal epithelium of the maternal placenta. The middle uterine artery immediately contracts following parturition. The weight of the amnion and the portion of the allantois in the birth canal tend to help remove the after birth from the uterus.

Normal expulsion of the fetal membrane is can be said to be a complex process involving both mechanical and hormonal factors.

3. In dogs and cats, the fetal membranes are usually expelled irregularly between the fetuses or one foetus may be expelled with its own placenta and that of a foetus expelled earlier.
4. In the sow, since a number of the allantois chorions may be fused, the fetal membranes may be expelled at only 2 to 3 intervals during parturition.
5. In the cows and buffaloes, the length of time required for the expulsion of the fetal membranes is normally ½ to 8 hours. The ewe is similar to cow and buffalo but the mare normally expels its fetal membranes within 0.5 to 3 hours after the birth of a foal.
6. Domestic animals with exception of the mare usually eat the expelled fetal membranes which causes indigestion.
7. After the expulsion of the fetal membranes in a normal birth, the cervix secretes rather thick tenacious mucus that tends to seal the cervix and thus prevents infection gaining entrance to the uterus.

(ii) Involution or regression of the uterus

1. In cow and buffalo time for involution varies from 26 to 56 days. In mare, regression of the uterus proceeds at a rapid rate. The endometrium largely restored by the third to fifth day, the foal heat occurs 9 to 12 days postpartum and conception often occurs from service at the estrum. Exercise appears to hasten involution.
2. In multiparous animals and in the ewe, estrus usually does not occur until after the young one weaned, but involution of the uterus rapidly takes place.
3. In the bitch, the uterine horns are back to nearly normal size in 4 to 5 weeks

Observations To Be Recorded

1. Study of different stages of parturition in different species
2. To study the involution of uterus
3. To study uterine discharge (colour, pH etc)

PRACTICAL NO. 6.
Approach To An Obstetrical Case

Objectives

The objective of the study is to know about the systematic approach on activities to be carried out before relieving dystocia in animals. The ultimate aim in handling a case of dystocia is to obtain a live cow and calf.

A suspected dystocia case should always be treated as an emergency, requiring a visit and examination as soon as possible. A detailed history should be obtained from the attendant by making cross questions, which should include:

1. Age and parity of the cow.
2. Previous calving of the cow.
3. Health during pregnancy especially in immediate period.
4. Present appetite and activity.
5. Date of service or expected calving date.
6. Sire of calf and details of other calvings where he was the sire.
7. First signs of impending calving (onset of first stage).
8. Evidence of straining, when it was first seen and its nature.
9. Evidence of foetus and/or foetal membrane at the vulva.
10. Evidence of rupture of amnion or allantochorion (water bag) with escape of fluids.
11. The nature of any examination or attempted delivery by any personnel.

The most importance question which is concerned with the life and future fertility of the animal in delayed cases of parturition is the onset of active labour pains. In case of heifers in particular and in adult animals general, mild and occasional straining without appearance of water bag would indicate that second stage of labour has not begun and it might take more time for normal delivery. If there is delay of over 24 hours and cessation of straining, then it may indicate a dead foetus, exhausted uterus, loss of foetal fluids and beginning of putrefactive changes. The prognosis in such cases is poor to guarded. In case the labour pains are intermittent and persistent, water bag has not appeared and no part of the foetus has protruded out from vulva, it indicates a case of uterine torsion.

Procedure of Clinical Examination

1. The Cow should be adequately restrained by the head in a suitable calving box.
2. General assessment of the cow"s bodily condition and health, with particular emphasis on the presence of hypocalcaemia or mastitis has to be made.
3. Assess the vulva and pelvic ligaments for degree of relaxation.
4. Note the nature of any vulval discharges, particularly their smell.
5. Examine the vulva for evidence of trauma from previous interferences.
6. Thoroughly wash the perineal area and vulva with warm water and soap.
7. Insert a clean (preferably sleeved) adequately lubricated arm gently into the vagina. The presence of a calf (or calves) should be determined together with its disposition.
8. Assess the presence of a live calf by eliciting flexor, eye or suck reflexes and note a heart beat or carotid pulse. In posterior presentation the anal reflex can be assessed.
9. Assess the integrity of the amnion and allantochorion.

10. Note the degree of dilatation of the cervix. When it is fully dilated only a small frill of tissue separating vagina from uterus can be palpated.
11. Note whether the calf is in the abdomen or in the pelvic canal.
12. Recognize the head or limb in the birth canal. In case of a limb, the first requirement is to ascertain whether it is a fore or hind limb.
    * If the plantar aspect of the digit is downward, it is highly probable that it is a fore limb and vice versa.
    * If the joint immediately above the fetlock flexes in the same direction as the latter, the limb is a fore one, and vice versa.
13. Determine and report the presence of any lacerations, haematomas or other injuries.
14. After vaginal delivery of a calf always check whether there is another.

The history followed by clinical examination should enable a diagnosis of dystocia to be made for deciding the further line of action for relieving dystocia.

Obstetrical Operations

Objectives

To discuss with the major obstetrical operation i.e. Mutation and Forced extraction and the procedure that are utilized in the correction of dystocia.

Obstetrical Operation - Mutation

Mutation is defined as those operations by which a fetus is returned to a normal presentation, position and posture by repulsion, rotation, version, and extension or adjustment of the extremities.

Mutation is performed inside the uterus after putting sufficient amount of lubricant. It is needed to repel the fetus from the birth canal into the abdomen and uterus in order to get sufficient space for correction.

Repulsion

Repulsion, sometimes called as retropulsion, consists of pushing the fetus out of the maternal pelvis or birth canal in to the abdominal cavity and uterus, where space is available for correction of the position or posture of the fetus and its extremities.

Repulsion of the foetus can be done with the help of arm or with a Crutch repellar (William's or Kuhn's). Epidural anaesthetic can be injected to reduce straining.

In anterior longitudinal presentation, the crutch or hand of the operator should be placed on the fetus between the shoulder and chest or across the chest beneath the neck.

In the posterior presentation, the hand or crutch should be placed in the perineal region over the ischial arch.

Rotation

Rotation is the turning of the fetus on its long axis to bring the fetus in to a dorso – sacral position.

After proper lubrication, the fetus should be repelled cranially out of the pelvic cavity and rotation can be done with operator's hand with or without using chains on legs of fetus.

In dorso-ilial position, rotation is not so important, but in **dorso-pubic position**, the fetus should be repelled out of the pelvis, leaving the limbs in the pelvic cavity for performing rotation.

Version

Version is the rotation of the fetus on its transverse axis in to an anterior or posterior presentation.

This is done most commonly in mare in transverse presentation of the fetus. The version is usually done by repulsion of one end of the fetus and traction on the other. This is done to change transverse presentation in to a longitudinal presentation. If possible, the fetus should be turned into a posterior presentation; this prevents the head and neck from complicating the delivery.

Extension and Adjustment of the Extremities

Extension and adjustment of extremities is the correction of abnormal postures usually due to flexion of one or more of the extremities causing dystocia.

This operation includes correction of flexed carpus, tursus, elbow or shoulder joints with the forelimb extended beneath the body, or the head and neck flexed alongside beneath or over the body of the fetus. For this operation, repeller or other obstetrical equipment such as eye hook, snare may be needed.

Obstetrical Operation - Forced extraction.

Forced Extraction (Traction) is recommended when the presentation, position and posture is normal. Traction after correction (mutation) is undertaken when the foetus is malpresented or in faulty disposition. Forced traction is also done when the maternal expulsive force are inadequate, mild oversize of the fetus and after foetotomy operation.

Traction without correction is invariably dangerous. Before performing traction the fetus and birth canal should adequately be lubricated. For the purpose of forced extraction, sometime the operator needs the help of snare or chains.

1. ***Attachment of chains or snare to the extremities:*** To avoid injury to the limb, a chain or snare should be placed above the fetlock and a half hitch around the pastern.
2. ***2 or 3 - point traction:*** Traction on the two feet is referred to as **"2-point traction"** and is adequate in many cases. **3-point traction** should be considered which simply involves the use of a head snare, chain, or some other device used to apply traction to the head, neck and eventually the chest of the fetus.
3. **Calf puller:** Now a days Fetal Extractors or so-called ”calf puller”, is one of the most common obstetrical instrument used to remove the fetus from the birth canal.

Direction of Traction

1. In either the anterior or posterior presentation when the fetus is in the uterus traction should be applied upward and backward to lift the fetus up and over the brim of the pelvis into the birth canal.
2. At this stage, with the fetal extremities approaching the vulva, the direction of traction should at first be backward and slightly upward, and as the fetal legs and head engage in the vulva, the direction of traction should be downward.
3. After the head in anterior presentation or the hips in posterior presentation pass through the vulva, the direction of traction should be more and more downward so that when the back of the fetus is passing through the vulva, the direction of traction is perpendicular to the spinal axis of the dam or parallel to her hind limbs.
4. The application of traction in this fashion allows the delivery of the fetus to simulate the normal arc associated with physiological birth.
5. Traction should be intermittent and should be applied when abdominal straining / expulsive efforts of the dam occurs. Abdominal contractions pull the pelvic floor cranially which makes the pelvic inlet larger and facilitates delivery of the calf. Continuous traction prevents the calf breathing and hastens anoxia and death.

Foetotomy and Caesarean section are the commonly followed obstetrical operations -

Fetotomy is normally done on dead foetus and when manual manipulation seems to be of no help. Caesarean section is to be preformed when foetus is alive and other operations appear to be of no use to save the life of be foetus/dam or both. Moreover, caesarean section is carried out in delayed cases of uterine torsion,

when uterine adhesions have developed or cervix has failed to dilate after detorsion. In all the delayed cases, manual or foetotomy operations should be carried out under epidural anaesthesia. Repeated lubrication of the foetus and genital tract during operation is essential. Epidural anaesthesia and proper lubrication are the key to success.

PRACTICAL NO. 7.
Obstetrical Anaesthesia

A. Epidural Anaesthesia

Objectives

The induction of local anaesthesia in the dam is essential in order to achieve safe, expeditious and humane delivery in some of the severe types of dystocia. Epidural anaesthesia is ideal for obstetrical purposes in ruminants. By means of a single injection of local anaesthetic solution into the epidural space, the coccygeal and posterior sacral nerves are affected thus producing anaesthesia of the anus, perineum, vulva and vagina. The duration of action depends on the properties of the agent used and its site of injection. In most obstetrical cases the solution should be injected in repeated small injections, so that the animal remains standing. It too much is given the animal will stagger, and possibly fall and injure itself.

The objective of the study is to learn and practice the correct technique of administration of epidural anaesthesia in large animals.

Drugs and doses used

1. Lignocaine hydrochloride 2% 4-8 ml
2. Bupivacaine hydrochloride 0.5% 6-10 ml
3. Xylazine @ 0.03 mg/kg b.wt. with addition of 2% lidocaine hydrochloride solution to a total volume of 5 ml per animal. Anaesthesia with this agent extends upto level of T_{13}, L_1 and includes tail, perineum, udder and flank areas.

Site of injection

1. Space between first and second coccygeal vertebrae
2. Space between first coccygeal and last sacral vertebrae

Action

1. Stops abdominal straining
2. Makes mutation of foetal extremities, repulsion of the foetus, correction of breech presentation and uterine torsion much easier.
3. Abolishes or reduces pain and therefore should be administered when great power is used as in some forced extractions.
4. Greatly increases the speed, ease and safety to the operator and patient in foetotomy operations.
5. Animal stands quietly without moving about or lying down, which is helpful to the operator.
6. Often the cow that is down and refuses to stand will rise and stand normally following the administration of epidural anaesthesia.
7. Defecation is suspended.
8. The animal does not rapidly expel lubricants pumped into the uterus. When used in caesarean section it controls straining and prevents intestinal prolapse through the operative incision.
9. Used to aid replacement of prolapse of the vagina, cervix uterus, rectum or bladder.
10. By controlling straining, it may prevent prolapse of the uterus immediately after a difficult parturition.
11. It alleviates symptoms of straining caused by severe vulvitis or vestibulitis. Most of the vaginal deliveries and caesarean section can be carried out with this block without ill effects on the dam and/or the foetus, if alive.
12. It can be used for episiotomy and for suturing the vulva or perineum.

Materials required

1. 16-17 gauge, 5 cm long needle
2. Blade / Scissor
3. Soap
4. Water
5. Alcohol
6. Experimental animal

Procedure

1. Determine the site for insertion of the needle by moving the tail of the animal upwards and downwards and by feeling where the vertebral joints are located by the depression and movement between the vertebrae.
2. Locate the sacrococcygeal joint, which is the first vertebral joint in which movement can usually be felt.
3. Immediately behind this, feel for the bony prominence of the dorsal spine of the first coccygeal vertebra and, move the fingers posteriorly along the tail to locate the second coccygeal spine. Between the two spines is the first inter coccygeal space and this joint is most movable in the cow.
4. Properly clip or shave the desired site, thoroughly wash with soap and water and disinfect the site with alcohol.
5. Introduce the needle into the middle of the space at a 10-degree angle caudally from the perpendicular and direct it downwards for a distance of 2-4 cm until it strikes the floor of the epidural space and then withdraw it slightly.

Confirm that the needle is correctly placed by attaching it to a syringe and making a trial injection with the anaesthetic solution. If there is no resistance to injection the needle point is in the epidural space. As the needle is advanced into the epidural space, the solution will be sucked in as a result of slight negative pressure existing there, and within 5-10 minutes the tail will become limp.

Sedation and / or General Anaesthesia in Bovine Obstetrics

Tranquilisers and psychotropic drugs have been widely used for restraint of apprehensive animals and to reduce the stress. Many combinations can be used along with local anaesthetics so as to reduce the dose and thus side effects of these sedatives or general anaesthetics. Anaesthesia depth can be monitored by ocular rotation, pulse, ECG, blood pressure, respiration rate and depth, blood loss, mucus membrane and capillary refill time observations.

(a) Ketamine and its combinations

I. Xylazine @ 0.05 mg/kg IM/IV and Ketamine @ 5 mg/kg IV
II. Acepromazine @ 0.05 mg/kg IM.IV and Ketamine @ 1-2 mg/kg IV
III. Diazepam @ 0.5 mg/kg IM.IV and Ketamine @ 5 mg/kg IV
IV. Detomodine @ 5-10 µg/kg IM.IV and Ketamine @ 1-2 mg/kg IV
V. A combination of Guaifenesin 5% and Ketamine 0.1 % and Xylazine 0.01% given @ 0.5 ml/kg I.V.

Ketamine is very safe drug when used in pregnant animals. Although, it crosses placenta, yet, it does not produce clinical side effects on the fetus. Xylazine can be safely used after last month of gestation as it causes uterine contractions. While using it in shocked, debilitated animals careful monitoring is needed. Diazepam causes minimum effect on cardiorespiratory system and does not alter the acid-base status in bovines. Phenothiazines such as acepromazine and chlorpromazine are the most important tranquilisers and show anti-dopaminergic, anti-histaminic and anti-adrenergig effects. Dizzepam, acepromazine, chlorpromazine and xylazine also reduce stress and thus may decrease the level of cortisol which is very important in anaesthesia. Guaifenesin provides adequate muscle relaxation when used along with zylazine and ketamine.

(b) Propofol Anaesthesia

It is intravenous, short acting anaesthetic agent and is successfully employed in anaesthesia of sheep and bovines. Very little of this drug crosss placental barrier. No adverse reaction is seen in the new-borns. It is used @ 4-5 mg/kg IV.

In addition to the above caesarean section can also be carried out in bovines by using low doses of thiopentone. Use of isoflurane, halothane and enflurane with oxygen is also indicated but these agents are very expensive.

General anaesthesia in bovines requires endotracheal intubation or atleast head and neck should be placed in dependent position to avoid any aspiration. Special care should be gien in recumbent animals in case of regurgitation and aspiration.

Conclusion

Wide variety of anaesthetic agents can be used for carrying out various obstetrical procedures in bovines. These agents should be used to the minimum possible doses as all of these have side effects which can be detrimental for the already depressed dam.

Phenothazine derivatives cause vasodilation so can profound the already existing hypotension due to dehydration to hypovolaemia. Xylazine enhances the uterine contractility and may interfere with uterine blood flow. Diazepam reduces the uterine activity during labour.

Similarly spinal/ epidural anaesthesia with lignocaine can potentiate the hypotension but the lower doses do not cause any fetal depression. Judicious use of anaesthetic and supportive fluid therapy will increase the success rate of the obstetrical manoeuver.

Immediately after the delivery, use of ventilatory support and oxygen along with some respiratory stimulant (Dozapram 0.1 – 0.4 mg/kg IV) will enhance the neonatal survival rate.

PRACTICAL NO. 8.

Manipulation of Foetal Malpresentation, Position and Posture in Phantom Boxes

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Objectives

The objective of the study is to get acquainted with various types of presentations, positions and postures that a foetus may assume at the time of its entrance into the birth canal or pelvis.

Presentation includes

1. The relation of the spinal or longitudinal axis of the foetus to that of the dam. Presentations are either **longitudinal** or **transverse**.
2. The portion of the foetus that is approaching or entering the pelvic cavity or birth canal. This portion is **anterior** or **posterior** in the longitudinal presentation and **dorsal** or **ventral** in the transverse presentation.

Position includes the relation of the dorsum of the foetus in longitudinal or the head in transverse presentation to the quadrants (sacrum, right ilium, left ilium, pubis) of the maternal pelvis.

Posture signifies the relation of the extremities (head, neck, limbs) to the body of the foetus. The extremities may be flexed or extended or retained beneath, on the right or left side, or above the foetus.

In outline form, the presentation and position include all possible variations of the manner in which the foetus may enter the birth canal at parturition.

Presentations	Positions
Anterior, longitudinal	Dorso-sacral Right dorso-ilial
Posterior, longitudinal	Left dorso-ilial Dorso-pubic
Transverse ventral	Right cephalo-ilial
Transverse dorsal	Left cephalo-ilial

The normal disposition in uniparous animals is the anterior longitudinal presentation, dorso-sacral position with the head resting on the metacarpal bones and knees of the extended forelegs, or if the foetus is in the posterior longitudinal presentation with dorso-sacral position. Unless the foetus is small, other positions result in dystocia. The transverse presentation is rare in ruminants and multipara, but can occur in the mare when the foetus develops in both horns invariably resulting in dystocia, 30-40% of the fetuses of multipara are presented posteriorly and this is considered normal or physiological.

Abnormal disposition

This is the commonest cause of dystocia in all types and breeds of cattle. Common clinical signs could include unproductive straining, perhaps with some evidence of foetal extremities at the vulva, fully dilated cervix with the calf in abnormal presentation, position or posture.

Correction measure will depend upon the precise cause of dystocia, correction of faulty disposition which occurs in cattle due to different postural, positional and presentational abnormalities will be demonstrated in the Phantom Box with the help of a dummy calf made of stuffed rag-doll, following general principles.

A) Abnormal Disposition Due to Postural Abnormalities

These abnormalities can be unilateral or bilateral, involving the head and neck or limbs alone, or in combination.

In anterior presentation

1. **Unilateral or bilateral carpal flexion :-** Treated by repulsion and extension.
2. **Unilateral or bilateral elbow flexion :-** Treated by repulsion and extension.
3. **Unilateral or bilateral shoulder flexion :-** Treated by repulsion and extension. The head can protrude from vulva and become oedematous, congested and enlarged (hung calf). If it is dead, simple foetotomy involving amputation of head by disarticulation of the atlanto-occipital joint allows repulsion and extension of the forelimbs.
4. **Lateral flexion of head and neck :-** This can also occur with other postural abnormalities. Treatment is by repulsion and extension unless there is ankylosis of the vertebrae. Foetotomy or casesarean operation should be performed if this is unsuccessful.
5. **Ventral flexion of head and neck :-** In mild cases downward deviation of the head between the forelimbs and only the nose of foetus is caught on the brim of the pelvis with the forehead entering the pelvic inlet, **"vertex presentation"**. In more severe flexing of the head beneath the neck, the ears and the top of the head are presenting, "**poll presentation**". In the more severe cases the neck extends between the forelimbs, "**nape presentation**", and the head is against the foetal sternum or abdomen. Treatment is by repulsion and extension.
6. **Hip flexion ("dog-sitting posture") :-** Where the hind limbs are extended towards the calf's head and are placed over the pelvic brim of the cow into the birth canal; it can be confused

with simultaneous presentation of twins. Treatment is by repulsion and traction.

In posterior presentation

1. **Unilateral or bilateral hock flexion :-** Treated by repulsion and extension.
2. **Unilateral or bilateral hip flexion ("breech posture") :-** The hind limbs retained or extended beneath the body in dorso-sacral position is commonly spoken of as "breech". Treatment is by repulsion and extension.

Abnormal Disposition Due To Positional Abnormalities

These abnormalities can occur with the calf in anterior or posterior longitudinal presentation in combination with abnormalities of posture. It includes -

1. Right or Left dorso-ilial position - *Right or left dorso-ilial positions* in anterior or posterior longitudinal presentation where the dorsal aspect of the fetus is directed towards the lateral aspect of the maternal abdomen.
2. Variations involving admixture of above positions e.g., Right or Left lateral position with dorso-pubic position.

Treatment involves repulsion and rotation about the longitudinal axis, which may need to be repeated several times until correction is complete. Adequate lubrication is important.

B) Abnormal disposition due to presentational abnormalities

These abnormalities are not common in the cow unless posterior longitudinal presentation is considered abnormal (about 5% of calves are born thus, frequently without dystocia). Foeto-maternal disproportion is accentuated in this presentation and the incidence of stillbirth is higher than following anterior presentation

PRACTICAL NO. 9.
Fetotomy In Cadavers

Foetotomy is defined as those operations performed on the foetus within the body of the mother for reducing its size by either its division or removal of certain of its parts. It can be sub-cutaneous or per-cutaneous. In sub-cutaneous foetotomy, the incision is made on the skin, it is separated from the bones and musculature which are removed after breaking the joints. The skin is kept intact and is used as a point of traction for removal of fetus. In per-cutaneous foetotomy, amputations are done involving the skin. Owing to availability of well fabricated instruments and ease in performing, generally per-cutaneous foetotomy is done.

Foetotomy makes the deliveries safe and quick.

Foetotomy can be partial or complete. Division of single part of the foetal body is called partial foetotomy. On the other hand in complete foetotomy the foetal body is cut into several parts.

Indications

Foetotomy is indicated when

1. Mutation fails or is not possible to correct mal-postures, malposition and malpresentation.
2. Incomplete dilatation of cervix but sufficient to allow hands and instruments
3. Emphysema of fetus
4. Foetal monstrosities, hydrocephalus, ascitis, oedema, anasarca.
5. Disproportion between size of foetus and birth canal.

Pre-requisites for foetotomy

1. Foetus should be dead. Life of the foetus has to be sacrificed if alive before foetotomy. This may be required when the dam is invaluable and surgery is to be avoided.
2. Epidural anesthesia, It is necessary to avoid straining and defecation during foetotomy operation.
3. Proper lubrication, It is important for smooth manipulations and to avoid injuries to the genital passage and the hands of the obstetrician.
4. Well designed foetotome and other instruments, Slight fault in foetotome will lead to breakage of wire during operation, improper cutting, slipping from the desired position.
5. Technical knowledge
6. The obstetrician must be well trained in the foetotomy operation, as it can be too exhaustive.

Safety rules to be followed during foetotomy

1. Frequent lubrication during the procedure is important.
2. Start with short and rapid sawing movements. This will facilitate securing the wire in the skin. Later the sawing movements should be long and forceful.
3. Place foetotome and position the wire saw at proper place.
4. Evisceration during the procedure significantly reduces the foetal size and helps in its easy delivery.
5. Avoid injuries to the genital tract by covering the cut portions with hand and using enough lubrication while applying traction to deliver the foetus.
6. Avoid excessive traction. If the foetus is not moving with traction, do not hesitate to give another cut to reduce its size.

Advantages of foetotomy

1. It requires little assistance, prevents trauma to the dam due to forced traction.
2. Post treatment recovery is fast with a low mortality rate.
3. The fertile life of the animal is maintained.
4. It replaces caesarean section which is costly, time consuming, requires more assistance and after care.
5. Peak production is achieved early and is not affected much which is almost lost in a particular lactation after surgery.

How to thread a foetotome Complete threading

The foetotome is placed on the table. The threader is passed through one of the barrels of foetotome from the side of the handle. One end of the wire saw (10 feet long) is introduced in the eye of threader, which is withdrawn back. The procedure is repeated on the other side of the barrel. This creates a loop towards the head of foetotome and free ends of wire towards the handle side, which are secured with the foetotome handles to have a better grip on the wire while sawing.

Partial threading

One barrel of the foetotome is loaded as above. The free end towards the head of foetotome is tied with the calving rope carrier (Sand's flexible or Schriever pattern). The calving rope carrier (leader) is passed over or around the foetal part to be amputated and pulled from below the part. It is taken out of vulva, the leader removed and the barrel loaded with threader. The free ends at the handle side are attached to wire saw handles. The foetotome is taken in and placed at right place to amputate the foetal part.

Partial threading *in anterior presentation* is required for-

1. Amputation of hind limbs following transverse division of foetal trunk
2. Bisection of pelvis

Partial threading *in posterior presentation* is required for –

1. Diagonal division of foetal fore part
2. Amputation of one fore limb
3. Amputation of other fore limb

Partial threading *for regional foetotomy* is needed for –

1. Amputation of forelimb at the knee – carpal flexion posture
2. Amputation of forelimb – shoulder flexion posture
3. Amputation of head and neck at the base of neck – lateral deviation of head
4. Amputation of hind limb through hock – hock flexion posture
5. Amputation of hind limb at femur joint – breech posture

Foetotomy in ventral transverse presentation

Remove whatever part is approachable or bisect the foetus at lumbar region and remove the foetus into two parts.

Foetotomy in dorsal transverse presentation

In this presentation also, the cut is made in the middle of foetal trunk.

Regional/Partial Foetotomy in Abnormal Foetal Postures

1. Carpal flexion posture

Amputation of foetal head will create enough space for correction of the deviation or amputation of one or both forelimbs below the knee joint should be done. This will preserve the point for traction.

2. Shoulder flexion posture

Amputation of the head or amputation of one or both the forelimbs will facilitate delivery of the foetus.

3. Lateral deviation of head

Amputation of forelimb opposite to the side of flexion of the head will create space for easy correction of the deviation. Alternatively, amputation of the head and neck can be performed.

4. Hock flexion posture

Amputation of the hind limb below the hock joint often facilitates correction mal- posture.

5. Hip flexion Posture

Amputation of one or both the hind limbs will effect the delivery of foetus.

6. Hip-lock condition

First cut is given at the lumbar region, thereafter, bisect the foetal pelvis.

7. Dog sitting posture

Amputation of head and forelimbs or amputation at the lumbar region will facilitate foetal delivery.

Complete Fetotomy Procedure

1. **Amputation of Head:** Amputation of head include amputation at Atlanto-Occipital joint. Placement of the fetotome just back of the ramus of the mandible and the wire should be placed back of ears.
2. **Amputation of first forelimb**: Placement of the fetotome dorso-caudal to the Scapula. The wire should be placed properly without including other fetal body part.
3. **Amputation of other forelimb**: Same procedure to be followed as in the amputation of first forelimb
4. **Amputation of anterior thoracic cavity**: Placement of the fetotome at the mid of the sturnum and the wire should be placed perpendicular to the fetotomy head.
5. **Amputation of Caudal thoracic cavity:** Placement of the fetotomy head on caudal to the last rib of the dead fetus and the

feotomy wire should be perpendicular to fetotomy head

6. **Pelvic Bisection:** Placement of the fetotomy head anterior to the tubercoxae and the placement of the wire in between the tuber ischii including tail in opposite side of the feotomy head.

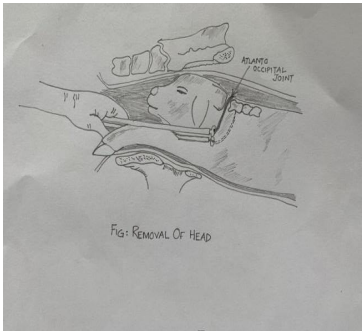

FIG: REMOVAL OF HEAD

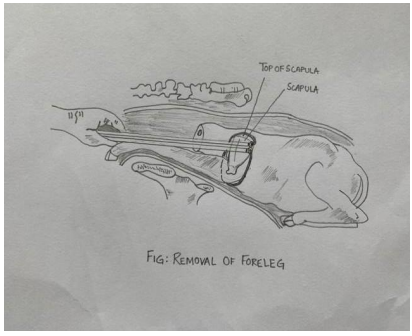

FIG: REMOVAL OF FORELEG

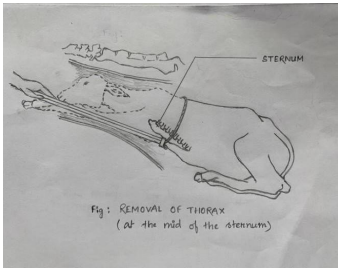

Fig: REMOVAL OF THORAX
(at the mid of the sternum)

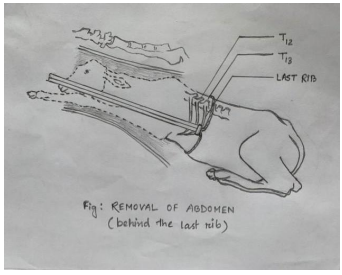

Fig: REMOVAL OF ABDOMEN
(behind the last rib)

Post-Operative Care of the Dam after Mutation, Forced Extraction or Foetotomy

Following a dystocia operation the genital tract should always be examined for the presence of another foetus and if the foetal membrane is lying loose in the uterus it should be removed. Special care should be taken in case of sows and bitches owing to multiple numbers of fetuses, which are likely to be retained for several days. In the sow the farrowing of the last foetus is usually followed by the sow's becoming quiet and content, nursing her piglets, urinating, eating and drinking. If the sow remains restless, uneasy, shows anorexia and intermittent tenesmus, the birth canal should be examined for the presence of another foetus. Similar symptoms are exhibited by the dog and the cat.

If the animal is exhausted following delivery a stimulant drug may be necessary, so also some uterine ecbolics. Take care of the young one if alive, and allow the dam to lick it. Immediately after the delivery, use of ventilatory support and oxygen along with some respiratory stimulant (Doxapram 0.1 – 0.4 mg/kg i.v.) will enhance the neonatal survival rate.

The genital canal should be examined thoroughly for any lacerations, ruptures, invaginated uterine horn or small tears of cervix, vagina and vulva. In extensive tears of uterus, prognosis is poor and owner should be cautioned. Large vaginal tears should be sutured. The patient should be treated parenterally with antibiotics for a period of 4-5 days along with fluids. Antibiotic tablets should be placed inside the uterus for 2-3 times on alternate days. If need be, steroids, antihistaminics, analgesics, coagulants may be administered parenterally and also local treatment with healing protective ointments.

Placenta and placentomes should be carefully examined in cattle and buffaloes for presence of any adhesions and infections. In the bitch, the retained placenta may be removed by use of a gauze

sponge on the forceps.

In most of the obstetrical cases in which forced traction or foetotomy is done, it is advisable to administer 50-100 IU of pituitrin for large animals, 20-50 IU for ewe and sow and 5-20 IU for bitch and cat. This may help to prevent prolapse of uterus, aid in the expulsion of foetal membranes and uterine involution.

PRACTICAL NO. 10.

Demonstration of Forceps Delivery and Cesarean Section in Large and Small Animals

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A. Foreceps Delivery in Small Animals

Dogs that are in distress and have been diagnosed with dystocia should be treated on an inpatient basis until all of the offspring have been delivered and until the mother has stabilized. If uterine contractions are absent and there is no evidence of fetal stress, medical treatment will be initiated. Your dog's condition may be due to low blood sugar, low levels of blood calcium, inadequate oxytocin production by the body or an inadequate response to normal oxytocin production. Agents used to promote uterine contractions should not be administered when obstructive dystocia is possible, as they may accelerate placental separation and fetal death, or may cause uterine rupture.

Oxytocin, glucose and calcium can be supplemented as needed. Manual delivery may be necessary to deliver a fetus that is lodged in the vaginal vault.

B. Caesarean Section In Large Animals Indications

Caesarean section is done as a last resort to deliver the foetus in

1. Cases of narrow pelvis
2. Uncorrectable foetal mal-presentations
3. Delayed cases of uterine torsion
4. Foetal monstrosities
5. Incomplete dilatation of cervix
6. Vaginal and cervical tumours.

Anaesthesia

Local linear infiltration of the incision line with 2% Lignocaine hydrochloride (60-90 ml) is the most preferred procedure, however, paravertebral blocks (T13, L1, L2, and L3) are also practiced when the operation is performed in standing animals. For linear infiltration, the anaesthetic agent is first infiltrated sub-cutaneously in both directions at the point of prick followed by administration in the musculature. Parietal peritoneum however, may not be properly desensitized.

Site of operation

Depending upon the general condition of the animal, the caesarean section is either done in standing animal or when casted in right lateral recumbency. Caesarean section is preferably done on the left side because of intestinal loops on the right side, which may hinder the operation. When performed in lateral recumbency, the line of incision is often paramedian, parallel to the milk vein. It can be pre-crural also. In standing animals, the operation is done from the lower left flank region.

Procedure

After proper restraint (in lateral recumbency), thorough preparation of the site and anaesthesia, skin is incised followed by blunt dissection for its separation from the fascia. Abdominus obliques externus, Rectus abdominus and aponeuosis of Abdominus obliques internus and transverse abdominus muscle are cut. After incising the peritoneum, omentum that covers the uterus and the intestines is reflected. It is pushed forward and downward and packed below the rumen. Make sure that the peritoneal cavity is properly packed with drapes to minimize spilling of uterine fluids. After exposing the uterus, foetal parts are palpated to confirm the pregnant horn. If non-pregnant horn is presented, it should be rotated to get the pregnant horn near the incision line. Grasp the foetal extremity and try to exteriorize the uterus along with the foetal

part. Preoperative administration of tocolytic drug (β-adrenergic agonist) like Isoxuprine lactate or Clenbuterol will help exteriorize the uterus. Then a stab incision is made on the pregnant horn in between the maternal caruncles that can be easily palpated as hard protuberances. Using the groove director or guiding with your finger use scissors to extend the incision line. Care should be taken to avoid incision on the caruncles as it can cause profuse bleeding. The incision length should be enough for easy delivery of the foetus while pulling it out of uterus otherwise irregular tear would occur in the uterine wall. Preferably grasp the hind limbs of foetus and bring them out. Pull the foetus obliquely and posteriorly to deliver it. Placenta if loosely attached is taken out after delivering the foetus. The uterus is properly cleaned preferably with weak povidone iodine solution. The uterus is sutured with chromic catgut No.3 or polyglycolic acid in continuous Lambert or Cushing pattern in single or double layer. It is important to embed the first knot in the uterine tissue and keep the stitches in oblique fashion while passing the round needle through the uterine tissue. This would help to reduce the chances of uterine adhesions. The suturing should be quick as in fresh cases the uterus involutes rapidly and suturing may become difficult. After stitching, the uterus is thoroughly cleaned with sterile gauge or normal saline solution and put back to its position. See that no uterine torsion occurs while replacing it or should be removed if surgery is performed in a case of uterine torsion. *Do not forget to remove the drapes put in the peritoneal cavity before its closure.* Water soluble antibiotics like penicillin and streptomycin maybe infused into the peritoneum before its closure. Before closure of the wound, to prevent uterine adhesions, sterilized solution of carboxy methyl cellulose sodium (1%) can infused intra- peritoneally. Peritoneum and abdominal muscles are sutured with braided silk no. 2 or 3 in continuous lock-stitch pattern in two layers. Avoid creation of dead space in between the muscles while suturing by taking deep

tissue bites. Interrupted horizontal mattress sutures are applied on the skin with silk.

Post operative care

Supportive therapy consisting of intravenous fluids, a course of antibiotics, local wound dressing, a non-steroidal anti-inflammatory drug and ecbolics should be administered. Calcium borogluconate to check hypocalcaemia and hasten uterine involution should be given. Cases having severe toxaemia need critical care after surgery.

Complications

Three major post-operative complications of caesarean include peritonitis, adhesions of the uterus with surrounding viscera and wound dehiscence.

Peritonitis is characterized by fever, inappetence, constipation or diarrhoea and arched back. Wound infection and dehiscence are common in cases where surgery is done at para-median site. The future fertility of the caesarean operated cases remains guarded due to uterine adhesions.

Occasionally sub-cutaneous emphysema can develop in cases where the peritoneum has not been apposed properly. This is true in animals where surgery is performed at flank region as at this site more of air is sucked into the peritoneal cavity. Placenta may be retained in majority of cases if it is not separated at the time of surgery. This may warrant intra-uterine and parenteral antibiotic administration.

C. Caesarean Section in Canines Indications

The caesarean section is the last resort to deliver the foetus in cases of narrow pelvis, uncorrectable foetal mal-presentations, foetal monstrosities, uterine inertia etc.

Anaesthesia

Anaesthesia is decided on the livability of the foetuses. If the

foetuses are live, local infiltration of 2% Lignocaine hydrochloride plus tranquilization is preferred. After removing the pups the bitch can be put on general anaesthesia for suturing. In delayed cases where the pups are supposed to be dead, the animal can be directly put on general anaesthesia for caesarean section.

Site of operation

The preferred line of incision is linea alba by putting the animal in dorsal recumbency. Linea alba is chosen to minimize the blood loss during operation. Flank approach is also being practiced, however, exteriorization of uterus is better through linea alba.

Procedure

Skin is the first layer to be incised followed by linea alba. After incising the peritoneum it is important to differentiate between the urinary bladder and the uterus. The uterus is exteriorized through the line of incision and the peritoneal cavity properly packed to avoid any spillage of the infected discharges into it. To deliver the foetuses, incision is made on the body of uterus through which the foetuses are squeezed from both the uterine horns. Make sure that all the foetuses have been removed from both the horns. Sometimes if the foetuses are jammed in the horns the incision has to be made on the uterine horn at the site of foetus. Along with the foetuses the placenta is also removed, however, if placenta is firmly attached it can be left in the uterus. Undue traction on adhered placenta will lead to excessive bleeding.

Inverted continuous sutures are applied on the uterus with catgut No.3. Thoroughly clean the uterus with saline before it is replaced into the abdominal cavity. Peritoneum and muscle are sutured in single or two tiers. Contrary to bovines, interrupted sutures are preferred on muscles to avoid wound dehiscence if at all any of the stitch breaks due to aggressive behaviour of the bitches.

Skin sutures in interrupted manner are applied using nylon.

Post-operative care

Supportive therapy of intravenous fluids, a course of antibiotics, local wound dressing and ecbolics should be given to avoid any toxaemia, septicaemia, wound dehiscence and early involution of uterus.

Complications of caesarean include dehiscence of wound, infection and adhesions of uterus at the site of incision.

PRACTICAL NO. 11.
Handling of Prolapse of Genitalia

Objectives

The objective of the study is to get acquainted with the handling and treatment of the 'total uterine prolapse' and 'cervico-vaginal prolapse' in cattle.

The prolapse of genitalia could be prepartum or postpartum where a portion of the genitalia is dislocated posteriorly. This is an important clinical condition with serious implications on production and reproduction. It can be cervico-vaginal prolapse in pregnant animals or complete uterine prolapse also known as "casting of the wethers"/ "calf bed" at the time of calving or in the immediate postpartum period. Among the possible etiological factors, besides heredity, deficiency of minerals, oxidative damage to the tissues and endocrine alterations leading to relaxation of perenium are the important causes. Excessive straining by the animal or pulling the retained fetal membranes can induce uterine prolapse. The ease of correction of prolapse depends upon the severity of condition, duration of prolapse, its size and whether the animal is recumbent or has associated complications like urinary tract infections. Earlier the treatment given better is the response.

Fig. – In Cow **Fig. – In Buffalo**

(Total Uterine Prolapse)

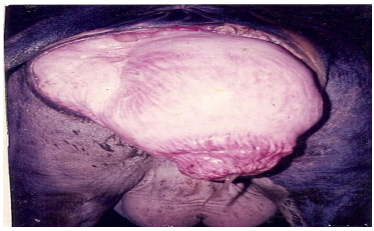


Fig. – In Buffalo (Cervico – Vaginal Prolapse)

Many operators, especially with heifers replace the prolapse in the standing animal with or without the use of epidural anaesthetic. If any difficulty is encountered the animal should be cast using Reuff's method and replacement undertaken as follows.

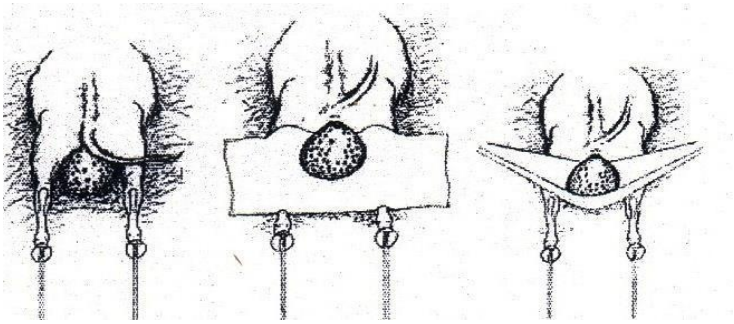


FIG. 3. Sequence of events during which the cow is positioned on its abdomen, with both hind legs pulled straight out and the prolapse positioned between its legs (a). The uterus is then placed on a bale covered by a clean sheet (b) or held in a sheet by two assistants or the operator (c).

The cow is rolled on to one side and the leg on the opposite side is pulled straight back. The cow is then rolled to the opposite side and the process is repeated. The animal is then pushed to lie on its abdomen with both hind legs pulled straight out behind and the prolapse positioned between legs. An extra person, if available, should sit astride the cow facing posteriorly and holding the tail straight up. After first cleansing and disinfecting the prolapsed mass, it is then either placed on a board or a bale covered by a clean sheet or held in a sheet by two assistants or held by the operator, depending on personal choice.

Three important steps in handling a case of prolapse of genitalia are reduction, repositioning and retention of the prolapsed mass.

Reduction in the size of prolapsed mass

1. **Drainage of urine**: Due to prolapse of vagina a kink develops in the urethra that leads to retention of urine in the urinary bladder. This increases the size of the prolapsed mass. Thus, drainage of urine will often reduce the size of the prolapsed mass. Simply lifting the prolapsed mass upward straightens the kink in the urethra and releases the retained urine. Alternatively, it can be drained by using urinary catheter.
2. **Reduction of edema** : Due to occluded blood supply, the prolapsed mass develops oedema. Lifting the prolapsed mass above the level of ischial arch can reduce this edema. Cold water, ice packs or applying hypertonic sugar solution on the prolapsed part can further reduce it. The local administration of oxytocin in the uterine musculature in the uterine prolapse will also reduce the size of the prolapsed mass.

Repositioning of the prolapsed mass

Repositioning of the genitalia is always done under epidural anaesthesia. Slight lifting of rear parts of the dam will help in easy repositioning. After giving epidural anaesthetic and evacuation of the bladder, thoroughly clean the prolapsed mass with mild detergent or acriflavin solution, and water so as to remove all the dirt, dung or straws sticking to the mass. This helps reduce irritation to the tissues and is an important step for successful treatment of prolapse. Before reposition of the prolapsed mass, tears or lacerations if any should be properly sutured. Apply antibiotic and anaesthetic ointments on the prolapsed mass to control straining and check the local infections. This also lubricates the tissue and will help easy repositioning. Start repositioning, firmly but gently, using the palms of the hand or fist starting from the lateral walls adjacent to the vulva, then the middle portion followed by roof of vagina and straightens the

organ. **While reposing the mass, do not put pressure with the fingertips, instead use the palm to put pressure.** The operation becomes more difficult the less that needs to be replaced. The last portion is the most difficult and frequently requires an assistant to pull open the vulva. In cases of uterine prolapse once the organ has passed through the vulva it must be pushed cranially and ventrally (Fig.2) to ensure that the prolapse is completely reduced and the uterine horns are completely everted and returned to normal. This is aided by putting the fist and arm in the uterine lumen and using them in a pumping action; the length of the arm can possibly be extended by grasping a bottle and inserting that as a plunger. Alternatively filling saline in the uterine horns should ensure complete straightening of the uterine horns but make sure that most of the infused fluid is drained out.

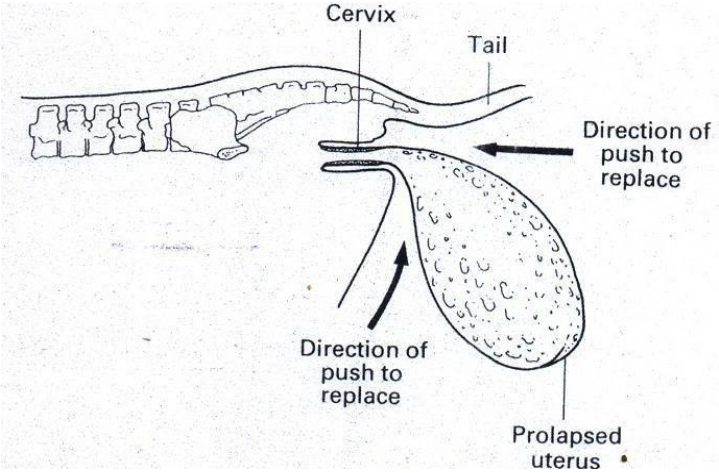


FIG. 4. Method of replacement of prolapsed uterus.

Retention of the prolapsed mass

A number of methods including vulvar sutures are used for retaining the prolapsed mass among which Buhner‟s sutures is the method of choice (Flg.3). Retention along with supportive therapy ensures that the tissue regains strength and occupies its original position.

1. Buhner's Sutures

These are applied under epidural anaesthesia with a special needle, the Buhner's needle. An incision on the skin is made 1-inch below the ventral commissure of vulva. Thoroughly sterilized Buhner's needle is passed below the skin at a distance of 2-inches from the vulvar lips towards the dorsal commissure of vulva and taken out between anus and the dorsal vulvar commissure. Here the skin may also need a small incision. A nylon ribbon, umbilical tape or bandage (about 2 feet long) dipped in antiseptic solutions like povidone iodine (Betadine), is passed through the eye of the needle and the needle is withdrawn from the same tract. Then pass the needle on the other side of vulvar lips from the same ventral incision and bring out of the same dorsal incision. The free end of tape is loaded into the eye and the needle similarly withdrawn. This forms an encircling subcutaneous stitch around the vulvar lips. Finally, an easy release knot is tied at the ventral commissure keeping a gap of 4 inches between the dorsal and ventral commissure of vulva. This puts a uniform pressure on vagina and helps retain the prolapse. It does not obstruct regular flow of urine and prevents vulvar edema. Occasionally if edema develops, slightly loosen the knot. This will prevent venous congestion and establish normal blood circulation.

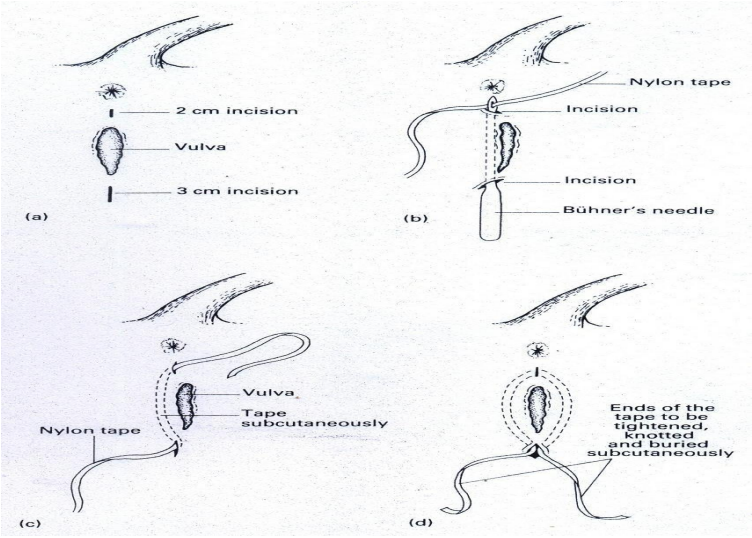
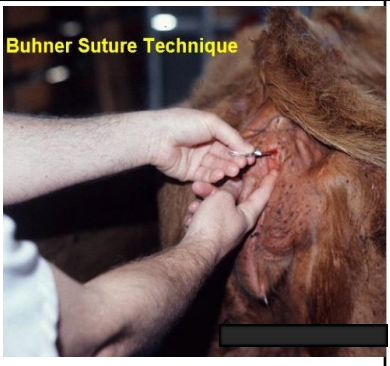
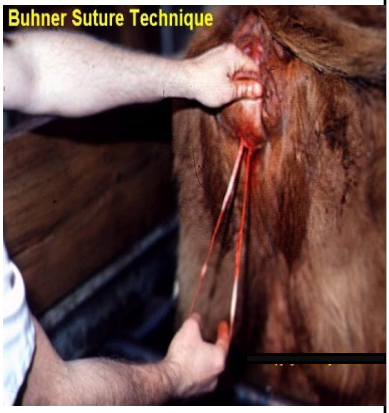


FIG. 5. Buhner's method for retention of cervico-vaginal prolapse.

Buhner's suture	Step Wise Procedure
	Restrain the animal properly. Wash and clean the prolapsed part and perineal region, then replace the prolapsed part to its normal position. Give epidural anaesthesia and sterilize the area with povidone iodine. Two incisions of about one-half inch are to be made 1 – 2 inches above the upper commissure and below the lower commissure of the

	vulva.
	A long eye point needle, a **Gerlach's perivaginal needle** has to be passed within the tissues from one incision to the other incision lateral to one vulvar lip. One 18 inch piece of one-eighth inch nylon cord or heavy vetafil is to be threaded through the eye of the needle and in one stroke pulled out through the ventral commissure. The needle is to be reinserted in the opposite direction lateral to the opposite vulvar lip to the lower incision site and again withdrawn.
	The purse string suture around the vulva is to be tightened sufficiently to allow 4 fingers in the vulva. The knot is to be tied and buried beneath the skin of the upper incision by suturing the skin over the heavy purse string suture leaving it buried within the vulvar tissues until parturition or as when needed.

2. Lacing of the vulva/shoe lace suture

This technique is preferred by some operators when parturition or abortion is expected in a few days. Three to four small separate loops of doubled 1/4 - 3/8 inch umbilical tape or No.2 or 3 black silk are placed on either side of the vulva in the thick skin at the hairline from the level one inch below the anus to about opposite the lower commissure of the vulva. Generally three loops for cervico-vaginal prolapse and four loops for uterine prolapse on either side of the vulva are applied. The sutures should be located at least 2 to 3 inches lateral to the vulvar lips in the hairline. This affords a much tougher and thicker skin for the suture, which does not tear out as readily nor cause as much irritation as one in the vulvar lips. About 2 feet of 1½ inch to 3 inchgauze bandage, doubled, is used to lace up the loops in a manner similar to lacing a shoe. The advantages are simplicity and the intentional loosening of the lacing if parturition seems imminent and the animal calves unattended or replace it if desired. The disadvantages are that the retention is temporary and may have to be replaced, the lacing tends to collect faces and the irritation may induce resumption of tenesmus and prolapse.

3. Flessa sutures

These are specially designed sutures consisting of three metallic rods, two holed aluminium strips, six wooden beads and a Flessa needle. After fixing a wooden bead and passing through the aluminium sheet, the metallic needles are passed through the skin at the level of the base of the vulvar lips and through vestibule with the help of Flessa needle. These are secured with the aluminium strip and tightened with wooden beads on the other side. Since mucosa of vagina is damaged, infections can settle in. Many obstetricians prefer Flessa sutures over Buhner's sutures.

4. Robert's vulvar sutures

These are similar to Flessa sutures but the beads are metallic instead of wooden beads.

These are similarly applied as Flessa sutures.

5. Supportive therapy

The cases of genital prolapse need supportive therapy with intravenous fluids, intravenous calcium, antibiotics, anti-histaminics, analgesics and antioxidants. In some cases with incomplete gestation, progesterone treatment may help as progesterone competes with the oestrogen for the steroid receptors and lowers the effect of oestrogen. The cases with continuous tenesmus do not respond favourably to conventional treatments. Therefore, checking of straining (through sedation or epidural anaesthesia with long acting drugs like bupivacaine, 4.0 ml of 0.5% solution, or Xylazine @0.05 mg/Kg), daily dressing after cleaning of vagina and other medicinal treatment prove helpful in successful treatment. In delayed chronic cases, urinary tract infection is a regular finding. Hence, in the presence of painful urination, urine culture and sensitivity based antibiotics must be administered.

Treatment in one pregnancy does not prevent its reoccurrence in the next gestation.

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