

The Birth Canal

The birth canal is that through which the fetus can pass to the outside, during the process of normal parturition. It includes both the soft and the bony birth canals.

The birth canal was bounded:

Dorsally: sacrum and first 3 coccygeal vertebrae.

Ventrally: pubis anteriorly and ischium posterior.

Laterally: ileum and acetabular branch of ischium

Pelvic inlet:

Situated slightly oblique and facing caudo-ventrally.

It is rounded (mare) oval (cattle).

Dorsally: sacrum promontory

Laterally: wings of sacrum along the ilio-pectineal to the pectin osseous pubis.

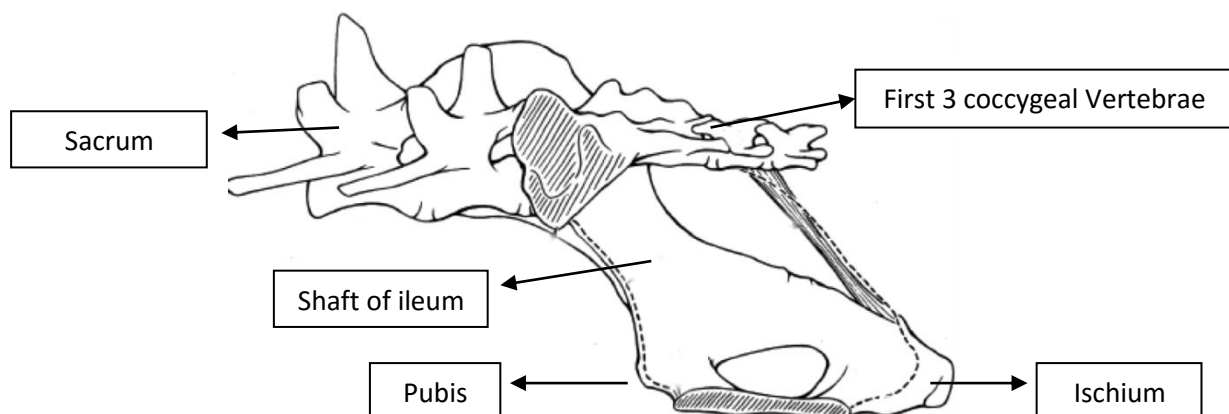
The pelvic outlet:

Is much narrower than the inlet.

Ventrally: surrounded by ischeal arch

Dorsally: first 3 or 4 coccygeal vertebrae.

Laterally: caudal borders of broad ligaments of pelvis.



The defects of the lateral walls of the bony birth canal is completed by the ligamentous and tendinous structures, known as the pelvic ligaments, these are:

- The dorsal and the lateral sacro-ileal ligaments:** which fasten the medial wing of ilium to the lateral portion of the sacrum and the sacrum and the summits of the sacral spines.
- The sacro-sciatic ligaments:** It extends from the lateral border of the sacrum and the transverse processes of the first two coccygeal vertebrae to the ischiatic spine and the tuber ischii, it furnishes attachment for the large gluteal muscles and vulva.

The size of the pelvic inlet varies greatly within the same species, due to the breed, age and the size of the animal.

The pelvic cavity is determined by the following dimensions:

- 1) **The conjugate diameter (sacro- pubic):** extends from the promontory of the sacrum to the anterior end of pelvic symphysis.
- 2) **The transverse diameter:** extends between the Two iliac shafts (range 13 – 20 cm.)
- 3) **The vertical diameter:** extends from the anterior end of the symphysis to the junction of the third and the fourth sacral vertebrae (range 22.5 cm.).

In the cow:

The pelvic inlet is nearly oval or elliptical in shape.

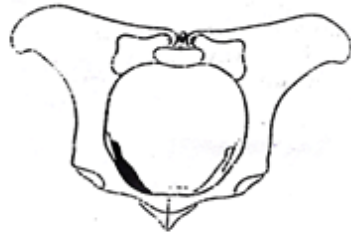
The transverse diameter measures about 20 cm. while the conjugate and the vertical diameters measure 25 cm and 22 cm respectively in adult animals.

In the mare:

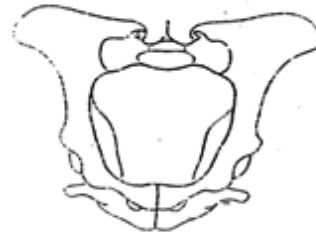
The bony pelvis of the mare is the most ideal one in all domesticated animal, from the obstetrical point of view. The inlet is more or less circular with an average diameter of 25 cm.

The small ruminants:-

The pelvic inlet is nearly circular or oval in shape. The pelvic floor is tray- like and hollow. Thus its long axis goes smoothly horizontal. The pelvic features are much more favorable for normal parturition than in cattle. The incidence of maternal dystocia in these animals is considerably low.



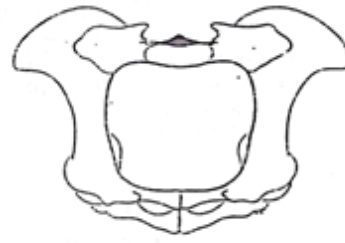
Cow



Ewe



Mare



Sow

PELVISES OF DOMIESTIC ANIMALS (bony birth way)

Theories of causes of parturition

1- Maternal Hormones theory (Progesterone):

Progesterone declines a few hours or days before parturition (progesterone blocks myometrial contraction). The withdrawal of the progesterone block would allow the myometrial stimulatory effects of estrogen and $\text{PGF}_2\alpha$ to be more manifest. Possibly progesterone production is stopped by the interaction of prostaglandin with foetal glucocorticoids acting as a stimulus for prostaglandin synthesis.

2- Oxytocin levels:

Oxytocin hormone normally inactivated by an enzyme oxytocinase which present in large amount in blood during pregnancy and disappears from blood near the end of pregnancy so release of oxytocin leads to contraction in an estrogen sensitized myometrium.

3- Estrone and estradiol

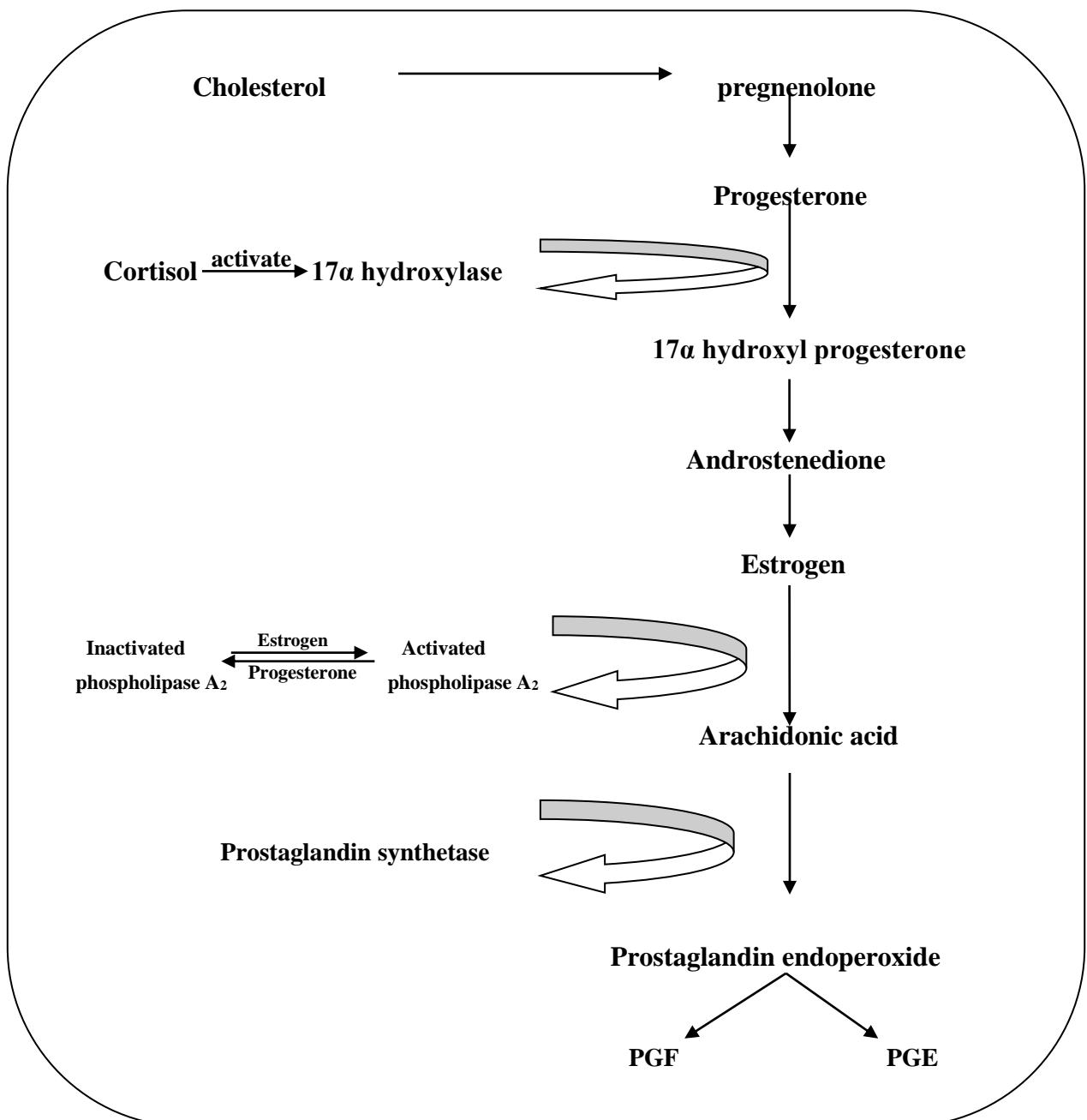
Increase during pregnancy in domestic animals and reach a peak a few days before parturition. Estrogen increases spontaneous monitorial activity. During the last hours or days of pregnancy, the declining influence of progesterone and the increasing influence of estrogen favor myometrial contractility estrogen also cause relaxation(along with relaxin) of the birth canal especially the cervix and vagina.

4- Prostaglandins $\text{F}_2\alpha$:

Appears to be of considerable importance in parturition in sheep and goat, increase of $\text{PGF}_2\alpha$ in uterine vein blood within the 24 hours before parturition, the source may be the placenta or the endometrium stimulus for $\text{PGF}_2\alpha$ synthesis may come from the foetal adrenal level of corticoids. $\text{PGF}_2\alpha$ is luteolytic and strong myometrial stimulant.

5- Foetal Hormones theory:

In the normal foetus high levels of fetal corticoids appears the last few hours before parturition. The rising level of foetal glucocorticoids is temporarily associated with an increased prostaglandin $F_{2\alpha}$ and estrogen output from the placentomes of sheep and goat. Furthermore progesterone production is reduced; the rising levels of estradiol and $PGF_{2\alpha}$ precede declining progesterone therapy setting the stage for myometrial contraction.



6- Physical or mechanical factors (increase of uterine volume):

The size and weight of the foetus increase during pregnancy causing distension of the uterus, increase irritability of the myometrium & uterine contractions.

Evidence for this is that twin pregnancies usually in monotocous animals often experience a sharpened gestation period. In fact the length of gestation in all monotocous or polytocous species is inversely related to the number of fetuses. Increased movement of the large foetus has been suggested as a stimulus to myometrial contraction which could lead to parturition.

Signs of approaching parturition in domestic animals

Signs for approaching parturition vary from species to species.

In the cow:-

The pelvic ligaments, especially, the sacro-sciatic ligment become progressively more relaxed, causing sinking of the croup muscles. The caudal border of the sacro-sciatic ligament between the coccygeal vertebrae and the ischial tuberosity become less cord like and more relaxed and flaccid. The presence of very relaxed ligaments indicates that parturition will probably occur in 24 to 48 hours. This relaxation of the ligaments is also noted by the elevation of the head of the tail.

Oedema of the external genitalia and its surroundings, the vulva, hind quarters, udder and sometimes the ventral abdomen wall anterior to the udder and may extend to the xiphoid region.

The vulva become progressively edematous and more flaccid until it is two or six times its normal size. The udder is greatly enlarged and edematous. In heifers. The udder enlargement begins at about the fourth or the fifth month of gestation in pluriparous animal, it occurs two to four weeks before parturition.

Just before parturition, the udder secretion changes from viscous like dry secretion to yellow, turbid, cellular secretion called the colostrum.

Mucous appears from the vulva, starting from the last month, these secretions increase in amount, become profuse as parturition advances. Just before parturition, by few hours the cervical seal liquefies.

In the Mare:

Somewhat similar signs are present. The sinking of the sacrosciatic ligament is not so pronounced (due to the heavy gluteal muscles). The vulva does not become edematous as in the cow. No vaginal discharge before foaling.

The udder, starts to develop before foaling by about 3-6 weeks and it becomes filled and distended with colostrum about two days before foaling, and secretes of this colostrum from the teats. Then drying of secretion on the teats forms a waxy seal this usually indicates impending parturition when uterine contraction beginning may bring distress, sweating in the flank region and behind the elbows is noticed.

Dam movement in circles and kick towards her flank with the symptoms of colic pain. These symptoms continuous till parturition begins.

In Sheep and Goats:

The symptoms are similar to that in the cow, but the udder development is not so great. During the late stages of pregnancy, a vaginal and vulvar discharge is usually occurring.

Stages of parturition

Parturition in all species of domestic animals usually occurs with the dam in lateral recumbancy.

Parturition is one continuous process it can be divided into 3 stages.

1- The first stage of parturition(dilation of cervix) or (preparatory stage):

This is the stage of dilation of the cervix and active contraction of uterus caused by beginning myometrial contraction, forcing the foetus and the fluid filled membrane which act as a wedge.

The dilation start at the internal os, after pass the time complete dilation of the cervix take place and the uterus and vagina becomes a continuous canal.

Duration:

This stage may last for day in cow from 1/2 hours: 24 hours and incase of dog and cat 2-12 hours.

Events:

Uterine contractions begin at the tip of the uterus and continue backwards. The posterior part of the uterus does not contract but dilate.

The contraction occur every 15 minutes interval and every contraction lasts for 15-30 seconds at the end of this stage contraction occur every 3 minutes.

- Allantoic sac is considered as first water bag pushes through cervix and rupture through this stage then followed by amniotic sac.
- In this stage cow lies down then get up & repeated tail twisting, drop in body temperature, pulse and respiration rate increase.
- In multiparous animals contraction start cranial to the most caudal foetus while the rest of uterus remains quiet.

2- Second stage of parturition (Expulsive stage):

It consists of complete dilation of the cervix and delivery of the foetus. The uterine contractions increase in intensity and frequency and their action is reinforced by the abdominal press which provides the additional force necessary for parturition.

Duration:

The time involved in the second stage depends on the species in cow 1/2 hour – one hour, small ruminant 1/2 – 2 hours Mare 10 – 30 minutes and bitch 2 – 6 hours and may take larger time according to number of fetuses.

Events:

- The uterine contraction at about 2 minutes interval.
- Amniotic sac passes through dilated cervix and ruptures as the foetal feet pass through the vulva.
- The abdominal pressure (first strain) as a reflex stimulus when foetus enters the pelvis.
- The second great strain occurs when the chest of foetus passes through the birth way.

3- Third stage of parturition (expulsion of the placenta):

Duration:

The time required for completing this stage varies according to species this due to the type of placenta. Expulsion of placenta in mare very quickly few minutes after foaling. In cow the placenta is expelled up to 12 hours post delivery.

Events:

The uterine contractions continue strongly after expulsion of fetus, middle uterine artery contracts immediately followed parturition and disappear of buzz (thrill).

In some polytocous species the foetal membranes are expelled with or after each foetus, and before the next foetus is delivered. In other species the placenta does not follow each fetus and may be expelled as group after several fetuses are delivered as in case of sow.

The period following parturition required for the reproductive tract to return to normal is called the puerperium these is varies with the species.

In mare and cow usually required 35 – 60 days. In small animals less time is required.

The bitch appears to be an exception because her uterus is so sensitive to progesterone C.L functions throughout pregnancy and pseudo-pregnancy and her uterus required 100-159 days to return to normal.

Requirement of normal parturition

The foetus	The Dam
1- normal foetal size	1- good physical health
2- normal presentation	2- normal soft and bony birth ways
3- normal position	3- normal relaxation
4- normal posture	4- Adequate uterine contraction and abdominal pressure.

Definition

1) **Obstetrics:**

- Is the science that deals with female animals from time of conception till end of postpartum period?
- It also include: normal & abnormal pregnancy, normal & abnormal parturition, postpartum period and diseases of newborn animal.

2) **Eutocia = Normal parturition:**

- Is self expulsion of: normal, mature, alive fetus from uterus to outside through birth way without any hindrance, harmful, danger on mother animal or fetus.

3) **Dystocia:**

- Mean that there is a hindrance or obstacle so the young can't be delivered with maternal effort alone and need outside interference.

Mature fetus:

- Lower incisors.
- Covered with hair.
- Body weight.

4) **Gestation period:**

- Is the period from fertilization till parturition **or** from conception till birth.
- During this period developing of conception is occurred.

American Opossum & Virginian cat	10 – 12 days
Small ruminant (Ewe &Doe)	5 months
Cow	9 months
Buffalo	10 months
Mare	11 months
She-donkey	12 months
She-camel	13 months
She-elephant	22 months

5) **Nullipara:**

- Female animals which give no birth before.

6) **Primipara:**

- Female animals which give one birth before.

7) **Pluripara:**

- Female animals which have given more than one birth before.

8) **Unipara:**

- Female animals which gives one offspring at each occasion of delivery.

9) **Multipara:**

- Female animals which gives more than one offspring at each occasion of delivery.

Concepts:

- **Fertilized ovum** :0 – 12 day till implantation
- **Embryo**: 12 – 45:50 days till organogenesis.
- **Fetus**: 50 days till full term.