Parturition and Lactation

Gestation length

<table>
<thead>
<tr>
<th>Specie</th>
<th>Average Length (days)</th>
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</thead>
<tbody>
<tr>
<td>Swine</td>
<td>114</td>
</tr>
<tr>
<td>Sheep</td>
<td>148</td>
</tr>
<tr>
<td>Cattle</td>
<td>280</td>
</tr>
<tr>
<td>Mare</td>
<td>340</td>
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</tbody>
</table>

Factors influencing gestation length:

Maternal age

younger dams have shorter

Sex of fetus

males 1-2 days longer than females

Twins are carried 3-6 day less than singles.

Genotype of fetus

breed differences exist
Cattle fetuses from breeds with shorter gestations have decreased gestation length when transferred to recipients with longer gestations.

Mule foals have longer gestations than horse foals.

Some of these differences maybe due to different growth rates.

Species and breed differences in fetal size are largely due to genetic differences in rate of cell division.

Most of the increase in weight occurs in last 2 months of gestation.

Nutrition at this time is critical.

Undernutrition early in gestation has little effect on fetus.

Late in gestation poor nutrition decreases fetal growth and chances for survival after birth.

Age, Parity, Size of mother affect birth weight.

PARTURITION: Labor & Delivery

Signs of approaching parturition:

Enlargement of mammary glands: may include milk or colostrum dripping from teats

Nest building behavior can be seen in swine if given the chance.

Mucous may be seen stringing from vulva.

Stages of Labor
I. Dilation of Cervix:

- regular uterine contractions caused by estrogen and PGF2
- Lasts from 2-12 hours
- Marked by maternal restlessness

2. Expulsion of fetus:

- stronger uterine contractions oxytocin is involved now. Abdominal contractions begin.
- Rupture of chorio-allantois and amnion.
- Lasts from 30 min. to 3 hours.
- Oxytocin secretion is stimulated by aneuroendocrine reflex.

3. Expulsion of placenta:

- uterine contractions decrease in strength. Cannot be separated from second stage in sows or sheep with twins.
- Of short duration in sows and mares.
- Takes longer in ruminants because of type of placenta.
- Cows: expulsion of placenta normally 6-12 hours. If >24 hours it is considered a retained placenta.
- Retained placentas lead to increased risk of infections and can delay rebreeding.
Metritis: infection of uterus

Antibiotic infusions to uterus or antibiotic boluses will often lead to expulsion.

Oxytocin and PGF2 have been used to attempt to cause expulsion of fetus.

Manual removal is not recommended.

Vitamin A or E or Selenium deficiencies can increase the incidence of retained placentas.

Dystocia: difficult birth

Dystocia increases the incidence of retained placentas.

2 main causes of dystocia: large birth weights and abnormal presentation of fetus

Large birth weights more of a problem in females giving birth for first time.

Parity: number of parturitions a female has experienced pregnancy

Nulliparous: none

Primiparous: 1

Multiparous: >1

Labor usually takes longer in primiparous females.

Normal presentation of the fetus is forward with head between front legs.

Other types of presentation can lead to dystocia.
Abnormal presentations more common in multiple births in monotocous species.

Some changes required for survival of neonate outside of uterus.

Ductus Arteriosus: open in fetus, shunts blood away from lungs. This must close quickly after umbilical cord is broken.

Foramen Ovale: opening that allows blood to go from right atrium to left atrium. Closes shortly after birth.

POSTPARTUM

Postpartum period: repair of reproductive tract to prepare for another pregnancy.

Uterine Involution: restoration of uterus to nonpregnant size and function will never return to exact size as before pregnancy. Always slightly larger.

Timing

Mares: rapid involution, about 2-3 weeks.

Sows: rapid involution, 2-3 weeks.

Ewes: return to nonpregnant size in about 2 weeks. Another 2 weeks required for regeneration of endometrium.

Cows: return to nonpregnant size 25-30 days. Full regeneration of endometrium takes another 2-3 weeks.

Dystocia, retained placentas, metritis: all extend the time needed.
for uterine involution

One uterine horn may stay larger than the other.

Lochia

uterine discharge, Consists of fetal membranes, maternal tissue, blood

Lasts 2-7 days postpartum

Discharge due to continued release of PGF2 from uterus.

PGF2 secretion also promotes more rapid involution.

Release of oxytocin by suckling also promotes uterine involution

Postpartum Anestrous Period

For most species reproductive activity does not resume immediately after parturition.

There is a period of time before estrous cycles start again.

Mares are an exception to this.

Most mares exhibit FOAL HEAT : 8-15 days postpartum.

They can be bred at this time if reproductive tract is recovered from pregnancy.

Fertility is lower than at later estrus.

The other farm species exhibit a period of anestrus and anovulation postpartum.
Factors affecting length of Postpartum anestrus

1. Suckling of progeny

2. Nutrition of dam: prepartum and postpartum

3. Age of dam: primiparous females have longer anestrous periods

4. Season of year: sows weaned in summer are more likely to remain anestrus

5. Breed: Brahma based breeds have longer anestrous periods than Bos taurus breeds

Sows: Remain anestrus for the typical 3-4 week lactation period

Estrus is seen 4-7 days after weaning.

Poor nutrition can delay the return to estrus.

Split weaning: weaning the larger piglets 24-48 hours before smaller ones can improve return to estrus

Ewes: Postpartum period is complicated by seasonal anestrus.

Ewes lambing in spring do not cycle until the next fall because of long days of spring and summer.

Ewes lambing in the fall will resume estrous cycles in 5-6 weeks.
Cows: Dairy cows cycle 20-30 days postpartum

Usually bred on second estrus.

Inadequate dietary energy in high producing cows can delay return to estrus.

Beef cows have longer anestrus periods than dairy because of suckling of calves.

Calf removal after birth causes beef cows to return to estrus similar to dairy cows.

48 hour calf removal shortly before the breeding season can increase the number of cows cycling.

Low energy diets before or after calving will lengthen the postpartum anestrus.

In many cows the first ovulation postpartum is silent: without estrus.

This is followed by a short-lived CL and then a normal estrus and ovulation.

The CL is short lived because of early release of PGF2 alpha.
Suckling lengthens the postpartum interval by suppressing GnRH and LH secretion.

Psychological bonding of dam to calf also delays rebreeding.

Low dietary energy also suppresses GnRH and LH secretion.

LACTATION

Essential for survival of young

Anatomy of Mammary System

Cow: udder contains 4 glands each with a single teat.

Each gland or quarter is a separate unit.

Ewe and doe: 2 glands with 1 teat each

Mare: 4 secretory regions fused into 2 glands

Each gland has a single teat which drains 2 of the secretory regions

Sow: 4-9 pairs of glands located along both sides of midline.

Each gland has a single teat.

Colostrum

The first milk produced immediately after parturition

It is higher in protein and vitamin A than milk.

Contains immunoglobulins to provide passive immunity to
neonate until its own immune system begins to function.

Other hormones involved in Lactation

Placental Lactogen: ruminants

Stimulates duct and alveoli growth

Some hormones synergize (make more effective) other hormones.

Cortisol, thyroid hormones, insulin, GH synergize with estrogen and progesterone during pregnancy to increase mammary development.

Prolactin is necessary for the start of lactation.

In cows after lactation starts prolactin is no longer necessary.

GH can increase milk production in cows by directing nutrient transfer to the mammary gland.

Prolactin will not cause this effect.

This effect of GH reduces the amount of nutrients available for other physiological systems.

Suckling

Suckling and or removal of milk are necessary for continued lactation.

Presence of milk in the cisterns prevents further milk synthesis.

Suckling causes release of several hormones.
Oxytocin is essential for milk release not milk synthesis.

Oxytocin is released by a Neuroendocrine Reflex.

Milk letdown in dairy cows is stimulated by washing and massaging of udder in parlor.

Milk letdown can become a conditioned reflex so that sounds or sights can trigger oxytocin release.

Other hormones released by suckling include Prolactin, GH, and cortisol.

Stress can inhibit milk letdown through release of Epinephrine from the Adrenal Medulla.