

# Puerperium and involution of uterus in farm animals

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# Puerperium

A period after completion of parturition (including third stage) when the genital system is returning to its normal non-gravid state.

Genital system **does not return** completely to original pregravid state

Certain changes are irreversible



# Why puerperium is important ?

✓ **Most vulnerable period for picking up uterine infections**

✓ **A normal puerperium prepare uterus for next pregnancy.**

✓ **Extended puerperium brings infertility**

✓ **Weak uterine system give rise to uterine diseases (metritis – pyometra complex)**

✓ **Economic loss to dairy industry**



# Puerperium in cow

**S**hrinkage and atrophy of tubular genital tract

**R**eduction in the size of organ and termed as **involution**•

**T**he process is triggered by removal of fetus

**A**ided by hormone  $\text{PGF2}\alpha$  and oxytocin





# Puerperium in cow

## Changes during involution

Major changes occurs during **first few days**  
**post calving**

Uterine contractions continues for several  
days post calving

Contraction decreased in regularity,  
frequency, amplitude & duration



### ❖ Atrophy of myofibrils

- ❖ Size reduces from 750  $\mu\text{m}$  to 400  $\mu\text{m}$  **on first day**
- ❖ < 200  $\mu\text{m}$  in **next few days**



# Puerperium in cow

## Changes during involution

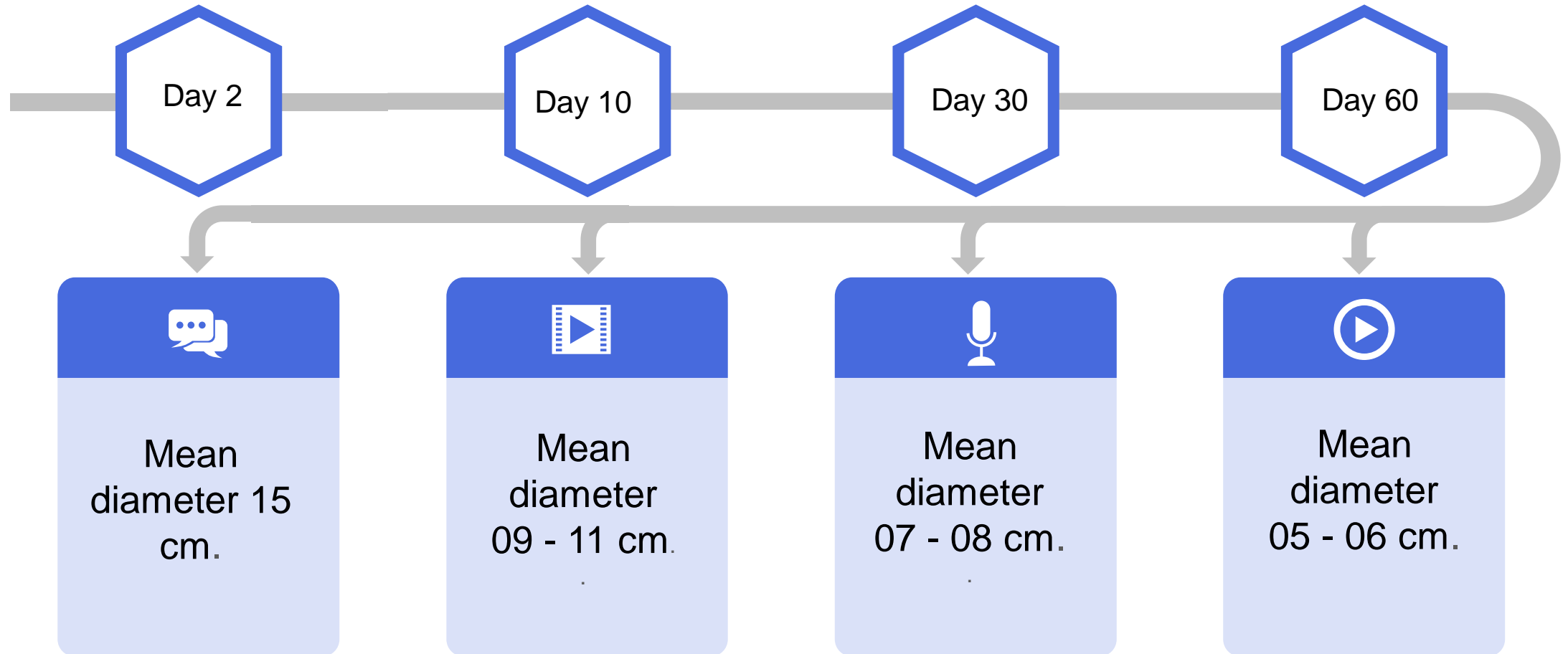
- ❖ Diameter of gravid uterine horn
  - ❖ Reduces to **half** in 5 days
- ❖ Length of gravid uterine horn
  - ❖ Reduces to **half** in 15 days
- ❖ **Complete palpation** of uterus per rectally
  - ❖ Day 8 - 10
  - ❖ Similar for primipara & pluripara
- ❖ **Changes** after 20-25 days is **imperceptible**

❖ **Time taken for complete involution**  
- **26-52 days**





# Changes in cervical diameter





# Changes in the cervix

Constriction is very rapid

01

Reduction in collagen & smooth muscle

Impossible to insert hand after 10- 12 hours of normal calving

02

Cervical diameter used as indicator of involution

Two fingers dilation after 96 h

03

About day 25, cervical diameter > diameter of horn (proper involution)

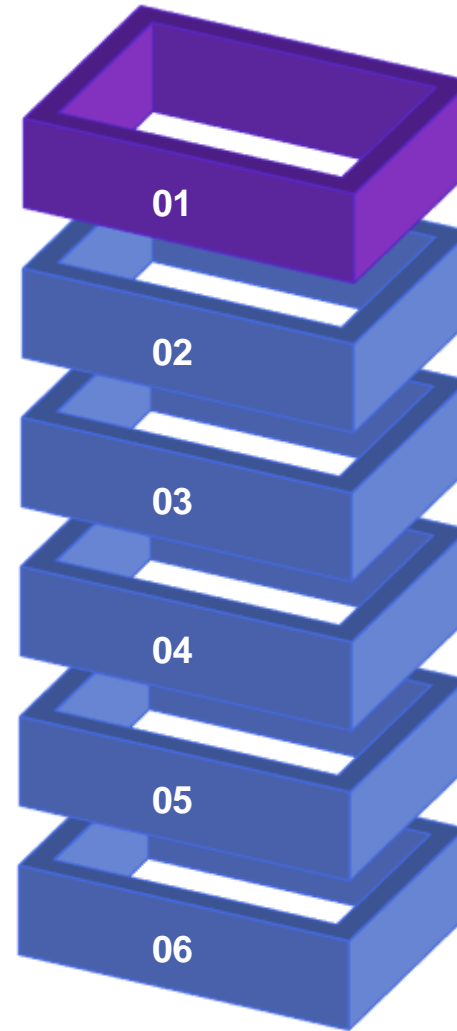
Atrophy and shrinkage due to elimination of fluid

04



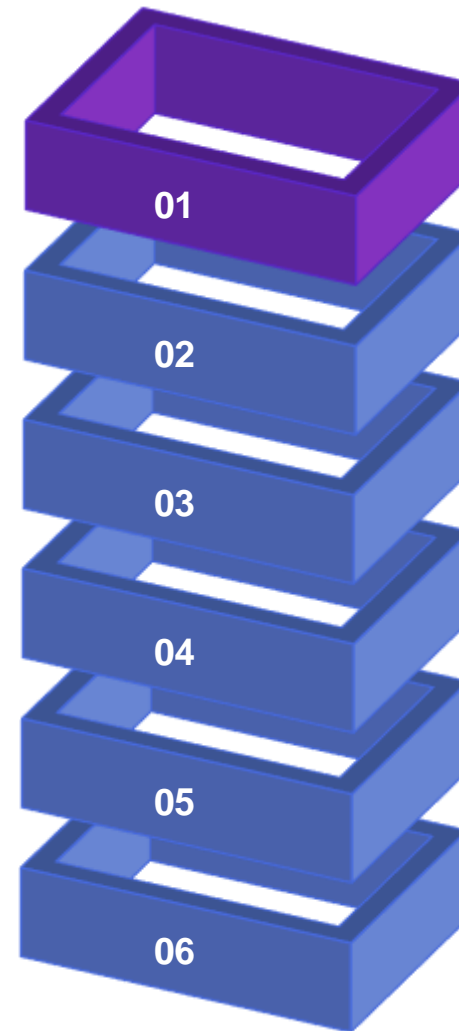
# Restoration of endometrium

- ❖ Loss of fluid and debris (day 7-10)
- ❖ **Lochia / secundus / second cleaning**
- ❖ Average discharge vol. 1000 ml (maximum 2000 ml)
- ❖ Amount will be less in primipara (500 ml)
- ❖ **Some animals do not void lochia (complete absorption)**
- ❖ Maximum amount voided in first 2-3 days post calving



## Restoration of endometrium

- ❖ **Maximum** lochia voided in first 2-3 days, **reduced** by day 8, **disappear** by 14 - 18 days
- ❖ Day 9 , **blood stains** are frequently present, **before disappearance** is 'lymph like'
- ❖ No foul odor
- ❖ Lochia (fetal fluid + blood from rupture umbilicus + shreds of FM)





# Major changes during puerperium



01

Shrinking and atrophy  
of tubular tract  
(voiding of fluids and  
tissue debris)



02

Restoration of  
endometrium &  
uterine wall



03

Resumption of ovarian  
function and return to  
cyclicity (polyestrus animals)



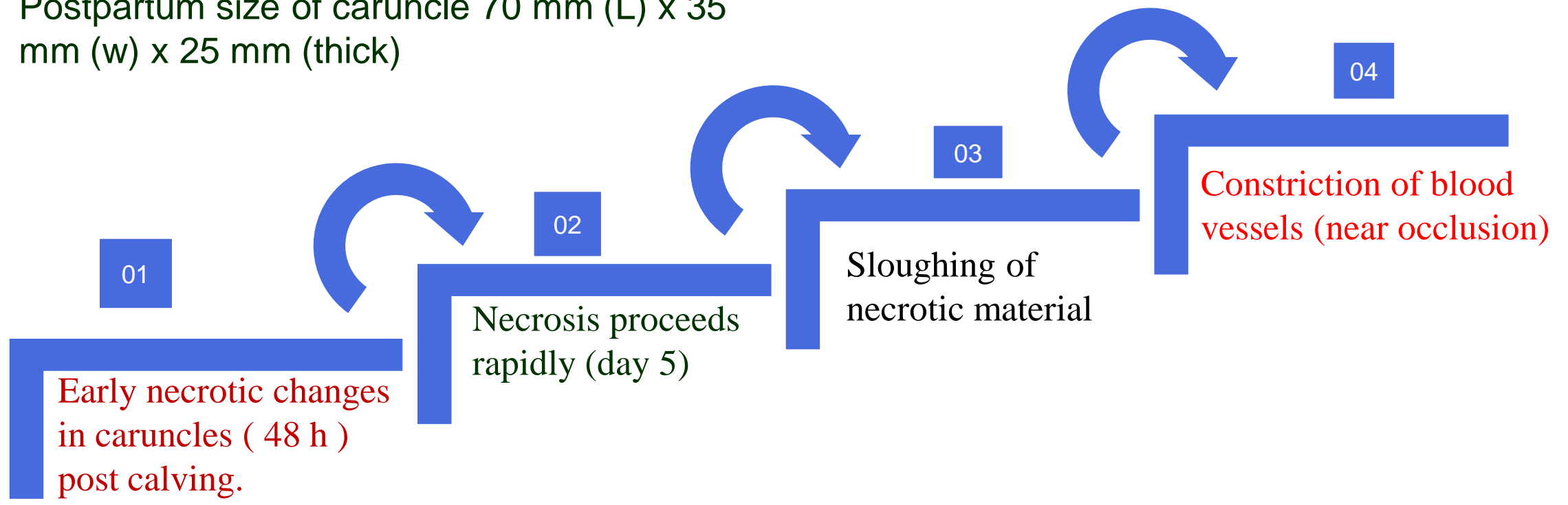
04

Elimination of  
bacterial  
contaminants



# Changes at caruncle level

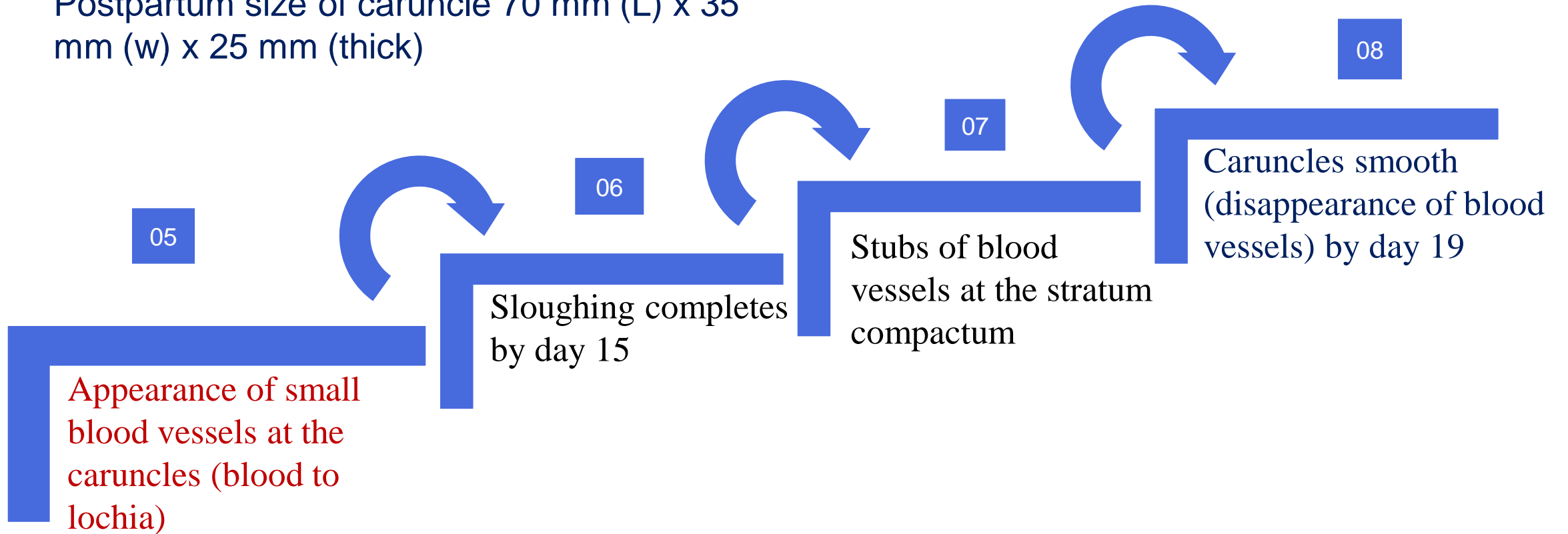
Postpartum size of caruncle 70 mm (L) x 35 mm (w) x 25 mm (thick)





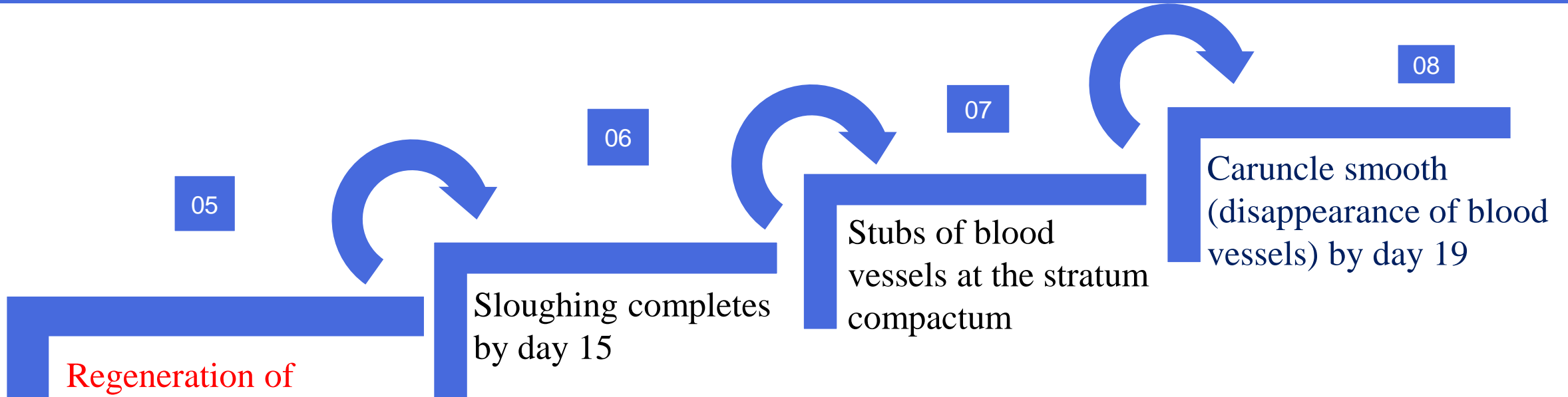
# Changes at caruncle level

Postpartum size of caruncle 70 mm (L) x 35 mm (w) x 25 mm (thick)





# Changes at caruncle level



Regeneration of endometrial epithelium

❖ At intercaruncular area (completes by day 8)

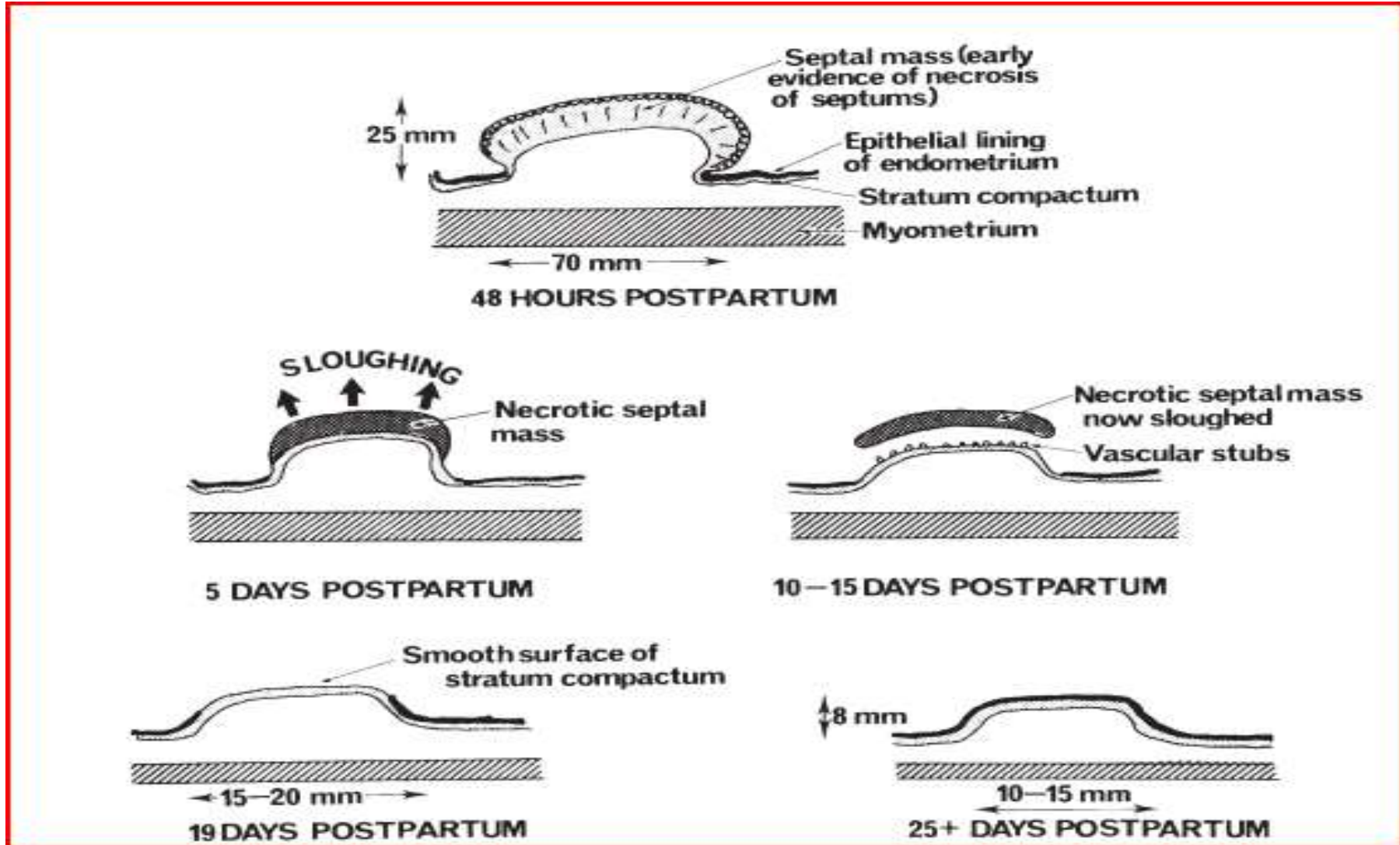
❖ At caruncle epithelium (completes by day 25)





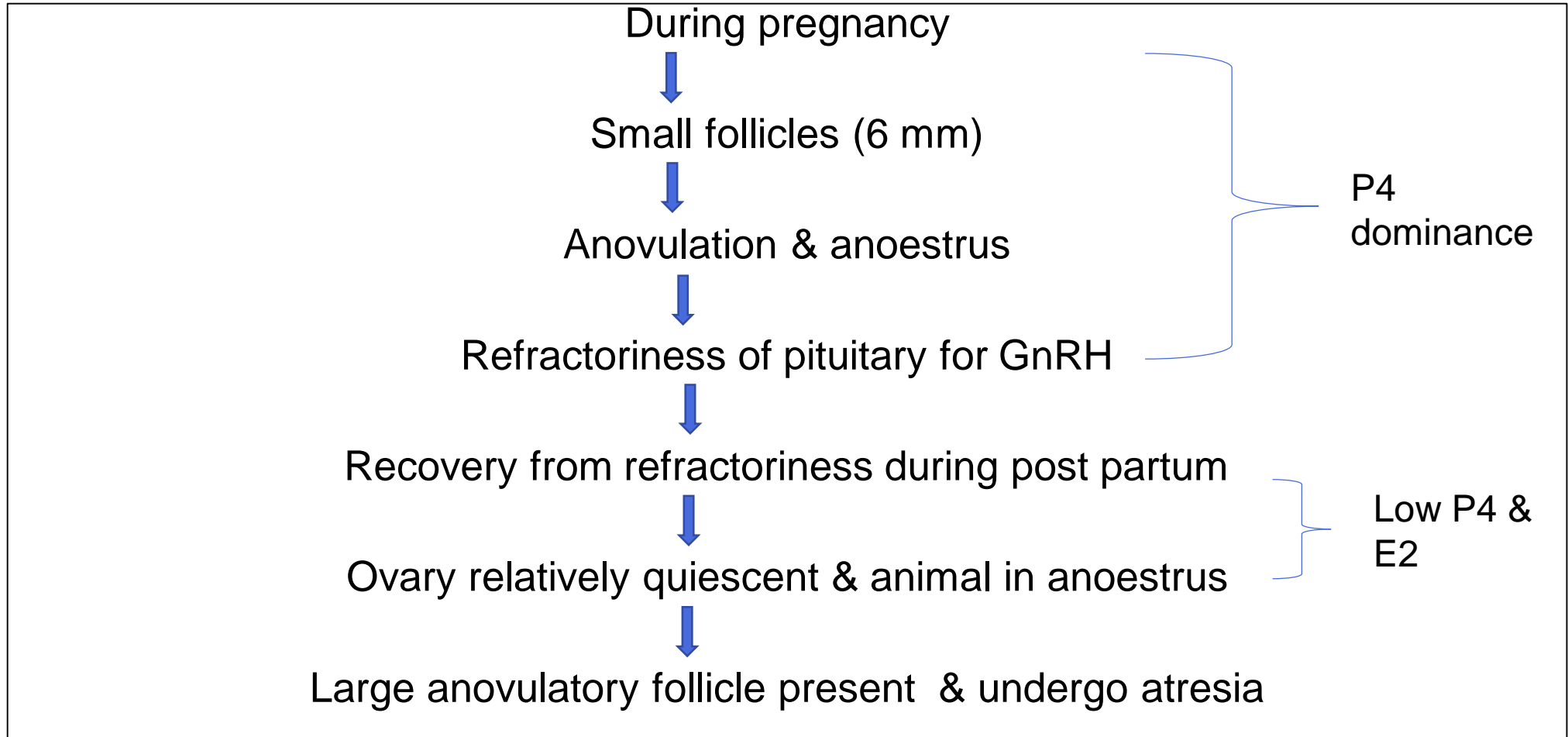


# Changes occurring in the caruncles during the puerperium in Bovine

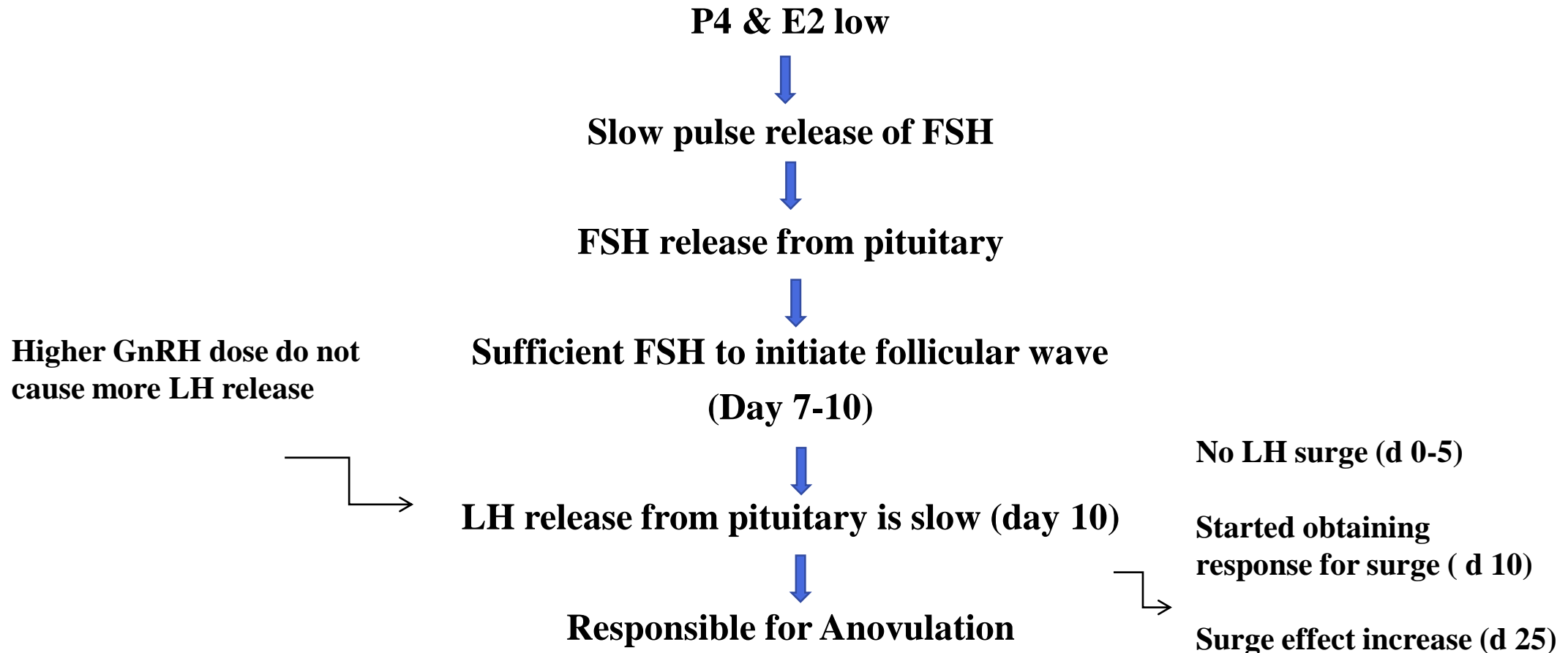




# Return of ovarian activity (ovarian rebound)



# Return of ovarian activity (ovarian rebound)



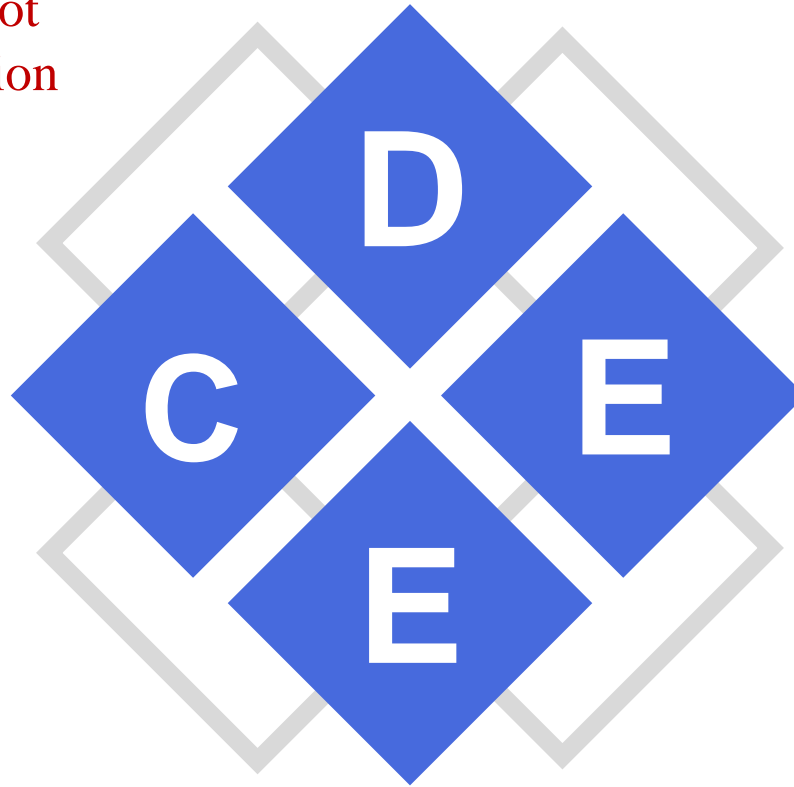
**EB induced**



# Regeneration of endometrium

Degeneration and sloughing is not comparable with cow (placentation differences)

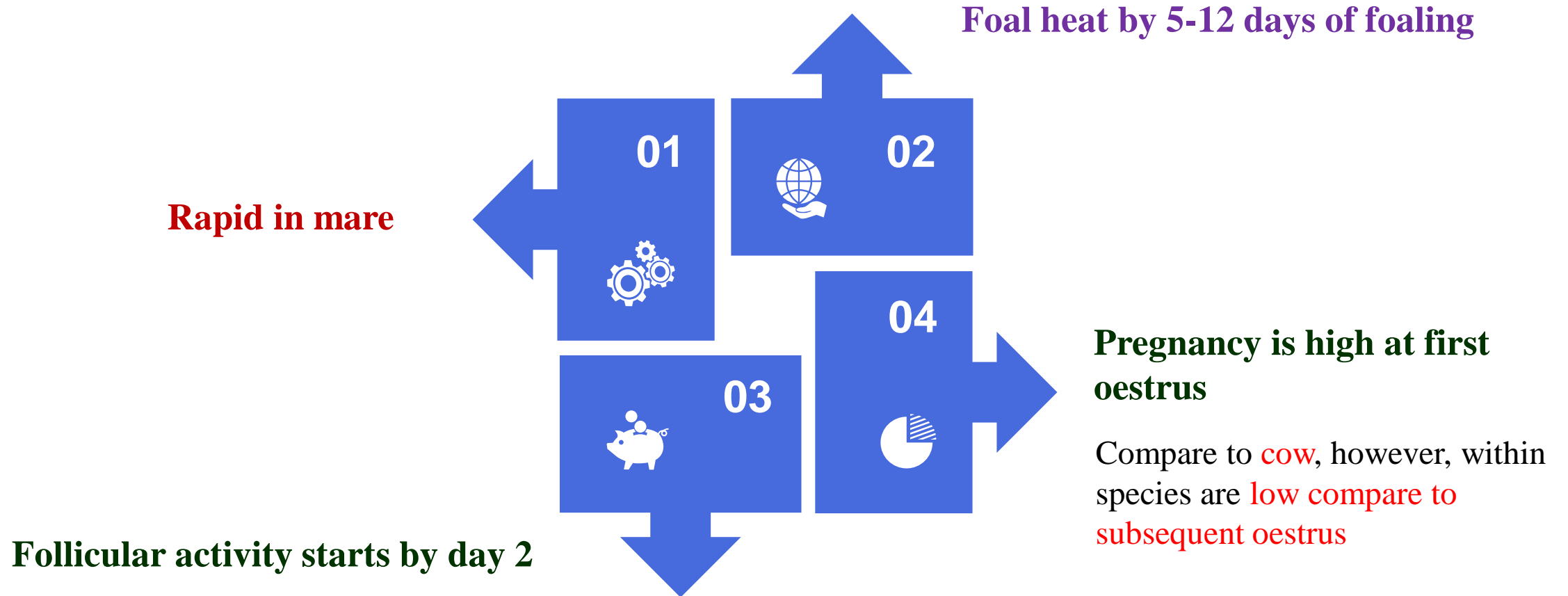
Endometrium is normal by day 14



Crypts disappears due to lysis and shrinkage of epithelial cells of endometrium

Elimination of bacterial contaminants disappears by the time of foal heat.

# Return to cyclic activity (ovarian rebound)



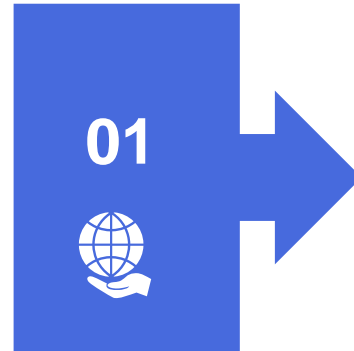


# Elimination of bacterial contaminants

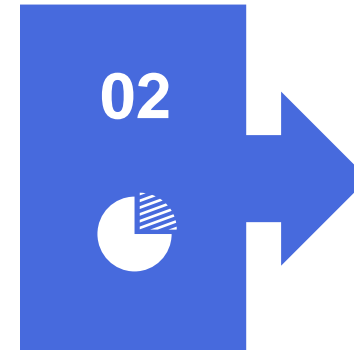
All postpartum uterus is contaminated with bacteria



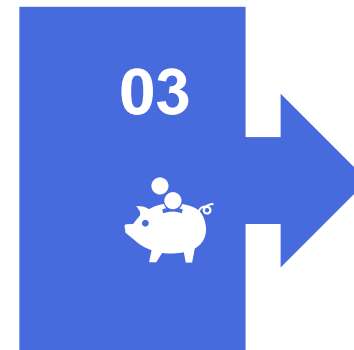
**Contaminants decreases with passage of time due to**



**Myometrial contraction**



**Restart of ovarian activity**



**Increased concentration of Estrogen**





# Factors affecting puerperum

**Uterine involution** : delayed involution affect puerperium. Involution is delayed by following

- 1 | Age**  
Rapid rate of involution in primipara.
- 2 | Season of the year**  
Rapid in spring than summer
- 3 | Climate**  
heat stress accelerate or inhibit involution
- 4 | Periparturient abnormalities**  
Dystocia, RFM, hypocalcemia, ketosis, twin calves , metritis delayed involution (by 10 or more days)
- 5 | Delayed ovarian activity**



# Puerperium in Mare

❖ Body and horns are palpable after 12 h of foaling

(in ponies, thoroughbred take longer time)

❖ Lochia is less in amount compare to cow

❖ Lochia ceases by 24 – 48 h postpartum

❖ In few cases, lochia may take 1 week

❖ Horns reaches pre gravid size by day 32

❖ Cervix remains slightly dilated and closes

after the first oestrus

❖ Puerperium is shorter compare to cow





# Puerperium in Ewes and Goats

## Involution

- ❖ Rapid shrinkage and contraction of uterus during day 3 – day 10.
- ❖ Involution is **complete by 20-25** days
- ❖ **Massive breakdown** of **collagen** contents of uterus is responsible for **decrease in size** of uterus





# Restoration of endometrium

- ❖ Carried out by degeneration, necrosis, sloughing and regeneration process.
- ❖ Degenerative changes starts in the caruncles 3 days before parturition
- ❖ Connective tissues at the base, adjacent walls & crypts of endometrium undergo degeneration
- ❖ Degeneration in the walls of arteries and vein reducing lumen diameter
- ❖ Degeneration follows **dehiscence of placenta** resulting in constriction of blood vessels.
- ❖ Necrosis of superficial layer
- ❖ After day 4, superficial layer undergo autolysis and liquification
- ❖ Lochial discharge dark reddish brown or black colouration



# Restoration of endometrium

- ❖ By day 16, **all superficial part of caruncle undergo necrosis**
- ❖ **Separation of brown necrotic plaque in the uterine lumen**
- ❖ **Appearance of clean, glistening surface of caruncle**
- ❖ **Regeneration completes with re-epithelialisation of caruncle (day 28)**
- ❖ Quantity of lochia voided is variable
- ❖ **Initial lochia : fetal fluid + blood + placental debris**
- ❖ **Subsequent lochia : plus liquified sloughed caruncle tissue**



# Return to cyclical activity

- Ovarian activity starts few days postpartum to 2 weeks postpartum
- LH pulse regain slowly, hence maturation and ovulation is affected
- In majority of the cases ,animal after parturition undergo period of anoestrus (non-breeding season)
- Ovarian rebound is normal when parturition occurs at the start of breeding season
- ✓ **Elimination of bacterial contaminants expelled within 2 weeks.**





# Return to cyclical activity

- ❖ Follicular activity occurs during suckling and follicle diameter of 6-7 mm may reach, however no ovulation happens but signs of estrus may present
- ❖ *After weaning, LH surge occurs within 7 days*
- ❖ Prolactin decline sharply after weaning
- ❖ FSH concentration rises 2-3 days after weaning
- ❖ Severe weight loss delays ovarian activity
- ❖ Season of the year delays ovarian activity





## **Involution**

- Rapid weight loss of uterus in first 5 days
- After day 6 , loss in weight is due to
  - 1. Reduction in myometrium cell numbers**
  - 2. Reduction in myometrium cell size**
  - 3. Reduction in amount of connective tissue**
- Decrease in thickness of endometrium &  
myometrium is complete by day 28





# Puerperium in sow

## Return of cyclic activity

- ❖ Suckling & weaning had profound influence on ovarian rebound puerperal changes in the genital tract
- ❖ No return to oestrus and ovulation until piglet is removed
- ❖ Split weaning (permanent removal of part of litter) allows early ovulation and oestrus
- ❖ Follicular activity occurs during suckling and follicle diameter of 6-7 mm may reach, however no ovulation happens but signs of estrus may present
- ❖ After weaning, LH surge occurs within 7 days





# Puerperium in sow - **Return of cyclic activity**

Transient LH rise at the time of weaning but no consistent change in pattern of release

Prolactin decline sharply after weaning

FSH concentration rise 2-3 days after weaning

Ovulation is suppressed in lactation or till weaning occurs

Severe weight loss delays ovarian activity

Season of the year delays ovarian activity



# Thanks!



Any questions?

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