INFERTILITY IN COWS - I
(CYSTIC OVARIAN DISEASE)

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- Fertility is one of the key determinants of the lifetime performance of a cow.
- One calf needs to be produced every year.
- Regular breeding depends on the normal function of the reproductive system.
- An absolute inability to reproduce – Sterility (rare)
- Reduced fertility – Subfertility (common)

Functional ovaries

Display estrus behaviour

Mate, conceive

Sustain the embryo through gestation

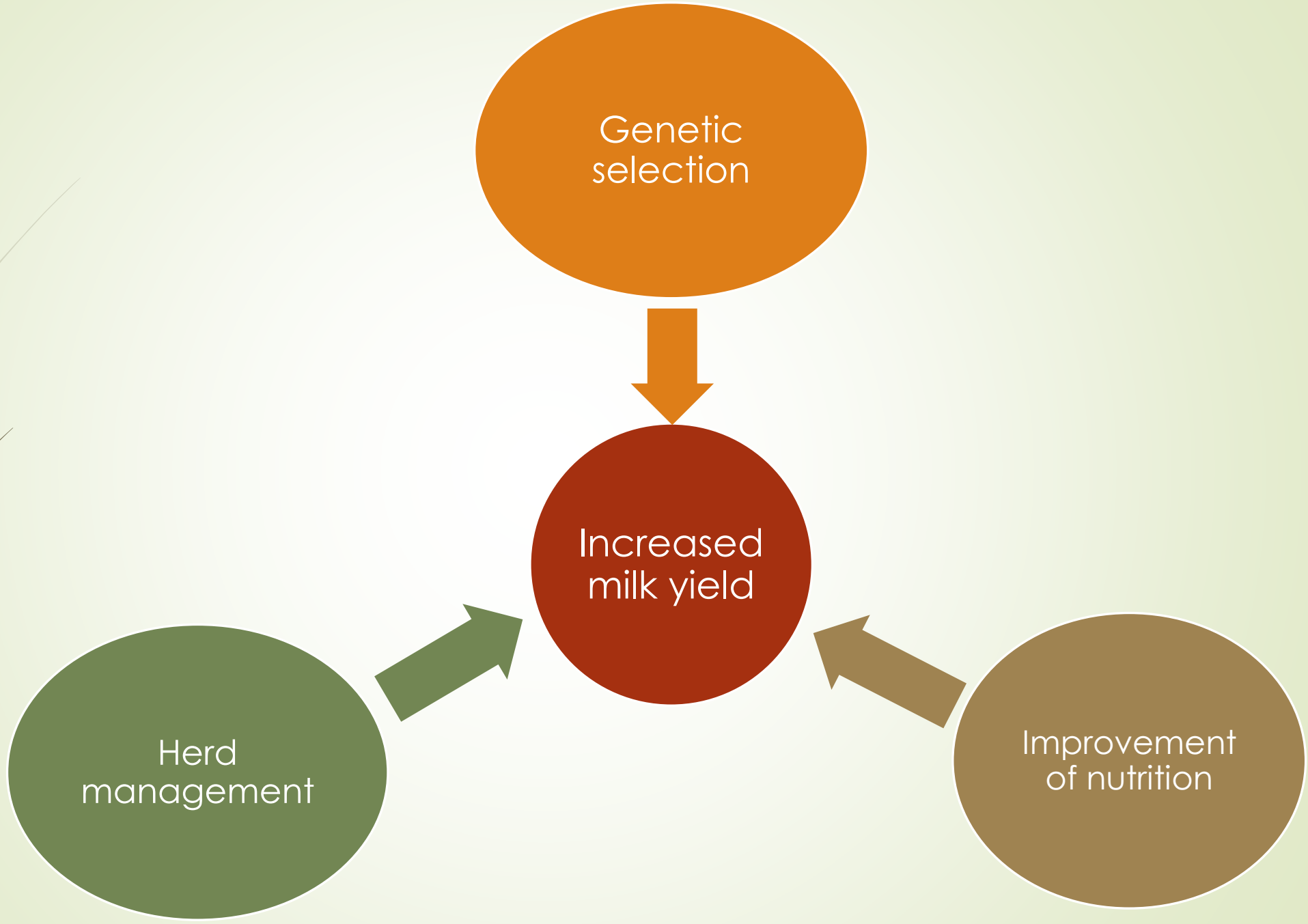
Calve

Resume estrus cycles

Restore uterine function after calving

Causes of infertility

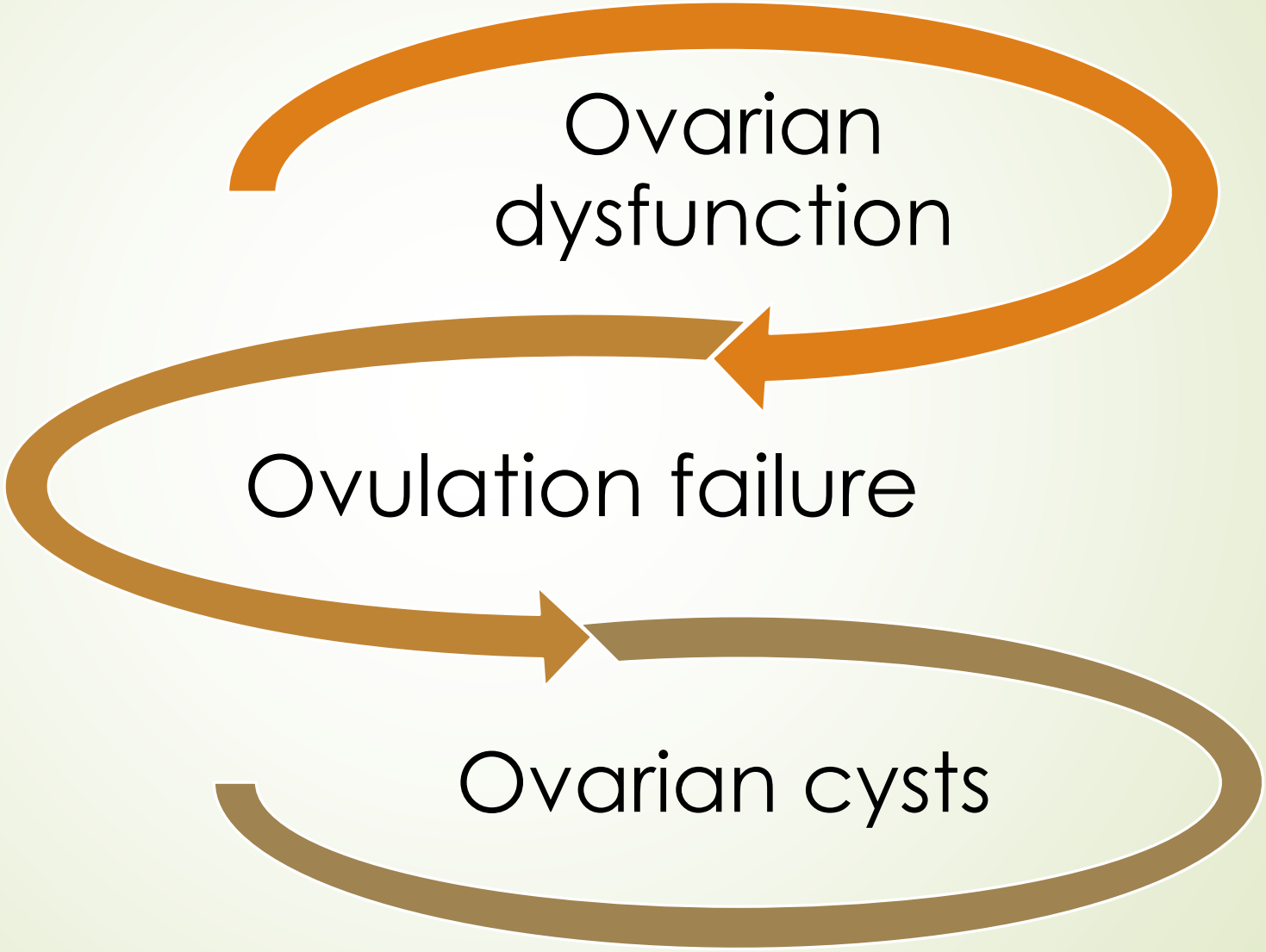
- **Congenital and acquired lesions of the genital tract** (structural causes)
- **Ovarian dysfunction**
  - anoestrus
  - expression of oestrus
  - follicular or luteal dysfunction
  - age- and breed-related effects
- **Stockmanship and management**
  - oestrus detection
  - nutritional management
- **Infections**
  - metritis complex/retained fetal membranes
  - venereal diseases (trichomonosis, campylobacteriosis, ureaplasmosis)


Genetic selection
Increased milk yield
Herd management
Improvement of nutrition

Dairy cow fertility

Selection for production characteristics

Most common during Postpartum period



Adverse effects can be:
Increased calving to first service interval,
Calving to conception interval, and
Inter-calving interval

McNutt (1927) – used the term "cystic" for referring persistent follicles >20mm in diameter.

Also called as
Adrenal virilism,
Nymphomania,
Cystic ovarian degeneration,
Cystic ovaries, and
Ovarian cysts

What is ovarian cyst?????

- **A mature follicle that fails to ovulate at the appointed time of ovulation during the estrous cycle (Peter, 2004).**

- **Normally, follicles typically ovulate at 13-17mm in diameter with a follicular turnover occurring at every 8.5 days.**

- **Fluid-filled structures with min. 17mm diameter (may be up to 25mm or more) that persists >10 days (up to 13 to 19 days) in absence of a corpus luteum can be called cyst.**

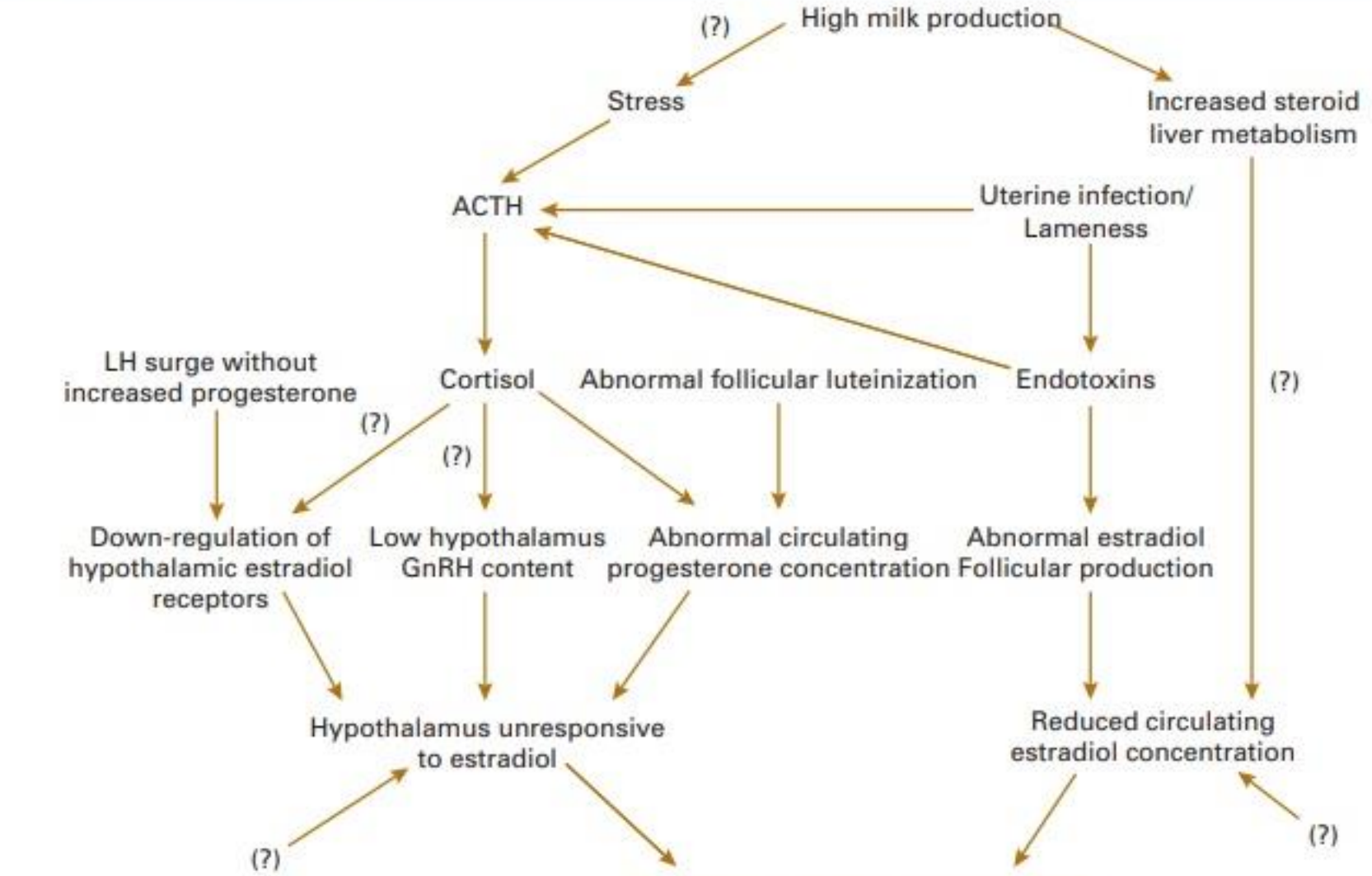
- **Anovulatory follicles (<2 cm) on one or both ovaries that fail to regress yet maintain growth and steroidogenesis and interfere with normal ovarian cyclicity (Vanholder et al., 2006) with absence of a corpus luteum as the essential criterion.**

* Non-steroidogenic cysts can occur together with a corpus luteum as they are hormonally inactive and do not influence estrous cycle.

Predisposing factors!!!!!!!!!!

- Genetic predisposition
- Breed : Holstein-Friesian
- Age : 4-6 years
- Cows with higher milk yield
- Retained placenta
- Metritis
- Ketosis
- Lameness
- Stress

The pathogenesis of cystic ovarian disease in cattle involves the absence of the preovulatory LH surge resulting from a disturbance in the positive feedback effect of estradiol on the hypothalamus. This disturbance is caused by hypothalamic unresponsiveness or by reduced circulating estradiol concentration.



Diagnosis??????

- History and clinical signs
- Transrectal palpation
- Ultrasonography
- Plasma or milk progesterone assay

History and Clinical signs

- Frequent, irregular, prolonged or continuous signs of estrus (nymphomania), but the majority are anestrus especially during the postpartum period .
- Relaxation of the pelvic ligaments, elevated tail-head, (sterility hump) and development of masculine characteristics may be observed in chronic cases.
- Prolonged persistence of follicular cysts, endometrial gland hypertrophy may lead to mucometra.

Sterility hump

- Seen occasionally in cows with chronic cystic ovarian disease. Elevation of the tailhead can occur as a result of chronic relaxation of the pelvic ligaments due to chronic exposure to elevated concentrations of oestrogen. These cows show frequent behavioral estrus. In the vernacular they are called buller cows. They can be of help in a heat detection program, however their behavior is not consistent. The elevated tailhead is sometimes referred to as the sterility hump.

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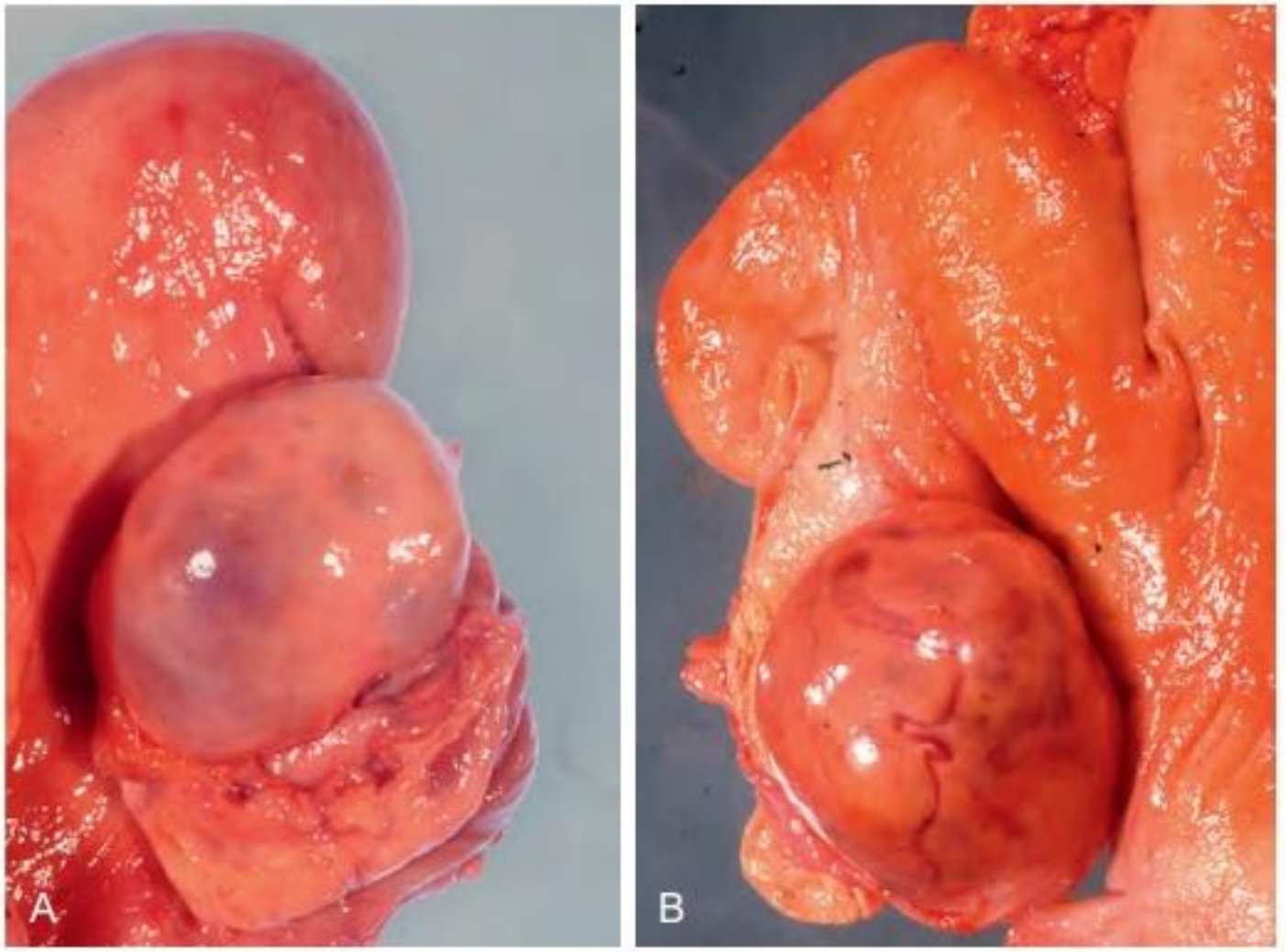
Transrectal palpation

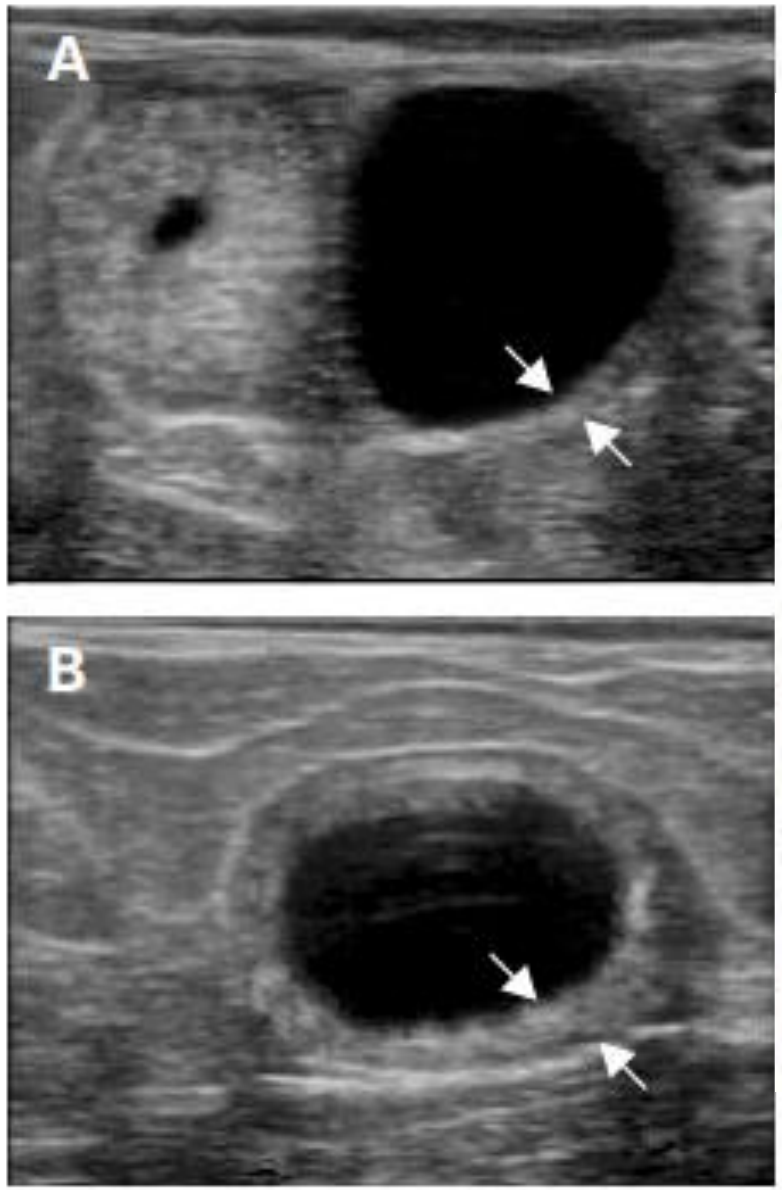
- Most common and effective method.
- Difficult to differentiate between follicular and luteal cyst solely by palpation.
- Ovarian cysts and normal follicles are differentiated based on number and size but mainly uterine tonicity.
- Palpation may be done at a gap of 10 days to determine whether ovulation has occurred followed by CL formation.



(A) Thin-walled follicular cyst and (B) thick-walled luteal cyst in cows' ovaries.

Ultrasonography

- Effective in detecting follicular and luteal cysts with high accuracy.
- CL with cavity is readily distinguished from a cyst, since the maximum CL cavity diameter is <20 mm.
- In follicular cysts, the wall is ≤3 mm thick, while in luteal cysts the wall is >3 mm thick.



Ultrasound images of the ovaries of a cow with chronic, multiple, cystic ovarian disease. In one ovary (A) a follicular cyst (fluid-filled structure on the right) was observed; cyst cavity was 30 mm in diameter and cyst wall (arrows) was 3 mm thick. In the same ovary a corpus luteum (CL) with a cavity was observed adjacent to the follicular cyst (echodense structure on the left); note that in the CL the luteal tissue layer is very thick and the cavity is < 20 mm. In the other ovary (B) a luteal cyst was observed; this cyst cavity was 24 mm in diameter and cyst wall (arrows) was 6 mm thick.

Progesterone assay

- Analysis of circulating progesterone concentrations.
- Follicular cyst - <1 ng/ml
- Luteal cyst - ≥1 ng/ml

Treatment options!!!!!!

- As soon as diagnosed.
- GnRH and its analogs
- $PGF_{2\alpha}$
- Combination of GnRH and $PGF_{2\alpha}$
- Progesterone and implants

Use of GnRH


GnRH Injection
Immediate LH increase and Leutinisation of cyst
Ovulation of present follicles
Progesterone level rises and cyst becomes responsive to $PGF_{2\alpha}$
responsiveness of the hypothalamus to the positive feedback effect of estradiol
Return to normal cyclic ovarian activity

Drugs, doses, routes, and protocols for COD treatment.

Drug	Dose	Route
Gonadorelin (GnRH)	100 µg	IM
hCG	10,000 IU	IM
Dinoprost ($PGF_{2\alpha}$)	25 mg	IM
Cloprostenol ($PGF_{2\alpha}$)	500 µg	IM
Progesterone	1.9 g	intravaginal implant

Treatment protocols

(1) GnRH (or hCG) + $PGF_{2\alpha}$ (day 0); $PGF_{2\alpha}$ (day 9 if no estrus).

(2) Ovsynch: GnRH (day 0); $PGF_{2\alpha}$ (day 7); GnRH (day 9); fixed-time AI, 16 h after last GnRH treatment.

(3) Progesterone implant for 12 days (not for dairy cows).

Take home message

- Strategies to reduce postpartum diseases and stress.
- The earlier the diagnosis is made, the better it is.
- Accurate diagnosis requires a combination of diagnostic approaches, USG is a promising approach.
- Important to treat earlier, so as to minimise the undue economic losses.
- Combination of PGF_{2a} and GnRH in various protocols has proven advantageous.