Ovarian cysts in the cow

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Definition
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Growth phase:
- Puberty, pregnancy, postpartum

Preovulatory phase:
- Post-partum
- Reproduction period
- Puberty

Reproduction periods and anovulation

Recruitment phase:
- Prepuberty, postpartum
Cyst = abnormal follicular growth

- Follicular reserve
- 1st group: recruited follicles
- 2nd group: selected follicles
- 3rd group: dominant follicle
- 4th group: preovulatory follicle

Three evolutions:
- Atresia
- Ovulation
- Cyst

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So, the cyst is an abnormal ovarian structure …

- In 30 to 40% of cases: cyst coexists with a CL
  1. Absence of corpus luteum
  2. Duration of dominance: 5 to 6 days
     2. More than 1 week
  3. In the cow, ovulation between 13 to 19 mm
     3. Diameter more than 20 to 24 mm
Frequency
Frequency of ovarian cysts amongst different studies (1974 to 1994)
Frequency of ovarian cysts

- Fourichon et al., 2000: meta-analysis (20,000 cows in 196 dairy herds): 12% (3 to 29%)
- Lubbers 1998 (Holland): 12,626 lactations during 10 years in 39 herds 7.2% (1.9 to 11.3% amongst herds)

More than 10%: herd problem
Evolution with time
4 dairy farms
Diagnosis

- Manual palpation
- Ultrasonography
- Hormones
- Ethology
Manual / US diagnosis

Follicular cyst

Cavity anechogenous
Diameter: 31 ± 4 mm to 33 ± 7 mm
(if > 24 mm: Hanzen and Bascon 2007)
Thin wall (< 3 mm)
Easily depressed

Luteinized cyst

Cavity less large (24 to 49 mm) and anechogenous
Diameter: 35 ± 7 mm to 39 ± 9 mm
(if > 24 mm: Hanzen and Bascon 2007)
Thick wall (3 to 9 mm)
Less easily depressed

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Caracteristics of cysts
Characteristics of cysts (ultrasonography)
Luteinized cyst an corpus luteum with cavity
Diagnosis (hormones)

Progestérone
- low: 0.13 et 2.1 ng/ml
- « high »: 1.08 et 10.4 ng/ml

Oestradiol
- low or high
- low

> 0.5 or 1 ng/ml

Anoestrus or nymphomania
Courtesy Prof Badinand ENV Lyon
Etio-pathogenesis
Risks factors of ovarian cysts and their interrelationships in the cow

Hypothalamo-hypophysis complex
- Low progesteronemia
  - Lack of tonic LH inhibition
  - Modification of β FB of oestradiol on cyclic LH

Follicular wall
- Abnormal production of proteins by cellular matrix
- Abnormal production of growth factors
- Modification of oestradiol receptors

Animal
- Number of lactation
- Milk production
- Stage of postpartum
- Puerperal diseases
- Genetic
- Negative energy balance
- Hypoinsulinemia
- Hypoglycemia
- Decrease of leptine
- IGF1 decrease
  - GnRH inhibition by neuropeptide Y
  - Increase of LH inhibition by alpha MSH and endorphines
  - Decrease of LH/FSH

Environment
- Season
- Stress
- Cortisol
- LH inhibition
- Nutrition
Hormonal pathogeny of ovarian cyst in the cow

1. Wave 1

2. Growth stimulation

3. Impaired ovulation

4. Oestradiol Inhibine

5. Progesterone (0.1 à 1 ng)

6. New wave

7. Cyst

8. Hormonal pathogeny of ovarian cyst in the cow

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Frequency (%) of cysts according to stage of postpartum (days)

Treatments

- To treat or not to treat?
- Preventive treatments
- Non hormonal curative treatments
- Hormonal curative treatments
  - individual approach
  - hormonal associations
To treat or not to treat : that’ the question

- Stage of the postpartum period
  - Length of the waiting period decided
  - Diagnosis during the reproduction period
- Spontaneous regression of cysts
  - 28 to 80 % before d60 of postpartum
- Accuracy level of the diagnosis : follicular vs luteinized
- Efficacy of the treatment : different parameters
  - Interval treatment-pregnancy
  - Fertility index after treatment
- Cost of the treatment
- Preventive or curative treatment
Preventive treatments

- Association of GnRH and PGF2a (10d apart) at d15 postcalving
- Decrease the frequency of placental retention, endometritis, lameness
- Regular control of the BCS to prevent a NEB
- Genetic selection?
Non hormonal curative treatments: manual rupture

Lopez-Gatius personal communication

Effect of manual rupture of a cyst on the oestrus return rate in the 14 days after treatment (388 dairy cows)
Non hormonal curative treatments: manual rupture
Lopez-Gatius personal communication

- Effect of manual rupture of a cyst on the pregnancy rate at first AI after treatment (10,634 lactations)
- Oestrus observed 6-8 days after treatment in 36% of cows
Hormonal curative treatments: general objective

To obtain as soon as possible a new follicular growth with expulsion of a mature oocyte
Hormonal curative treatments: three steps

1. To obtain a P4 phase
   - hCG
   - GnRH
   - PRID
   - CIDR

2. To stop the P4 phase and assume the final follicular growth
   - PGF2α
   - Remote of PRID
   - CIDR

3. To assume ovulation of the dominant follicle
   - hCG
   - GnRH
Hormonal treatment steps of a follicular cyst

Endogenous synthesis of P4

1. LH effect
   - hCG or GnRH

2. Luteinization if receptors
   - CL
   - PGF2α
   - 7 to 14 d

3. Increase of P4
   - 7 to 20 days
   - 70 to 90 % of cases

Ov

Oestrus

GnRH

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Hormonal treatment steps of a follicular cyst
Effect of an exogenous administration of P4

1. Progesterone treatment (7-12 days)
2. Increase of oestradiol and LH receptors
3. New wave and DF?
4. Oestrus (0 to 66 %)

Ovulation
Hormonal treatment steps of a luteinized cyst

- PGF2α
- GnRH
- Oestrus

2 to 5 d
Hormonal associations

Justifications:
- difficulty to make a differential diagnosis between cysts?
- decrease time between treatment and pregnancy?
Some hormonal associations

1. hCG or GnRH (d0) – PGF2a (d7 or d14)
2. GnRH and PGF2a (d0) – PGF2a (d14)
3. hCG (d0) – PGF2a (d7 to d12) – GnRH (d9 to d14)
4. hCG or GnRH(d0) – Progesterone (d7 to d14 or d16) – PGF2a (d14 or d16) – GnRH (d16 or d18)
5. Ovsynch : GnRH (d0) – PGF (d7) – GnRH (d9)
Hormonal association: Progesterone with OB

Douthwaite et Dobson Vet Rec. 2000, 147, 355

Progesterone treatment (12 d)

- LH
- Oestrus
- AI OD
- PR: 14 to 28%
- PR: 18 to 23%
- 2 to 5 d

OB
Hormonal association: GnRH-PGF-GnRH (Ovsynch)

0
GnRH

7
PGF2a

9
GnRH

16 – 24 h

AI
Bibliography : Ovsynch and treatment of ovarian cysts

5. Bartolome et al. Theriogenology, 2005, 63, 1643-1658
Ovsynch and treatment of ovarian cysts (8 studies and 792 cases of cysts between year 2000 and 2008)

% of pregnancy rate

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### Comparison of hormonal treatments of cysts (Hanzen et al. 2008)

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<th>PR (%)</th>
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<td>63</td>
<td>14 to 28</td>
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<td>GnRH (J0)-PGF (J14)</td>
<td>62</td>
<td>8 to 16</td>
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<tr>
<td>GnRH-PGF (J0)-PGF (J14)</td>
<td>65</td>
<td>22 to 36</td>
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<tr>
<td>OVSYNCH</td>
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<tr>
<td>GnRH(J0)-Ovsynch(J8)</td>
<td>89</td>
<td>30</td>
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## Comparison of hormonal treatments of cysts (Hanzen et al. 2008)

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<td>17</td>
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<tr>
<td>CIDR 7J-PGFJ7</td>
<td>82</td>
<td>23 (CR)</td>
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<tr>
<td>CIDR (J0-J7)-PGF (J7)-GnRH (J9)</td>
<td>11</td>
<td>27</td>
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Conclusions: to take home

1. Accuracy of ultrasonography diagnosis (> 24 mm) → Importance of correct diagnosis for quantification
2. Herd problem if > 10 % → Importance of HHM system
3. Impact of NEB in dairy cows and postpartum diseases → Importance of preventive approach
4. Poor results of hormonal therapy → Importance of quality and time of diagnosis