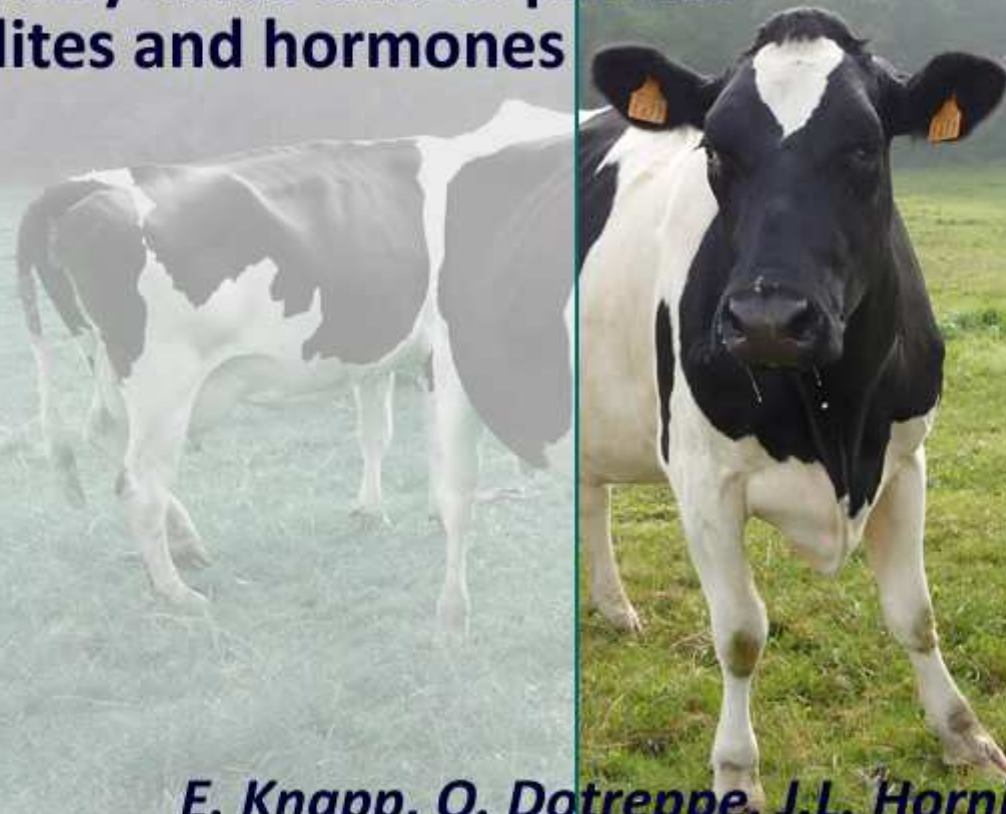


# Cysts and ovarian activity in Holstein dairy cows in early lactation related to milk and plasma fatty acids and to plasma metabolites and hormones



*E. Knapp, O. Dotreppe, J.L. Hornick, L. Istasse, I. Dufrasne  
Nutrition Unit, Veterinary Faculty, University of Liege, Belgium*

# Introduction

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- 1. During the early lactation there are large métabolic changes associated to NEB and fat mobilisation**
- 2. These changes are physiologicals but can cause disturbances :**
  - » Production
  - » Health
  - » Reproduction

Levels
- 3. Two majors reproduction problems observed in the field are :**
  - » Delayed resumption of cyclicity
  - » Ovarian cysts

# Introduction

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**4. The management of the waiting period and the early detection of ovarian problems are essential for good performances. It is a difficult task:**

- a. Number of environmental factors which influence performances (nutrition, genetic, sanitary...)
- b. Accuracy or constraints of the available tools (BCS, BHB, glucose, NEFA...)

**5. The goal of this study was :**

A field survey to assess the links between the metabolic changes in blood and milk during the lactation and the resumption of cyclicity or ovarian cysts.

# I. Materials and methods

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## 1. Characteristics of the farms :

- a. 32 cows from 5 private farms
- b. Good management with achievement of the goals by the farmers :
  - Production and milk quality:  $7727 \pm 1201.2$  kg milk,  $43.3 \pm 3.1$  g fat/l and  $34 \pm 1.0$  g proteins/l ,  $250.8 \pm 27$  mg urea/l ,  $271\ 150 \pm 89924$  cells/ml,
  - Reproduction : AFC  $26.8 \pm 1.8$  months, CI  $397 \pm 14.0$  days
  - Sanitary : prophylaxy and IBR status in order
  - Nutrition : mostly grass silage (60%), balanced to achieve production goals

## 2. Samples :

- a. Taken every month, from the first milk recording to the positive pregnancy test (3-5th milk recording)
- b. blood, milk and gynecologic examination (sonograph)

## II. Results

### 1. Ovarian activity : mesured by the presence or absence of a corpus luteum (+ progesterone).

a. In the blood

	Chol	TG	Glu	BHB	IGF1	NEFA	Fatty acids NEFA (%)			
							C16	C18:0	C18:1	C18:2
<b>No activity</b>	<b>4.8</b>	0.15	68.6	<b>0.91</b>	<b>38.6</b>	<b>0.23</b>	25	<b>36.5</b>	<b>32.9</b>	<b>5.6</b>
<b>Corpus luteum</b>	<b>5.5</b>	0.16	68	<b>0.54</b>	<b>62.7</b>	<b>0.12</b>	23.7	<b>39.7</b>	<b>28.3</b>	<b>8.3</b>
<i>SEM</i>	<i>0.12</i>	<i>0.01</i>	<i>1.03</i>	<i>0.05</i>	<i>3.13</i>	<i>0.02</i>	<i>0.32</i>	<i>0.69</i>	<i>0.71</i>	<i>0.51</i>
<i>P&lt;F</i>	*	<b>NS</b>	<b>NS</b>	**	***	**	+	*	**	*

- The markers of intense negative energy balance and fat mobilisation are higher when no activity was recorded :BHB, NEFA, C18:1 in NEFA
- On the other hand cholesterol, IGF1, C18:0 and C18:2 in NEFA were greater when a corpus luteum was observed

## II. Results

### b. In the milk

	Fatty acids profile in milk (%)						yield (kg/d)	Fat (g/kg)
	<b>C4-C14</b>	<b>C16</b>	<b>Odd + Br</b>	<b>C18:0</b>	<b>C18:1</b>	<b>Polyuns</b>		
<b>No activity</b>	<b>19.2</b>	35.4	<b>3.2</b>	<b>13.7</b>	25.9	2.4	35.6	4.4
<b>Corpus luteum</b>	<b>21.3</b>	35.9	<b>3.6</b>	<b>12.2</b>	24.4	2.5	36.1	4.3
<i>SEM</i>	<i>0.32</i>	<i>0.47</i>	<i>0.05</i>	<i>0.23</i>	<i>0.5</i>	<i>0.05</i>	<i>0.84</i>	<i>0.07</i>
<i>P&lt;F</i>	<b>**</b>	<b>NS</b>	<b>**</b>	<b>**</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>

- No differences between yield and fat in milk
- C4-C14, branched and odd fatty acids - from the rumen activity - were higher when activity was observed :
- C18 originating from the fat mobilisation was greater when no activity was recorded.

# II. Results

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## 2. Cysts

### a. Occurrence

- 41% of the cows developed at least one cyst during the study : 47.8% of the primiparous cows and 36% of the pluriparous cows.
- Cysts were observed on average at 67.8 days in lactation

### b. Consequences :

- Calving and first insémination interval: 71.2 d for normal cows and 80.2 d. for cystic cows
- Days open : 87.4 d for normal cows and 116.1 d for cystic cows.
- Fertility index : 1.8 for normal cows and 2.4 for cystic cows

# II Results

## c. Blood metabolites

	Chol	TG	Glu	BHB	IGF1	NEFA	Fatty acids NEFA (%)			
							C16	C18:0	C18:1	C18:2
<b>Cyst</b>	<b>4.5</b>	0.15	<b>73.1</b>	<b>0.83</b>	41.7	<b>0.21</b>	24.1	37.2	<b>33.1</b>	<b>4.9</b>
<b>No cyst</b>	<b>5.8</b>	0.16	<b>63.5</b>	<b>0.61</b>	<b>59.6</b>	0.14	24.7	<b>38.8</b>	<b>28.1</b>	<b>8.9</b>
<i>SEM</i>	<i>0.12</i>	<i>0.01</i>	<i>1.03</i>	<i>0.05</i>	<i>3.13</i>	<i>0.02</i>	<i>0.32</i>	<i>0.69</i>	<i>0.71</i>	<i>0.51</i>
<i>P&lt;F</i>	*	<b>NS</b>	*	<b>+</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>+</b>	*

- No clear relationship between presence of a cyst and blood metabolites except :
  - Higher glycemia and C18:1 in the NEFA fraction (rate of mobilisation)
  - Lower cholesterolemia and C18:2 in the NEFA fraction



## II. Results

### d. In the milk

	Fatty acids profile in milk (%)						yield (kg/d)	Fat (g/kg)
	<b>C4-C14</b>	<b>C16</b>	<b>Odd + B</b>	<b>C18:0</b>	<b>C18:1</b>	<b>Polyuns</b>		
<b>Cyst</b>	19.7	36.8	<b>3.2</b>	13.5	26.5	<b>2.2</b>	37.6	4.5
<b>No cyst</b>	20.9	34.5	<b>3.7</b>	12.6	23.8	<b>2.7</b>	34.1	4.2
<i>SEM</i>	<i>0.32</i>	<i>0.47</i>	<i>0.05</i>	<i>0.23</i>	<i>0.5</i>	<i>0.05</i>	<i>0.84</i>	<i>0.07</i>
<i>P&lt;F</i>	<b>NS</b>	<b>NS</b>	*	<b>NS</b>	<b>NS</b>	*	<b>NS</b>	<b>NS</b>

- Again, no clear relationship with fatty acids content in milk.
- Higher branched + odd and polyunsaturated fatty acids in normal cows.

# III. Discussion and conclusion

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## 1. Ovarian activity : blood and milk results showed that :

- a. Less negative energy balance is favorable for ovarian activity
- b. A normal liver activity (more cholesterol, IGF1..) is also beneficial for a good ovarian activity.

## 2. Presence or no of cyst :

- a. Less clear link with the metabolism in the blood or in the milk but :
  - Cholesterol (progesterone synthesis) seemed to have a role in the ovulatory process and the development of cysts
  - High glycemia (cows with insuline resistance ?) is favorable for the formation of cysts

## III. Discussion and conclusion

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- b. Formation of cysts can be linked to other parameters than nutrition like genetic, seasonal variation, parity, uterine infection...
- c. Cysts before 50 days of lactation have generally no impact on reproduction and can be physiological (29% in our study).

**3. According to these preliminary results blood and milk fatty acids could provide informations of interest for reproduction management.**