

## **DYNAMIC OF SEXUAL HORMONS IN COWS, ANTE AND POST PARTUM**

## **DINAMICA HORMONILOR SEXUALI LA VACĂ, ANTE ȘI POSTPARTUM**

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*The purpose of this paper was to study the hormones, estrogens (estradiol - E) and progesterone (P) levels modification during gestation and puerperal period, in Romanian Black and White dairy cows, with normal gestations and parturitions and to determine the postpartum start of cyclic ovarian activity and heat manifestation. The hormonal profile, dosing the estrogens and progesterone from sanguine serum was determined using the Estrogen and Progesterone Test Kit. The analyses were done weekly, in the last 2 month of gestation and 1 month after parturition.*

**Key words:** cows, estrogens, progesterone, gestation, puerperal period

### **Introduction**

Knowing the aspects about normal and pathologic evolution of reproductive activity in cows it can solve problems as: increasing the animal number, improving the breeds' structures, increasing the animal productions.

Important and critical periods in a female reproductive life are gestation and puerperal periods, when the animal is under special hormonal influences. These influences have a role in maintaining and normal evolution of gestation and assuring growth and development of conception product and to determine a normal parturition and puerperal period.

### **Materials and Methods**

The biologic material was represented by 80 cows, with an average of 6129 liters/lactation, bred in a commercial farm. The heat detection was done using observation of cows' behavior and pedometers. Blood was harvested in test tubes without anticoagulant, during the last 2 month of gestation and 1 month after parturition (1 harvest/week). The analyses were done using Hormones Test Kits (Estradiol Enzymatic Imuno-Analysis Kit – E2 IAE and Progesterone Enzymatic Imuno-Analysis Kit – P IAE).

## Results and Discussions

The average levels of estrogens and progesterone in sanguine serum in cows, for the last 2 month of gestation, for each week before parturition was calculated.

Table 1

Estrogens and progesterone average levels in cow, during the last 2 month of gestation

Weeks before parturition	ESTROGENS (pg/ml)	PROGESTERONE (ng/ml)
	$\bar{x} \pm s_x$	$\bar{x} \pm s_x$
<b>8</b>	2.83 ± 0.30	29.16 ± 0.17
<b>7</b>	3.33 ± 0.19	25.88 ± 0.17
<b>6</b>	4.99 ± 0.29	26.65 ± 0.18
<b>5</b>	2.96 ± 0.23	22.68 ± 0.18
<b>4</b>	2.23 ± 0.19	19.42 ± 0.19
<b>3</b>	3.20 ± 0.18	18.43 ± 0.21
<b>2</b>	4.90 ± 0.17	15.12 ± 0.22
<b>1</b>	47.72 ± 0.20	11.72 ± 0.21

The average value for E level is constant during the last 2 month of gestation. For P is the same, with a slowly decreasing trend. In the last week of gestation the average value of E level increased rapidly, suddenly and heavily and the average value of P level keeps on to decrease, leading to a change of E/P rapport, in favor of E (1:4.07). The differences between levels of ante partum estrogens and progesterone were calculated. There were significant differences ( $P < 0.001$ ) between E values at 8 and 1 week before parturition. Same result was obtained for P values.

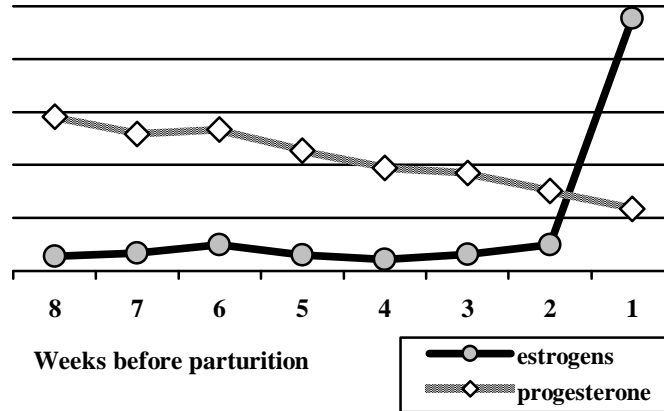


Figure 1. Evolution of estrogens and progesterone average levels during the last 2 month of gestation

Table 2

Significant differences test between antepartum estrogens and progesterone levels

<b>ESTROGENS</b>				
Ante partum compared weeks	Calculated Student t test	Table Student t test		
		<b>t<sub>0,05</sub></b>	<b>t<sub>0,01</sub></b>	<b>t<sub>0,001</sub></b>
8-7	0.598 <sup>NS</sup>	2.23	<b>3.17</b>	4.59
8-6	0.267 <sup>NS</sup>			
8-5	0.238 <sup>NS</sup>			
8-4	0.134 <sup>NS</sup>			
8-3	0.776 <sup>NS</sup>			
8-2	1.363 <sup>NS</sup>			
8-1	<b>3.829<sup>**</sup></b>			
<b>PROGESTERONE</b>				
Ante partum compared weeks	Calculated Student t test	Table Student t test		
		<b>t<sub>0,05</sub></b>	<b>t<sub>0,01</sub></b>	<b>t<sub>0,001</sub></b>
8-7	0.358 <sup>NS</sup>	2.23	<b>3.17</b>	4.59
8-6	0.352 <sup>NS</sup>			
8-5	0.337 <sup>NS</sup>			
8-4	0.678 <sup>NS</sup>			
8-3	1.143 <sup>NS</sup>			
8-2	1.602 <sup>NS</sup>			
8-1	<b>3.498<sup>**</sup></b>			

Table 3

Estrogens and progesterone ratio in the last 2 month of gestation

Weeks before parturition	ANTEPARTUM		Antepartum estrogens/progesterone ratio
	Estrogens	Progesterone	
<b>8</b>	2.83	29.16	1:10.30
<b>7</b>	3.33	25.88	1:7.77
<b>6</b>	4.99	26.65	1:5.34
<b>5</b>	2.96	22.68	1:7.66
<b>4</b>	2.23	19.42	1:8.71
<b>3</b>	3.2	18.43	1:5.76
<b>2</b>	4.9	15.12	1:3.09
<b>1</b>	47.72	11.72	1:0.25

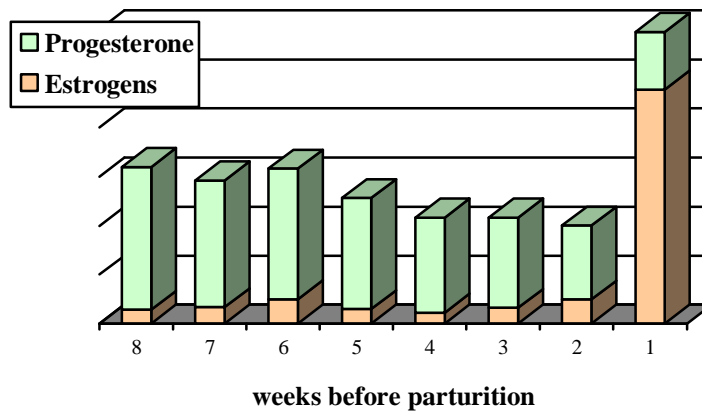


Figure 2 Estrogens and progesterone ratio in the last 2 month of gestation

The average levels of estrogens and progesterone in sanguine serum in cows, in the first postpartum month, for each week was calculated.

Table 4

Estrogens average levels in first month after parturition

Postpartum weeks	ESTROGENS (pg/ml)	PROGESTERONE (ng/ml)
	$\bar{x} \pm s_{\bar{x}}$	$\bar{x} \pm s_{\bar{x}}$
1	$1.33 \pm 0.69$	$2.95 \pm 1.14$
2	$1.23 \pm 0.44$	$4.35 \pm 2.58$
3	$2.03 \pm 1.08$	$4.25 \pm 1.30$
4	$2.54 \pm 1.64$	$8.70 \pm 4.43$

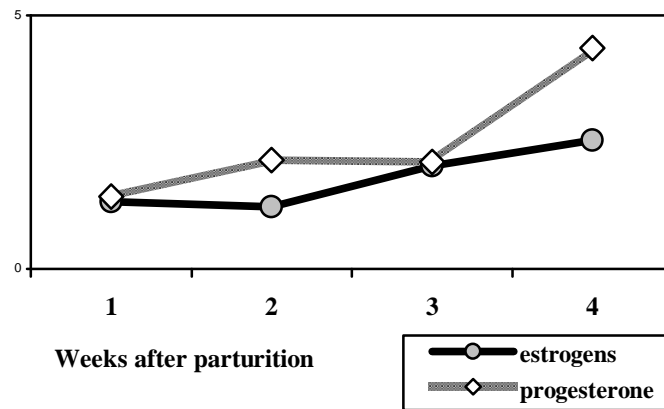


Figure 3. Estrogens and progesterone average levels in first month after parturition

It can be observed increasing and decreasing levels of postpartum estrogens and progesterone, which indicate start of cyclic ovarian activity in characteristically waves, each wave producing a dominant follicle, capable of ovulation.

The increasing estrogens waves appeared at minimum 14 days after parturition and at maximum 28 days after parturition, but the cows did not manifested heats. Cows which presented estrogens increased level at 14 days after parturition had a second wave of estrogens increased level after another 14 days (at 28 days after parturition). At this moment they manifested calm and quiet heats, due to the high milk production and lack of movement.

The waves of estrogens and progesterone values can be observed calculating the estrogens/progesterone ratio during the first 4 weeks postpartum.

Table 5  
Estrogens/progesterone ratio during first month after parturition

Postpartum weeks	Estrogens	Progesterone	Postpartum estrogens/progesterone ratio
1	1.33	2.95	1:2.22
2	1.23	4.35	1:3.54
3	2.03	4.25	1:2.09
4	2.54	8.7	1:3.43

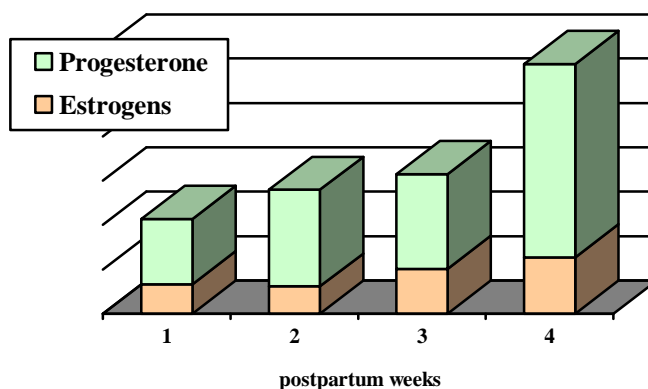


Figure 4. Estrogens/progesterone ratio, during first month after parturition

## Postpartum heat manifestation

Postpartum days	Cows	
	No.	%
0-30 days	3	8.33
31-60 days	21	58.33
61-90 days	11	30.56
Over 90 days	1	2.78

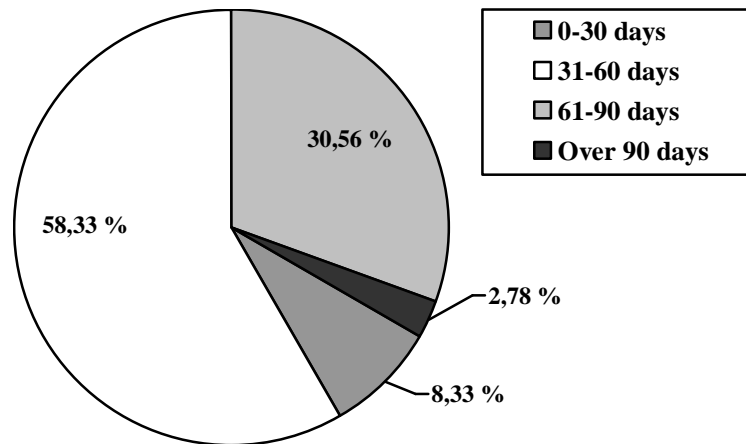


Figure 5. Postpartum heat manifestation

### Conclusions

1. The average value for E level is constant during the last 2 month of gestation. For P is the same, with a slowly decreasing trend. In the last week of gestation the average value of E level increased rapidly, suddenly and heavily and the average value of P level keeps on to decrease, leading to a change of E/P rapport, in favor of E (1:4.07). Differences between levels of ante partum estrogens and progesterone were calculated. There were significant differences ( $P < 0.001$ ) between E values at 8 and 1 week before parturition. Same result there was obtained for P values.
2. Increasing and decreasing levels of postpartum estrogens and progesterone can be observed, which indicate start of cyclic ovarian activity in characteristically waves, each wave producing a dominant follicle, capable of ovulation.
3. The increasing estrogens waves appeared at minimum 14 days after parturition and at maximum 28 days after parturition, but the cows did not manifested heats. Cows which presented estrogens increased level at 14 days after parturition had a second wave of estrogens increased level after

another 14 days (at 28 days after parturition). At this moment they manifested calm and quiet heats, due to the high milk production and lack of movement.

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