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BLOOD BIOCHEMICAL PROFILE OF HEALTY COWS AND THOSE WITH OBSTETRIC PATHOLOGY

Вміст загального білка та загальних імуноглобулінів у сироватці крові корів є важливим показником клінічного стану та резистентності організму. Визначення цих показників має велике діагностичне і прогностичне значення під час дослідження тварин. Встановлено, що на час родів у корів із затриманням посліду були вірогідно зниженими показники неспецифічного захисту (загальний білок, загальні імуноглобуліни) та А-вітамінного забезпечення, а в післяродовому періоді у хворих тварин вірогідно зменшувались показники загальних імуноглобулінів ($p < 0,01$) і каротину ($p < 0,05$).

Ключові слова: затримання посліду, білок, імуноглобуліни, каротин.

Statement of the problems. Cows with metabolic disorders characterized by calcium, phosphorus, carbohydrates, proteins, vitamins, erythro- and leucopoiesis and endocrine malfunctions have a high possibility of placenta formation, placental function and fetal organogenesis slowdown [1–3].

Analysis of recent research and publications. The delay of placental development leads to disruption of the nutrients' transport in the mother-placenta-fetus system, the development of acidosis and impaired synthesis and metabolism of hormones. Microcirculatory disorders in fetus and maternal parts of the placenta induce ischemia and swelling of the chorionic villi and promote their splicing [4, 5]. According to some researchers [6–8] biochemical blood parameters allow to estimate the functional activity of placenta, to predict the risk of labor violation, birth and postnatal complications and infertility in cows.

The purpose of research. It is believed that the concentration and the ratio of biochemical indicators during the pregnancy may characterize its flow, affects

the course of parturition and the postpartum period. Given the above, our main goal of our research was to establish hematological profile of healthy cows and those with obstetric pathology and to use the data for predicting the occurrence of partum and postpartum pathology.

Materials and methods of research. The development of pregnancy, calving and the postnatal pathologies was studied by the analysis of biochemical parameters of the blood of 50 cows that was taken 60–45 days before the expected calving, during calving and at 18–22 days after the calving. Of the 50 animals included in the test physiological course of pregnancy, calving and the postpartum period was registered in 30 cows. Obstetric disorders were recorded in 20 (40%) animals.

There were determined biochemical analyzes of blood serum: total protein content – Refractometrically by Reis, the total amount of immunoglobulins – photoelectrocolorimetrically with 18 % sodium sulfate by M.A. Kostin, total calcium – trilonometric method with murexide, inorganic phosphorus – by Doucet, carotene and vitamin A – spectrophotometric method by Besseya, modified by A.A. Anise.

Determination of biochemical blood components was performed in a interdepartmental research laboratory and the scientific laboratory of the Department of obstetrics and artificial insemination of agricultural animals of Bila Tserkva NAU.

Results and discussion. The obtained data are shown in table 1.

The data in table 1 show that the average total protein content indicators, immunoglobulins, total calcium, inorganic phosphorus, carotene and hemoglobin in the blood of dry cows in both groups were not significantly different. At the time of delivery in cows with retention of the placenta there were significantly reduced the indexes of non-specific defense (total protein, total immunoglobulins) and A-vitamin support. A similar trend was observed in animals with subinvolution and metritis.

Table 1 – Kinetics of biochemical indexes of blood of cows (healthy and with obstetric pathology)

| Indicators | The content of the blood, M ± m | | | | | |
|---------------------------------------|---------------------------------|--------------------------------|----|-------------------|----|------------------------------|
| | n | for 60–45 days for delivery | n | during calving | N | at 18–22 days after birth |
| Total protein, g/l | 30 | 81,2±1,0 | 25 | 82,3±1,1 | 25 | 79,1±1,3 |
| | 20 | 79,7±1,3 | 19 | 75,6±2,1** | 19 | 76,0±2,0 |
| General immunoglobulins, mg/100 ml | 30 | 2430±90 | 30 | 2440±104 | 25 | 2778±103 |
| | 20 | 2584±107 | 20 | 1776±154** | 19 | 2147±100** |
| Total calcium, mg/100 ml | 30 | 9,3±0,3 | 30 | 10,1±0,2 | 25 | 11,6±0,3 |
| | 20 | 9,8±0,3 | 20 | 10,5±0,5 | 19 | 11,2±0,5 |
| Inorganic phosphorus, mg/100 ml | 30 | 4,5±0,2 | 30 | 4,4±0,2 | 25 | 4,3±0,2 |
| | 20 | 4,2±0,1 | 20 | 4,2±0,2 | 19 | 4,2±0,2 |
| Ca:P correlation | 30 | 2,1:1 | 30 | 2,3:1 | 25 | 2,7:1 |
| | 20 | 2,3:1 | 20 | 2,5:1 | 19 | 2,7:1 |
| Hemoglobin, g/l | 30 | 108±4,0 | 30 | 115±2,0 | 25 | 105±1,7 |
| | 20 | 107±2,9 | 20 | 111±3,7 | 19 | 99±2,0 |
| Carotene, mkg/100 ml | 30 | 452±40 | 30 | 417±40 | 25 | 559±26 |
| | 20 | 424±25 | 20 | 320±27* | 19 | 325±19*** |

Note: the numerator – blood parameters of cows with physiological calving and the postpartum period, the denominator – the blood parameters of cows with the detention of the placenta and metritis subinvolution * – $p < 0,05$; ** – $p < 0,01$; *** – $p < 0,001$.

The curve of the dynamics of the total protein content in the blood of experimental cows during the peripartum period is shown on fig. 1.

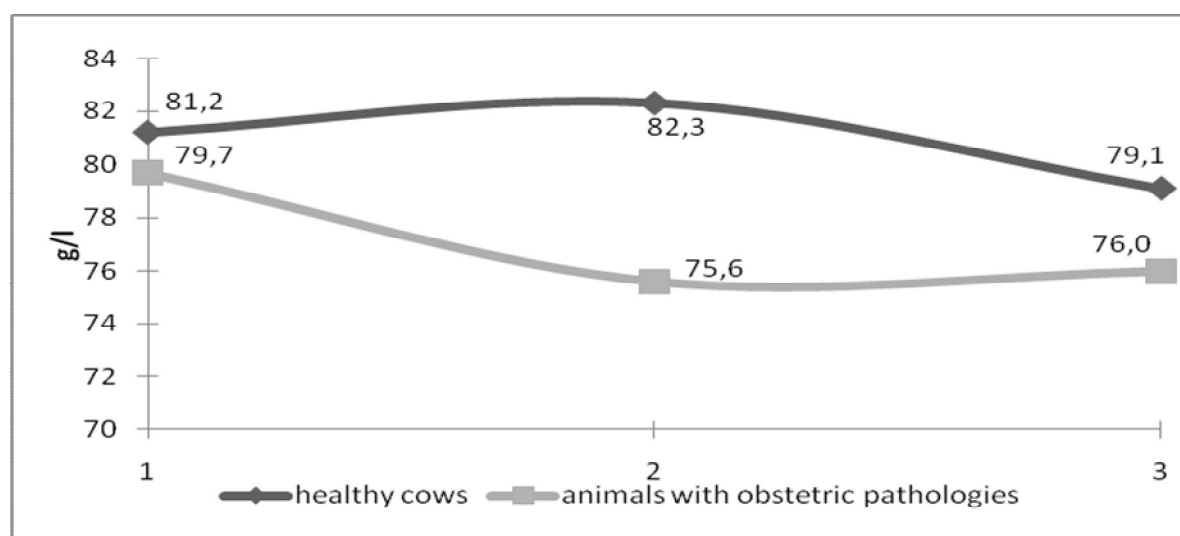


Figure 1 – The kinetics of total protein parameters in the blood of cows:

1 – 6–45 days before delivery; 2 – at the time of delivery; 3 – 18–22 days after calving.

From the data on the figure 1 it is evident that the content of total protein in healthy cows increases during calving. During the postpartum period it decreases that is probably connected with ongoing lactation. The particularities of the dynamics of the total protein content in cows with obstetric pathologies is that at the time of delivery it was significantly ($p < 0,01$) reduced and remained on the same level up to 18–22 days of post-partum period.

A similar pattern was observed in the overall dynamics of immunoglobulins (fig. 2).

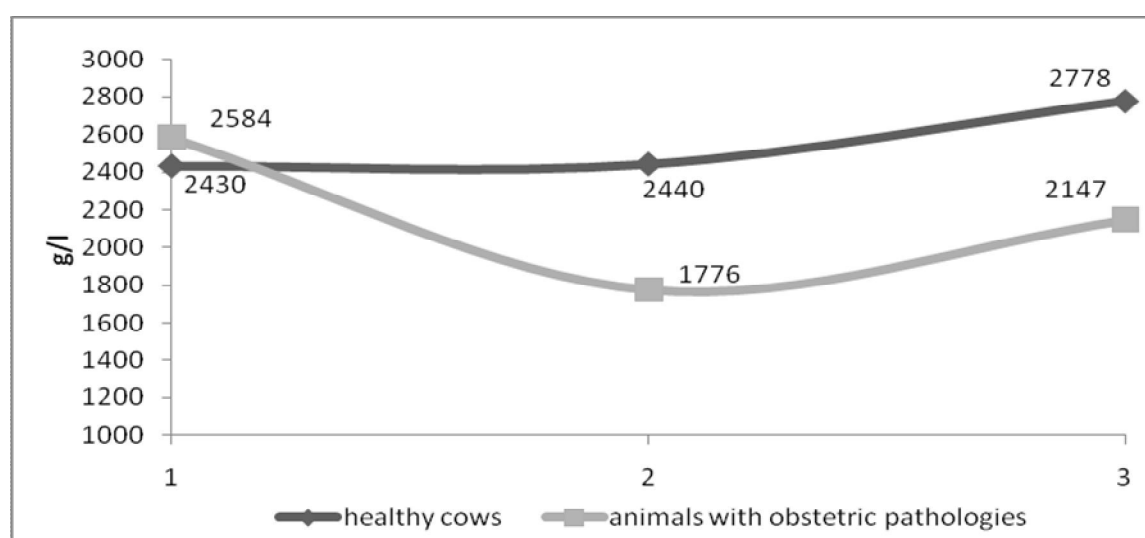


Figure 2 – **Kinetics of common immunoglobulins indexes in the blood of cows:**

1 – 60–45 days before delivery; 2 – at the time of delivery; 3 – 18–22 days after calving.

It can be seen that the content of immunoglobulins in cows with physiological course of calving and the postpartum period increases slightly at birth and more significantly (14 %) in the postpartum period. Whereas in cows with obstetric pathologies common immunoglobulins content was reduced by 27 % ($p < 0,01$) at calving and 23% ($p < 0,01$) in the postpartum period (18–22 days).

Reduction of total immunoglobulins in the serum of cows with retention of the placenta, endometritis and uterine subinvolution we explain by the emergence of immune deficiency, which was caused by an unbalanced feeding, poor keeping conditions, lack of sun exposure and physical exercise during housing of animals on the farm. These factors suppress the immune system or inhibit the synthesis of

immunoglobulins due to the formation of T-lymphocyte clones with a suppressive action.

The curve of the dynamics of the content of carotene in the blood serum of cows during dry, calving and the postpartum periods is shown in fig. 3.

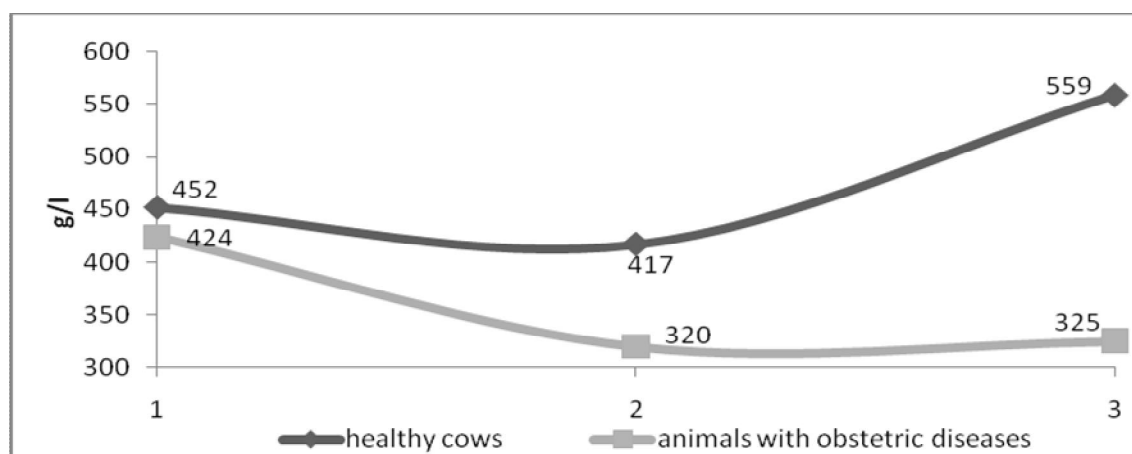


Figure 3 – **The kinetics parameters of carotene in the blood of cows:**

1 – 60–45 days before delivery; 2 – at the time of delivery; 3 – 18–22 days after calving.

From the above data it can be seen that the carotene content, as it was with the total immunoglobulins in the former case, ultimately increases in the blood serum of healthy cows and vice versa, carotene content in diseased animals was significantly reduced during delivery – by 25 % ($p < 0,05$) and in postpartum period – by 42 % ($p < 0,001$).

Reduced concentration of carotene in the blood of sick cows, in our opinion, was due to lack of its absorption from the intestine in cows with metabolic disorders, as well as the lack of its content in the feed ration and its destruction by antivitamins in the rumen and intestines.

Having studied the kinetics of hemoglobin in the blood of healthy and diseased cows (fig. 4) we found that during the dry period and delivery there were no significant changes in its concentration in the first and in the second group. The level of hemoglobin increased in both of them. Only on 18–22 day after parturition hemoglobin content was 6 % ($p < 0,05$) lower in animals with metritis and uterine subinvolution than in healthy cows. We assume that it was attributed to the

suppression of bone marrow function by various toxins that are absorbed into the blood out of the affected uterus.

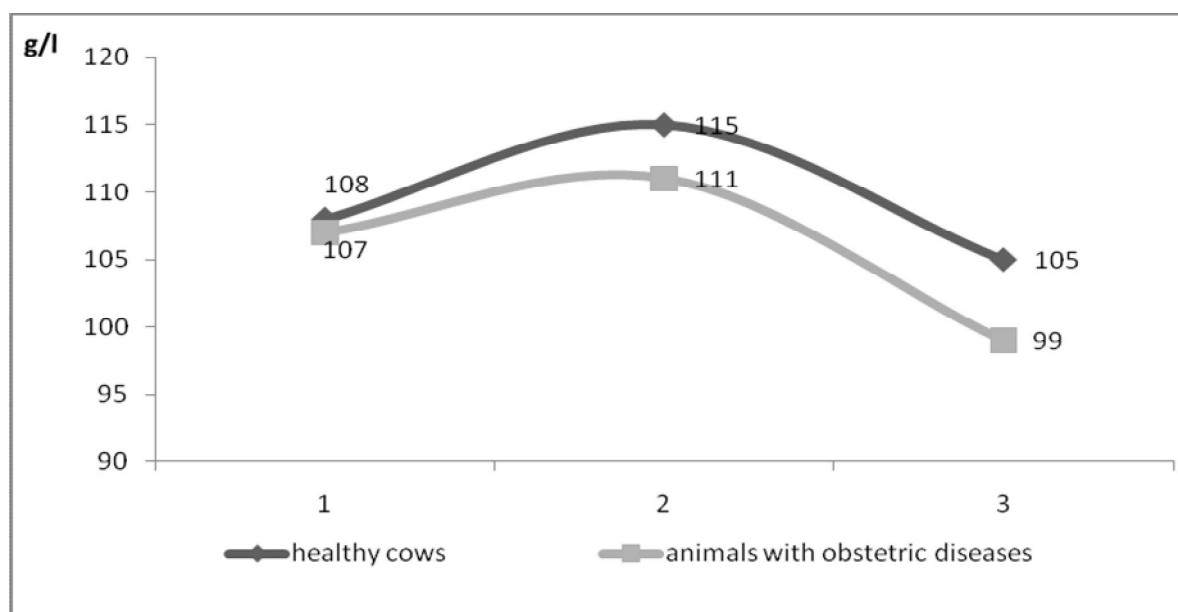


Figure 4 – **Kinetics of hemoglobin in the blood of cows:**

1 – during the dry period; 2 – calving; 3 – in the postpartum period.

Thus, adverse environmental factors caused by tethered keeping system and inadequate feeding induce metabolic disorders, especially among "at risk" group of cows. Therefore the determination the levels of some biochemical blood serum indexes in cows may be used to early diagnose and timely prevent the manifestation of obstetric diseases.

Conclusions and prospect of further research. 1. No significant differences in the content of the biochemical components in the blood of dry cows with healthy and unhealthy calving and postpartum period there were established.

2. At the time of delivery, in cows with placenta retention there was significantly reduced the indexes of non-specific defense (total protein, total immunoglobulins) and A-vitamin support.

3. In the postpartum period in affected animals there were significantly decreased the indexes of immunoglobulins ($p < 0,01$) and carotene ($p < 0,05$).

The prospect of further research should encompass the development of medical veterinary methods for correcting the course of labor and the postpartum period in productive cows.

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Биохимический профиль крови коров в норме и акушерской патологии

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Содержание общего белка и общих иммуноглобулинов в сыворотке крови коров является важным показателем клинического состояния и резистентности организма. Определение этих показателей имеет большое диагностическое и прогностическое значение при исследовании животных. Установлено, что на время родов у коров с задержанием последа были достоверно снижены показатели неспецифической защиты (общий белок, общие иммуноглобулины) и А-витаминного обеспечения, а в послеродовом периоде у больных животных достоверно уменьшались показатели общих иммуноглобулинов ($p < 0,01$) и каротина ($p < 0,05$).

Ключевые слова: задержание последа, белок, иммуноглобулины, каротин