Physiological characteristics of piglets during the milk feeding phase

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Abstract. The condition of all types of metabolism of piglets of milk power significantly determines the intensity of their growth at this age. At the same time, many of their regulatory parameters in piglets of milk nutrition in the conditions of Central Russia are still not estimated finally. The piglets contained in the farms of Central Russia, during the milk nutrition, the level of general protein is growing at the same time as the level of albumin levels. At the same time, the amount of urea increases in the blood, additionally indicating activation to them as protein metabolism grows. In the piglets for the phase of milk nutrition in the blood, the increase in glucose concentrations, triglycerides and cholesterol quantities were found. The phase of milk nutrition for the surveyed piglets was characterized by an increase in the activity of alkaline phosphatase and gamma glutamiltransferase. Under these conditions, there was an increase in the blood of the biological possibilities of transaminases in the stability of lactate dehydrogenase activity and creatine-cycinase. The number of registered metabolites and the identified activity of certain enzymes can be considered as normal for the piglets of the milk food contained in pigsties in the territory of Central Russia.

1. Introduction
Maintaining an acceptable physiological status of young pigs - a biologically extremely significant aspect of their viability, meaningful to pig breeding. Important in the process of implementing their ontogenesis has a milk power phase [1,2]. Researchers consider this period a serious stage of early ontogenesis of pigs. This opinion is supported by information that during this stage of individual development is intensified by many adaptation mechanisms in the body associated with the termination of the consumption of colosure and preparation for eating plant feeds [3,4].

In young young pigs, all types of metabolism are very actively implemented [5]. This creates conditions for high growth rates, exceeding growth activity in many other productive animals [6]. Hasive importance for this in piglets has a large number of in their blood of a number of biologically significant substances that perform functions of metabolites and biostimulants of vital processes in all internal organs [7, 8]. In this regard, the blood of the piglets of milk nutrition is considered to be a particularly important environment of the body, the composition of which allows for monitoring the state of animals by determining the levels of substances present in it, it is possible to unmistakably determine the biological status of the animal and make a forecast in its further change.
Monitoring the influence of negative external influences on the body of economic useful animals and especially young pigs is one of the fundamental moments studied by modern physiology [9]. In this regard, it is considered to be very important to continue collecting information about physiological and biochemical indicators of piglets throughout the milk nutrition phase. The definition of these features should help continue to specify the most optimal conditions for the content of these animals, contributing to their most successful growth and development when minimizing costs until they achieve the implementation parameters.

The goal of the work is to find out the physiological characteristics of the blood of piglets throughout the milk phase in the optimal conditions of detention in the pigsty located in Central Russia.

2. Materials and methods
The study was conducted strictly in accordance with all the ethical standards for the treatment of spinal animals during any scientific research. To perform this observation, a group was collected from the fully healthy piglets of the milk nutrition of a large white breed in the amount of 36 heads. The implementation of feeding and content of observed piglets was carried out standard in the framework of public technologies.

In animals, the physiological and biochemical characteristics were estimated four times during the milk phase: from the sixth day of life to the twentieth days of life (for 6 days, 10 days, for 15 days and 20 days). Blood for research in animals was taken from the tail vein in the morning. In their blood, the level of series of substances was recorded: general protein, albumin, urea, triglycerides, cholesterol and glucose. The piglets were evaluated by the enzymatic capabilities of aspartatenotransferase, gamma glutamyltransferase, alanine substransferase, alkaline phosphatase, lactate dehydrogenase and creatine-cycinase, taking generally accepted methods [10].

Digital values obtained in operation were processed using variation statistics. The accuracy of the dynamics of the recorded indicators was carried out by the criterion of Student. Its reliability was determined if p<0.05.

3. Research results and discussion
Changes in the physical status of animals always lies in the adequate dynamics of the number of metabolites in their blood and the functionality of the enzymes of enzymes for the implementation of the processes of growth, development and the natural physiological formation of all organs. As a result of the study, the piglets found statistically significant levels of levels in their blood substances belonging to the most important types of exchange and changes in the activity of the accused enzymes.

It has been established that in the blood of the surveyed piglets aged 6 days the number of common protein was small, accounted for 69.7±0.35 g/l. As the age increases in animals, its level in the blood demonstrated an increase, reaching the end of the milk nutrition phase 77.7±0.32 g/l due to a total increase by 11.5% (p<0.05). The increase in the content of a common protein in the blood in observatory animals between 6 and 20 days of life is apparently caused by the enhancement of the processes of suction in their stomach and intestines of amino acids, due to the splitting of the protein components of the milk of sows. At the surveyed piglets on the sixth day of ontogenesis, the level of albumin albumin reached 33.5±0.28 g/l, gradually increasing during the entire observation. The overall growth of this indicator for the phase of milk nutrition was 11.3% (p<0.05).

The urea content in the blood of the pins of milk nutrition at the age of six percentage of 2.90±0.29 mmol/l. As it observed, its number in the blood of animals increased and by the end of the observation reached 3.29±0.26 mmol/l. The revealed increase in this metabolite by 13.4% is a reinforcement marker in piglets at this stage of development of protein exchange processes.

As the age increases, the piglets have noted the stability of carbohydrate metabolism. This was stated by the immutability of the level of glucose in the blood of animals, which was by the end of the observation 4.3±0.20 mmol/l.

At the observation of piglets, physiologically beneficial changes in the parameters of lipid metabolism were found associated with the growth processes in animals. The concentration of
cholesterol in their blood for the sixth day of life turned out to be the lowest, accounted for 2.60±0.31 mmol/l. During the entire observation, the cholesterol content in their blood slowly increased, reaching for twenties day 2.97±0.47 mmol / l (the dynamics amounted to 14.2%, p<0.05).

Table 1. Piglet blood parameters during the milk feeding phase.

| Parameters                                      | Day of life, M ± m, n = 36 |
|------------------------------------------------|-----------------------------|
|                                               | 6                           | 10                          | 15                          | 20                          |
| Alaninamino-transferase, ncat/l                | 223.4±0.88                  | 260.6±1.01*                 | 298.4±0.86**                | 320.2±0.96**                |
| Aspartate aminotransferase, ncat/l             | 906.7±2.62                  | 963.3±2.62                  | 1091.4±2.17**               | 1205.3±1.88**               |
| Lactate dehydrogenase, ncat/l                  | 26.0±0.15                   | 26.6±0.27                   | 26.8±0.19                   | 26.4±0.14                   |
| Creatine kinase, ncat/l                        | 2601.3±2.71                 | 2586.3±2.54                 | 2600.3±2.46                 | 2591.6±2.39                 |
| Gamma-glutamyl-transferase, ncat / l           | 379.5±0.75                  | 386.3±0.54                  | 395.1±0.61                  | 416.8±0.56*                 |
| Total protein, g/l                             | 69.7±0.35                   | 70.9±0.31                   | 73.8±0.25                   | 77.7±0.32*                  |
| Albumins, g/l                                  | 33.5±0.28                   | 34.2±0.39                   | 35.8±0.26*                  | 37.3±0.22*                  |
| Urea, mmol/l                                   | 2.90±0.29                   | 3.01±0.20                   | 3.14±0.39                   | 3.29±0.26*                  |
| Alkaline phosphatase, ncat/l                   | 13100.0±2.72                | 1390.1±2.26*                | 1473.8±1.92*                | 1563.6±2.07**               |
| Cholesterol, mmol/l                            | 2.60±0.31                   | 2.69±0.32                   | 2.89±0.43*                  | 2.97±0.47*                  |
| Triglycerides mmol/l                           | 0.28±0.07                   | 0.30±0.06                   | 0.33±0.03*                  | 0.35±0.06**                 |
| Glucose, mmol/l                                | 4.2±0.22                    | 4.3±0.15                    | 4.4±0.16                    | 4.3±0.20                    |

Note: the reliability of the dynamics of indicators compared with the daily age * p <0.05; ** p <0.01.

In the blood of observed animals, the smallest level of triglycerides was detected at the age of 6 (0.28±0.07 mmol/l). Subsequently, their concentration in piglets gradually increased (summary by 25.0%) and at the age of 20 days it reached 0.35±0.06 mmol / l (p<0.05). The found changes in the parameters of lipid metabolism indicated the intensification in piglets at this age the metabolism of fats, very significant for the implementation of the processes of growth and the development of their organism [11, 12].

Registation of the activity of blood enzymes in piglets throughout the milk nutrition allowed the characteristic biological dynamics characteristic [13].

During the phase of milk nutrition in the blood of animals, the activity of the enzyme alkaline phosphatase grew. During the observation period, the dynamics of this indicator amounted to 19.3%
(p<0.01). The revealed growth of the enzymatic properties of alkaline phosphatase in the blood of the observed piglets was evidence of the activation of the metabolism of carbohydrates [14,15]. The activation of this enzyme can be considered as important for the formation of the entire metabolic system in piglets at this age, primarily in muscle tissue [16,17].

The biological capabilities of the enzymes of the alanineotransferase and aspartatenotransferase on the sixth day of life in piglets were minimal and amounted to 223.4 ± 0.88 ncat/l and 906.7 ± 2.62 ncat/l, respectively. During the entire observation, the activity of transaminase in the blood of animals gradually increased. During the observation, their level total increased by 43.3% and by 32.9%, respectively. Increasing the activity of these transaminases in the conditions of growth in the level of the general protein in the blood of animals during the milk phase, it is possible to communicate with the biologically popular reinforcement of anti-industrial processes in muscles and liver and enhancing the mechanisms of reaminting and deamination [18, 19]. It is clear that the state of the functional characteristics of transaminase is clearly related to the realization of the growth and development of the whole organism and especially in muscle tissue [20,21]. As a result, the dynamics of their activity can be considered markers of the dynamics of the processes of increasing the meat mass in any farm animals [22,23].

The level of activity of lactate dehydrogenase in the blood in the piglets on the sixth day of life amounted to -26.0±0.15 ncat/l and remained unchanged during the entire subsequent observation. The level of activity of creatine potential in the surveyed piglets has changed slightly and by the end of the study reached 2591.6 ± 2.39 ncat/l. At the observation of piglets on the sixth day of ontogenesis, the activity of gamma-glutamintransferase was equal to 379.5±0.75 ncat/l. Subsequently, its magnitude increased by 20 days of life increased by 9.8% (P <0.05), reaching a level of 416.8 ± 0.56 ncat/l. The found changes in the activity of blood enzymes in observed piglets are apparently associated with the strengthening of their adaptation mechanisms with age [24,25]. The basis of these changes, no doubt, there are changes in genetic expression and changes in protein synthesis processes in the liver, muscles and internal organs [26].

4. Conclusion
The preservation of the physiological status of young pigs necessary for life during the entire early ontogenesis is biologically extremely significant, since it determines their viability. The second phase of early ontogenesis is very important for the development of piglets of their individual development. This period is rightly considered a serious stage in the early ontogenesis of pigs. This is due to the fact that during this stage of individual development, many adaptive mechanisms in the body are intensified, associated with the cessation of colostrum consumption and preparation for eating plant feed. At this age, the dynamics of a number of blood indicators characterizing protein, fat and carbohydrate metabolism has a clear certainty. In their level, you can quickly evaluate the current physiological biochemical status of piglets and effectively carry out preventive and wellness activities. The values identified in this study characterizing the metabolism and the level of activity of a number of blood enzymes are closely related to the normal dynamics of their somatic status at this age. In this regard, they can be considered regulatory in the course of further research in various farms in Central Russia.

Acknowledgement
The authors would like to thank their colleague for their contribution and support to the research. They are also thankful to all the reviewers who gave their valuable inputs to the manuscript and helped in completing the paper.

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