

Immunobiological indicators of anti-infection resistance of Karakul lambs

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Abstract. The study investigated immunobiological indicators of natural resistance in Karakul lambs. Indices of natural resistance to conditionally pathogenic microorganisms were measured to determine the general anti-infective resistance of Karakul lambs. The amount of total protein, their fractions and immunoglobulins in the perfusion fluid passed through the blood system of the gastrointestinal tract of lambs in the first 48 hours after birth and after 48 hours of postnatal life of Karakul lambs was determined. Also, the titer of antibodies against conditionally pathogenic microorganisms in blood serum of Karakul lambs of different ages was determined, their importance in formation of colostral and natural active immunities was analyzed.

1 Introduction

The immunoglobulins present in colostrum play a crucial role in providing natural resistance to newborn animals. These immunoglobulins are primarily obtained from the mother's body through colostrum [10, 12, 20].

To enhance the specific resistance of newborn animals against infectious agents and opportunistic microorganisms, they must be injected with colostrum. The blood serum of newborn animals contains low levels of complement, preperidine, and gamma globulin, making them vulnerable to infections [10-11, 20, 23-25, 27].

These indicators are also a sign of the macro-organism's general infectious resistance. During the transitional stage, pathogens of infectious diseases typically become conditionally pathogenic. Under certain circumstances, opportunistic microorganisms can be the cause of serious and life-threatening diseases [1, 6, 14-15, 20].

The nature and significance of natural resistance in infectious diseases remains controversial until nowadays. The role of natural resistance will be objectively recognized as fundamental in the fight against infections in general and opportunistic pathogens in particular.

At the same time, an opposite point of view is put forward, according to which immune mechanisms are initially directed against individual microbes, specific protective factors subsequently became the basis for the formation of general mechanisms of resistance [19].

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Moreover, even the most comprehensive studies in recent years have made a categorical conclusion that even in the fight against CPM, the role of nonspecific resistance is insignificant [22].

However, despite all the debatability of the conceptual provisions of this problem, its practical aspects indicate the determining role of natural resistance factors in the fight against opportunistic infectious principles [7, 21].

Indeed, the work devoted to the role of natural resistance of animals and humans in the fight against opportunistic pathogens of infectious diseases is so extensive that they require differential analysis [2, 17].

In increasing the general resistance of animals, a special role is given to the conditions of detention in livestock complexes, seasonal and climatic factors. [4, 13, 19].

The leading importance of age in the occurrence of diseases caused by opportunistic infectious principles is, in our opinion, one of the clearest confirmations of the role of natural resistance [5].

Correction of passive components of the immune status is based on humoral factors of immunity, by replenishing the spectrum of specific and nonspecific antibodies in the body [8-10, 26].

In recent years, extensive factual material has accumulated indicating the priority role of colostrum immunity in the immune correction of newborns [16, 18].

In conclusion, we can conclude that the technology of growing and breeding young animals should be under a comprehensive veterinary assessment [3].

To achieve this goal, along with painstaking traditional treatment and preventive measures, more consistent, forward-looking actions are needed; a new approach is needed in the fight against opportunistic microorganisms.

2 Materials and methods

We carried out research work on (0.5), 1, 2, 3, 4, 5, 15-day-old, 1, 2, 3, 6-month-old and 1,2-year-old Karakul lambs of LLC "Nurota karakul breeding" of Nurota District of Navoi Region.

We determined the total protein by refractometer, protein fractions by paper electrophoresis, immunoglobulins G and M by the Mancini immunodiffusion reaction and the titer of natural antibodies against to the bacteria by the Wright agglutination reaction.

3 Results and Discussion

Our scientific research primarily studied the process and duration of absorption of colostrum proteins in the digestive tract of Karakul lambs (0.5), 1, 2, 3, 4 and 5 days old, as well as 3, 15 days old and 1, 2, 3, 6 months old were studied. Also the formation of antibodies in blood serum of 1,2-year-old Karakul lambs was studied. The biochemical and immunological basis of natural resistance was also analysed.

The level of the body's natural defence depends on the amount of immunoglobulins derived from the colostrum, the duration and efficiency of its absorption through the intestine [1, 20].

To further study the process and duration of colostrum absorption in the digestive tract of newborn Karakul lambs, we first monitored their oral milk intake. We performed perfusion in the circulatory system of the gastrointestinal tract, an hour after taking colostrum, immediately causing them general exsanguinations.

In total we conducted an acute experiment on the bodies of 18 Karakul lambs. Three of them were 0.5 days old; three were 1, 2, 3, 4 and 5 days old.

The literature indicates that colostrum antibodies are absorbed only in the first 36-48 hours of postnatal life. In our experiments, it was found that the absorption time of colostrum proteins and immunoglobulins more than 48 hours, as well as the duration of the absorption process is longer. In particular, the most effective was an increase in the absorption time of M-immunoglobulin.

In our studies, we first controlled the consumption of breast milk by newborn Karakul lambs.

An hour after the newborn Karakul lambs sucked breast milk, we immediately performed general exsanguinations and we performed perfusion their blood system of the gastrointestinal tract.

We immediately transferred the newborn Karakul lambs to the surgical ward for perfusion of the circulatory system of the internal organs of the body. There we maintained high humidity and a temperature of 38-40°C degrees.

We simply opened the thoracic cavity and placed a cannula into the aorta and adjacent vena cava to allow saline to flow into the aorta at about 39°C and out of the vena cava. In the perfusion system, the barometric pressure was maintained at 300-500 mm above the water column. The collection of perfusion fluid was started 5-10 minutes after its enlightenment that is the start of perfusion.

Perfusion lasted 2-3 hours. The perfusion liquid has evaporated in a vacuum desiccator to a consistency (thick liquid) close to serum. Then, the total protein in it, its fractions, and the amount of immunoglobulins were determined (Figure 1-2).

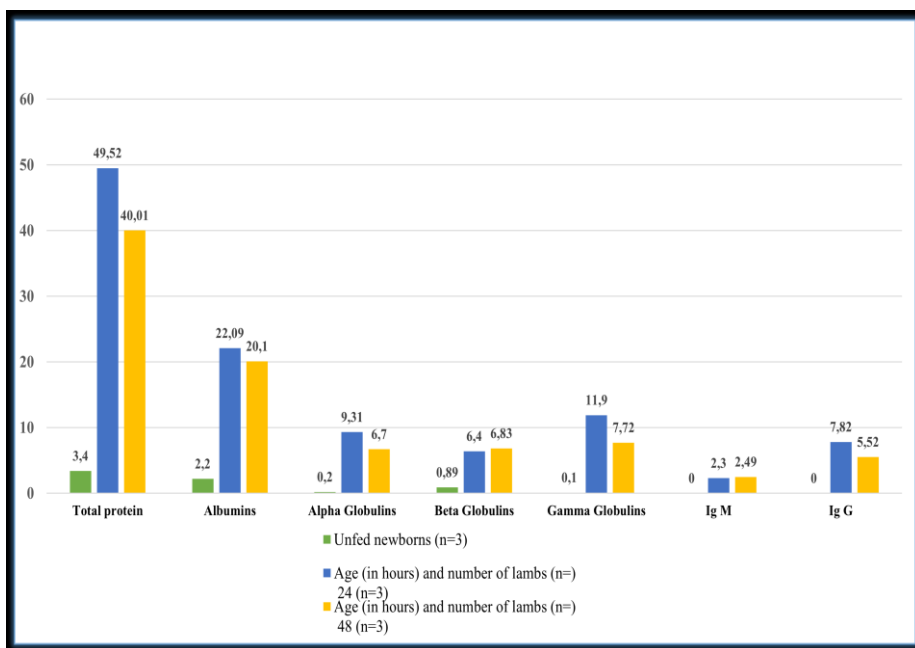


Fig. 1. The content of total protein, its fractions and immunoglobulins in the perfusion fluid (g/l).

Conducted experiments have shown that the absorption of proteins and immunoglobulins in living organs continues until 72 hours, even with a decrease in its daily intensity. In addition, their absorption up to 96 and 120 hours was recorded, although in very small amounts (Figure 2).

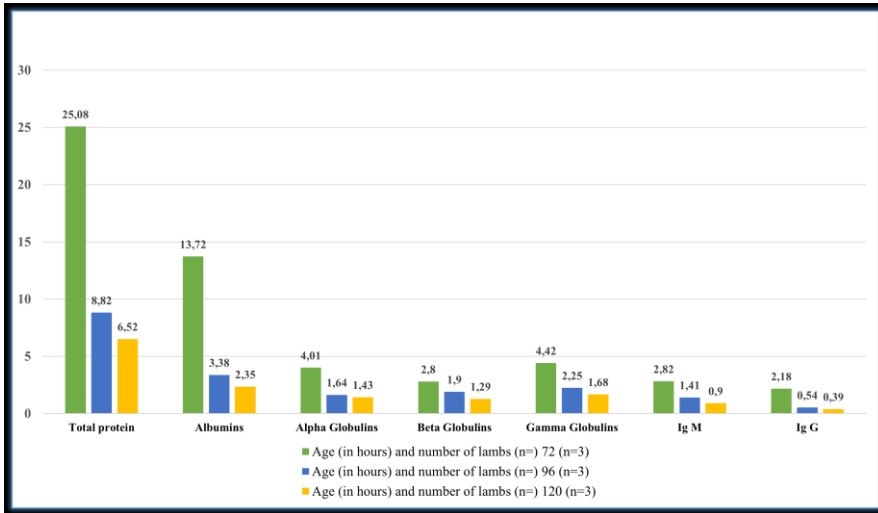


Fig. 2. The content of total protein, its fractions and immunoglobulins in the perfusion fluid (g/l).

As shown in the results of Diagram 1-2 the absorption of G-immunoglobulins in the blood system of the gastrointestinal tract of Karakul lambs of different ages up to 24 hours (7.82 ± 0.22) and up to 48 hours (5.52 ± 0.09), was significantly faster than 72-96-120 hours. On the contrary, the absorption of M-immunoglobulins up to 72 hours (2.82 ± 0.02) was faster than absorption up to 24 hours (2.30 ± 0.08) and up to 48 hours (2.49 ± 0.03).

These antibodies (immunoglobulins G and M) indicate that they have developed colostral immunity due to having passed through their mother's milk.

In order to study the formation of natural active immunity in 3, 6, 12-month-old Karakul lambs we continued the research and determined the amount of immunoglobulins in their blood serum. (Figure 3)

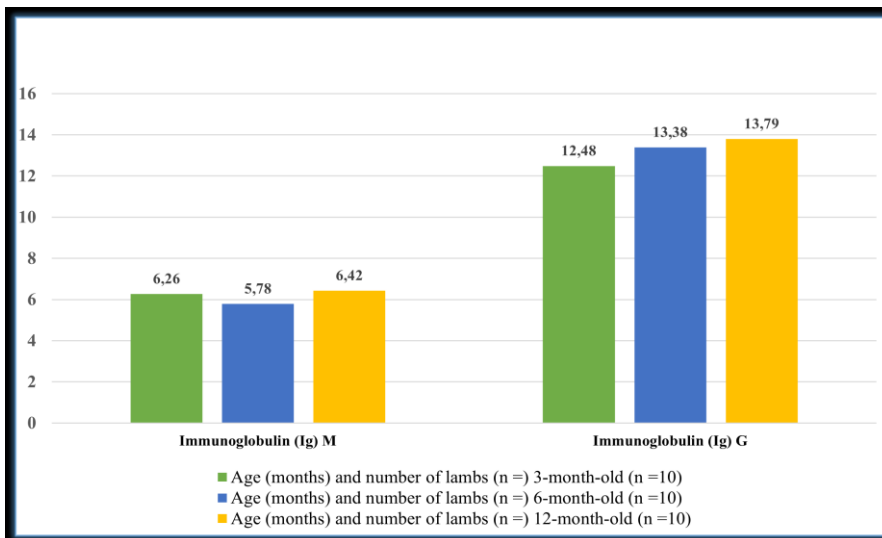


Fig. 3. Amount of immunoglobulins in blood serum of 3,6,12 months old Karakul lambs (g/l).

The results show that the amount of immunoglobulins in the blood serum of 3, 6, 12-month-old Karakul lambs is significantly higher. This indicates that it is of great importance in the formation of natural active immunity in the body of Karakul lambs.

The results of our research on Karakul lambs at the age of 3,15 days old and 1.2 months old (Figure 4).

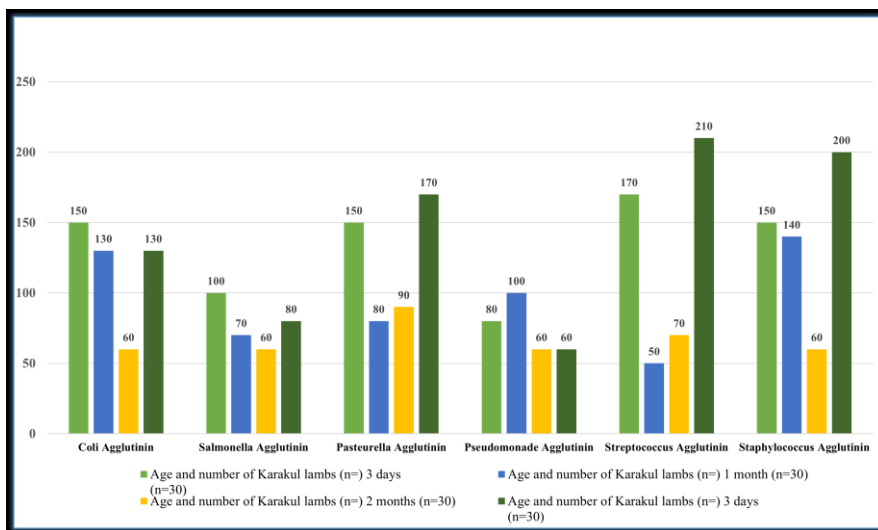


Fig. 4. Dynamics of antibody formation against conditionally pathogenic microorganisms in the blood serum of 3,15-day-old and 1,2-month-old of Karakul lambs.

Serological analysis of blood serum of newborn animals showed that specific agglutinins against *Escherichia coli* from 1:130 to 1:150, *Salmonella* from 1:80 to 1:100, *Pasteurella* from 1:150 to 1:170, *Pseudomonads* from 1:60 to 1:80, *Streptococcus* from 1:170 to 1:210, and *Staphylococcus* from 1:150 to 1:200 were recorded and it has been established that these antibodies are transmitted from the mother through breast milk.

As shown in Diagram 4, specific agglutinins in blood serum of 1-month-old Karakul lambs titre of *Escherichia coli* 1:130, *Salmonella* 1:70, *Pasteurella* 1:80, *Pseudomonads* 1:100, *Streptococcus* 1:50 and *Staphylococcus* 1:140, and in 2-month-old Karakul lambs titre 1:60 against *Escherichia coli*, 1:60 against *Salmonella*, 1:90 against *Pasteurella*, 1:60 against *Pseudomonads*, 1:70 against *Streptococcus* and 1:60 against *Staphylococcus* were detected and have wave-like dynamics.

In blood serum of 3- and 6-month-old Karakul lambs anticollibacterial antibodies are from 1:65 to 1:120, to *Salmonella* - from 1:55 to 1:60, to *Pasteurella* - from 1:80 to 1:90, to *Pseudomonads* - 1:60, to *Streptococcus* - from 1:70 to 1:80, to *Staphylococcus* - from 1:60 to 1:90 specific agglutinins were recorded (Diagram 5).

Presence of specific agglutinins in blood serum of 1- and 2-year-old Karakul lambs in relation to intestinal bacteria - from 1:80 to 1:280, cocci - from 1:80 to 1:260, *Synegonia coli* - from 1:70 to 1:150, and their wave dynamics indicates the formation of natural active immunity (Figure 5).

The development of specific natural immunity against opportunistic microorganisms in farm animals was not previously known. This phenomenon affects not only colostral (i.e. passive) immunity, but also active immunity.

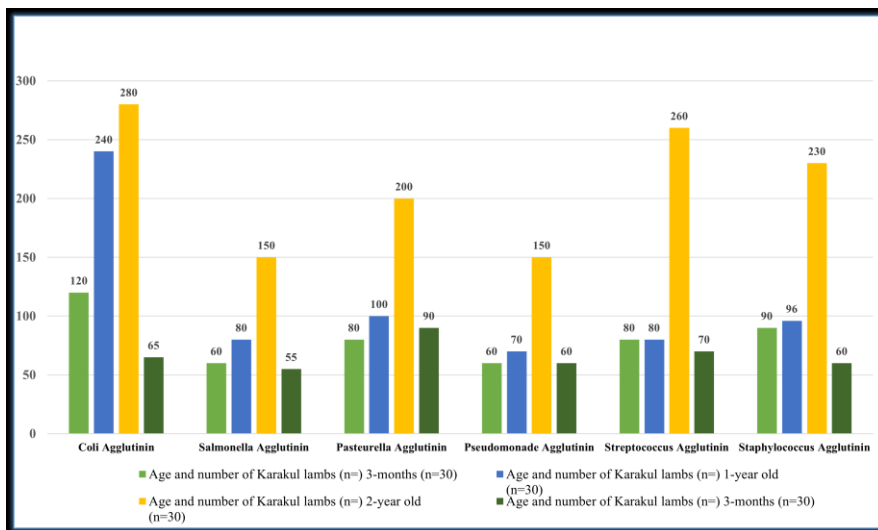


Fig. 5. Dynamics of antibody formation against conditionally pathogenic microorganisms in the blood serum of 3,6-month-old and 1,2-year-old of Karakul lambs.

4 Conclusion

- The absorption of immunoglobulins G in the digestive tract of newborn 1 and 2-day-old Karakul lambs, and the absorption of immunoglobulins M was faster in 3-day-old Karakul lambs. However, their absorption was recorded in very small amounts in 4- and 5-day-old Karakul lambs.
- An increase in the absorption time of breast milk proteins and immunoglobulins G and M in the digestive tract of newborn Karakul lambs is of huge importance in the formation of colostrum antibodies.
- Blood serum of 3-day-old Karakul lambs with high antibody titre has immune properties against opportunistic microorganisms.
- The positive agglutination reaction of blood serum from Karakul lambs with representatives of the microbial environment confirms the presence of both passive and active specific immune status during postnatal ontogenesis.
- The immunobiological indices determined in our studies indicate the formation of natural resistance in the body of Karakul lambs.
- Considering recent efforts to improve animal resistance, determining these indicators provides a basis for analyzing immunobiological indicators of natural resistance.

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