The effect of "Vetom 1.2" probiotic preparation on the cows' immunological status

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Abstract. The main task in the dairy farming organization is to obtain calves whose health directly depends on the immuno-biochemical status of their mothers. In our country and abroad, interest in probiotic preparation is increasing to maintain the biochemical and immunological status, to improve digestion, metabolism, as well as to increase the cows' dairy productivity. Probiotic preparations of the Vetom series are widely used in this industry. The aim of the study was to study the effect of "Vetom 1.2" probiotic preparation on the immuno-biochemical status of cows. Experimental studies were carried out in JSC "Uchkhoz "Prigorodnoye" in Barnaul on Russian black pied cows in the autumn-winter period. During the research, we have identified the following: 1. The use of "Vetom 1.2" probiotic preparation has a positive effect on the biochemical parameters' dynamics of cows' blood serum, and therefore, on the immuno-biochemical status of animals; 2. The use of "Vetom 1.2" probiotic contributes to an increase in immunoglobulins’ level in cows’ colostrum, thereby such colostrum can help to increase the resistance and safety of young animals.

1. Introduction
The main task in the dairy farming organization is to obtain calves whose health directly depends on the immuno-biochemical status of their mothers [1, 2, 3, 4].

Russian black pied is the leading breed of dairy cattle breeding in our country. It is characterized by good health, high milk productivity and good adaptation to keeping in various climatic conditions [5, 6, 7].

In our country and abroad, interest in probiotic preparation is increasing to maintain the biochemical and immunological status, to improve digestion, metabolism, as well as to increase the cows' dairy productivity [8, 9, 10].

Vetom series probiotics are widely used in this industry. These preparations have an extensive range of actions, one of which is the immuno-biochemical status correction [11, 12, 13]. The manufacturer of this preparation is LLC NPF "Research Center", Novosibirsk region, Koltsovo industrial settlement. The aim of the study was to study the effect of "Vetom 1.2" probiotic preparation on the immuno-biochemical status of cows.

2. Materials and methods of research
Scientific and economic experiment was carried out in JSC "Uchkhoz "Prigorodnoye" in Barnaul on Russian black pied cows in the autumn-winter period. Four groups of animals with five heads each were formed for experimental and control groups. The groups were selected according to analogy.
Table 2 shows the biochemical study results of the blood serum of the experimental groups’ cows. To determine the saturation degree of cow colostrum with immunoglobulins, colostrum studies were carried out in the first three days after calving using the “Kruse Kolostrum Densimeter” colostrometer. Using the technique of N. A. Pisarenko, the relative colostrum density was recalculated to the level of gamma globulins [14].

3. Research results
Table 2 shows the biochemical study results of the blood serum of the experimental groups’ cows.

| Indicators            | Physiological boundaries of indicators | Number of days before calving | Groups          |
|-----------------------|----------------------------------------|------------------------------|-----------------|
|                       |                                        | 1    | 2    | 3    | 4    |
| Total protein, g/l    | 72-86                                  | 30   | 79.2±7.1 | 81.4±6.9 | 77.5±6.2 | 80.3±6.7 |
|                       |                                        | 10   | 84.1±7.3 | 84.4±6.7 | 83.6±7.1 | 85.3±6.5 |
| Albumin, %            | 30-50                                  | 30   | 40.4±1.9 | 41.3±2.4 | 40.9±2.1 | 43.4±2.7 |
|                       |                                        | 10   | 45.6±5.2 | 44.7±1.8 | 46.2±3.1 | 47.6±3.3 |
| Gamma globulin, %     | 25-40                                  | 30   | 31.2±2.4 | 32.7±2.1 | 32.4±1.8 | 33.1±2.7 |
|                       |                                        | 10   | 36.8±4.6 | 36.5±2.3 | 37.2±3.2 | 38.1±3.3 |
| Beta globulin, %      | 10-16                                  | 30   | 12.7±1.1 | 11.9±1.4 | 13.2±1.9 | 13.5±1.8 |
|                       |                                        | 10   | 14.6±1.9 | 15.3±2.2 | 14.0±1.8 | 15.6±2.2 |
| Alpha globulin, %     | 12-20                                  | 30   | 13.6±0.8 | 13.1±0.9 | 14.0±0.6 | 13.8±1.2 |
|                       |                                        | 10   | 17.2±3.6 | 16.7±3.2 | 17.5±2.9 | 18.1±3.8 |
| Alkaline reserve, mmol/l | 115-145                                | 30   | 118.6±7 | 117.6±7.7 | 119.6±6.7 | 118.4±8.4 |
|                       |                                        | 10   | 124.7±12.8 | 125.4±11.1 | 126.1±13.8 | 126.8±11.6 |
| Retinol, mmol/l       | 1.4-5.2                                | 30   | 2.8±0.5 | 2.9±0.7 | 2.7±0.4 | 3.2±0.6 |
|                       |                                        | 10   | 3.8±1.3 | 3.6±0.9 | 3.7±0.8 | 4±1.4 |
| Carotene, mmol/l      | 7.5-18.6                               | 30   | 11.5±3.7 | 10.9±2.2 | 9.8±1.4 | 11.7±2.7 |
|                       |                                        | 10   | 14.5±3.4 | 13.3±2.7 | 13.8±2.8 | 14.4±3.2 |
| Tocopherol, mmol/l    | 10.8-25.1                              | 30   | 19.3±4.5 | 18.9±3.2 | 17.1±2.3 | 19.8±3.4 |
When reviewing the study results, it was found that there was no significant difference between the average group indicators in the experimental groups 30 days before calving (P>0.05).

When analyzing repeated research results, that is, 10 days before calving (probiotics application – 20 days), a favorable dynamics of average group indicators in experimental groups of animals was found. The results obtained were within physiological limits. A significant increase in some indicators during the research period should be noted: carotene by 27.4%, retinol and tocopherol by 26.5% and 16.2%, respectively, gamma globulin by 15.8%, albumin by 10.6%.

Table 3 shows the biochemical parameters of the blood serum of the control groups' cows 30 and 10 days before calving.

| Indicators                  | Physiological boundaries of indicators | Number of days before calving | Groups |
|-----------------------------|---------------------------------------|-------------------------------|--------|
| Total protein, g/l          | 72-86                                 | 30                            | 1      |
|                             |                                       | 20                            | 2      |
|                             |                                       | 21                            | 3      |
|                             |                                       | 22                            | 4      |
| Albumin, %                  | 30-50                                 | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
|                             |                                       | 13                            | 4      |
| Gamma globulin, %           | 25-40                                 | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
|                             |                                       | 13                            | 4      |
| Beta globulin, %            | 10-16                                 | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
|                             |                                       | 13                            | 4      |
| Alpha globulin, %           | 12-20                                 | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
|                             |                                       | 13                            | 4      |
| Alkaline reserve, mmol/l    | 115-145                               | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
| Retinol, mmol/l             | 1.4-5.2                               | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
| Carotene, mmol/l            | 7.5-18.6                              | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
| Tocopherol, mmol/l          | 10.8-25.1                              | 10                            | 1      |
|                             |                                       | 11                            | 2      |
|                             |                                       | 12                            | 3      |
| Total calcium, mmol/l       | 2.5-3.13                              | 30                            | 1      |
|                             |                                       | 31                            | 2      |
|                             |                                       | 32                            | 3      |
| Inorganic phosphorus, mmol/l| 1.45-1.94                             | 30                            | 1      |
|                             |                                       | 31                            | 2      |
|                             |                                       | 32                            | 3      |

After analyzing the data obtained from biochemical studies of cows' blood serum in control groups, there was no difference in the average group indicators between the study periods. The results of the studies were located within physiological limits and had no significant differences (P>0.05).
When assessing the immune status, an increase in serum immunoglobulins in the experimental group's cows compared to the control group was revealed: albumin by 14.4%; alpha, beta, gamma globulin by 16.3%, 13.7%, 17.8%, respectively.

Colostrum of experimental groups' cows was examined with a colostrometer to determine the level of gamma globulins. The studies were conducted in the first 3 days of lactation after calving. The average group indicators of the study results are shown in Table 4.

Table 4. The level of immunoglobulins in cow colostrum.

| Indicator       | Research days | Control (SFD) | Experimental (SFD+probiotic) |
|-----------------|---------------|---------------|-------------------------------|
| Immunoglobulins | 1             | 91.9          | 123.5                         |
|                 | 2             | 49.6          | 57.8                          |
|                 | 3             | 12.1          | 13.8                          |

Analyzing the obtained study results of cow colostrum, a decrease in the level of immunoglobulins with each subsequent day of lactation was revealed. In the experimental group of cows, it was found that on the first day of lactation, the level of immunoglobulins in colostrum was 31.4% higher; on the second day – 14.1% compared with the control group.

The dependence of immunoglobulins' level in cow colostrum on the number of lactations was also established. So, in the fourth lactation, their level is higher compared to other groups of animals. It should be noted that in the control groups, the average level of colostrum immunoglobulins was lower compared to the experimental group regardless of the number of lactations (Figure 1).

**Figure 1.** The level of colostrum immunoglobulins in experimental groups, g/l

### 4. Conclusion

Based on the results obtained, the following conclusions can be drawn:

1. Application of "Vetom 1.2" probiotic preparation has a positive effect on the biochemical parameters' dynamics of cows' blood serum, and therefore, on the immuno-biochemical status of animals.

2. The use of "Vetom 1.2" probiotic contributes to an increase in immunoglobulins' level in cows' colostrum, thereby such colostrum can help to increase the resistance and safety of young animals.
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