Intensification of the reproductive function of cows of the Kazakh white-headed breed by the biotechnological method

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Abstract. This paper discusses the issues of intensification of the reproductive function of cows of the Kazakh white-headed breed in the Republic of Buryatia, where severe natural and climatic conditions are observed by introducing biologically active drugs to animals (drugs "Estrofan" and "E-selenium"). Immunobiological blood test. The indicators of the reproductive function of females were determined.

1. Introduction
The advances in biological science, achieved in the last two decades, in understanding the patterns of neuroendocrine regulation of sexual function in female animals have created the necessary prerequisites for the development of effective methods for simulating animal reproduction. Achievements of the modern pharmaceutical industry provide a wide range of drugs for the introduction and use in the practice of animal husbandry [1-4]. Having studied and knowing the patterns of endocrine regulation of ovarian function in animals, it became possible to effectively intensify the reproductive function of females: activating and regulating the time of sexual heat (estrus stage of the sexual cycle) and ovulation at the optimal time, at the right time, convenient for the owners. The implementation of this urgent problem will serve as a powerful technological and economic lever for the intensification of the reproduction of cows, especially of the beef breed, since only an increase in the level of reproduction of the herd determines and increases the profitability and economy of the economy. In our opinion, the optimal development and improvement of an effective biotechnological method for stimulating and regulating the sexual function of females will contribute to the optimal solution to the implementation of this topical problem in cattle breeding [5-10].

In connection with the urgency of the above problem, our research was aimed at improving and developing an effective biotechnological method for stimulating and regulating the sexual function of females by exogenous injections of biologically active drugs (Estrofan and E-selenium), which improve the metabolism in the body of animals, as a result of which the optimal formation of immunobiological reactivity occurs organism, and the stimulation of the reproductive function of animals occurs as a result of the luteolytic action of the drug "Estrofan" on the corpus luteum of the ovaries [1; 6; 9]. In order to study the effectiveness of these biological preparations, we
studied the indicators of the immunobiological reactivity of the cows organism during the periods of the estrus stage of the sexual cycle, fertilization and implantation of the embryo into the mucous membrane of the uterus of cows. Vitamin E regulates and controls the main metabolic processes enhances the effect of vitamins A and D3 [2; 7]. With the introduction of this drug, an intensive increase in the amount of vitamin E and selenium in the blood of animals and other tissues occurs and, apparently, ensures the optimal formation of the immunobiological reactivity of the body, as a result of which the stimulating effect of the drug "Estrofan" on the manifestation of sexual function and the successful fertilization of animals [5; 8].

2. Materials and methods
The research was carried out in the SPK "Mikhailovka" of the Zakamsk region of the Republic of Buryatia. For this purpose, cows were selected from which we formed the experimental and control groups (n = 15 and n = 15, respectively).

The scheme of drug use in the experimental and control groups is shown in table 1. The drugs were administered intramuscularly.

| No | Name          | Experienced group, ml | Control group, ml |
|----|---------------|-----------------------|-------------------|
| 1  | Estrofan      | 2                     | 2                 |
| 2  | E-selenium    | 10                    | -                 |

In addition, in this work, a comparative study of the immunological parameters of the number of T- and B-lymphocytes and macrophages in cows from the experimental and control groups was carried out. Studies of immunobiological parameters of the animal organism were carried out in the laboratory of clinical immunology of the Republican hospital in Ulan-Ude.

3. Results and discussion
When studying the indices of the immunobiological reactivity of the organism of cows in the experimental group during the periods of the estrus stage of the sexual cycle, fertilization and implantation of the embryo into the mucous membrane of the uterus of cows, we obtained the following results. So, in particular, the data in table 2 show that the content of the absolute number of T-lymphocytes in the blood of experimental cows on the 1st day of the manifestation of the estrus stage of the sexual cycle was 0.79 ± 0.1, and in the control group 0.99 ± 0.17.

| Research time                                      | Experienced | Control |
|---------------------------------------------------|-------------|---------|
| On the 1st day of the onset of the estrus stage    | 0.79±0.1    | 0.99±0.17 |
| During fertilization and migration of the embryo (5-7 days after mating) | 3.07±0.29 | 2.01±0.32 |
| During the embryo implantation (12-19 days after mating) | 4.63±0.12* | 4.15±0.17 |

Note: *- P <0.01 reliability of the difference between the mean values of the experimental and control groups.

Upon further study of these indicators of immunity, namely, during the period of fertilization of the egg and migration of the nidation of the embryo in the mother's genital tract (5-7 days after mating), the content of the absolute number of T-lymphocytes in the blood of experimental cows increased and was 3.07±0.29 and in the control group 2.01±0.32. The difference between these indicators of the experimental and control groups was statistically significant at P <0.01. The coefficient of variation
(Cv) in the experimental group of animals during the study periods was insignificant (28.30, 33.42 and 26.90%, respectively), when compared with the control group (34.61, 32.27 and 35.01, respectively). The low coefficient of variation indicates the maximum homogeneity of the reaction of the organism of the animals of the experimental group to the exogenous administration of biologically active preparations. Such an increase in the content of the absolute number of immunocompetent cells, in our opinion, is associated with the successful fertilization of the egg and its migration, since it has now become known that the newly formed and developing zygote in the maternal organism causes an immune response of the cellular order. Then, on days 12-19 after insemination, the blood content of cows in the experimental group of the absolute number of T-lymphocytes increased to 4.63±0.12, and in cows of the control group 4.15±0.17. Obviously, such an increase in the absolute number of T-lymphocytes in the blood of experimental cows is associated with the activation of the immunosuppressive function of the maternal organism, which prevents rejection and contributes to the preservation, further optimal development of the implanted embryo and the successful course of pregnancy [2-3; 5]. In addition, it became known that during pregnancy in mammals hormonal changes in the body take place, which also contributes to the formation of immunological tolerance, i.e., a local mechanism of immunity is triggered, which prevents the rejection and death of the embryo, as an allograft.

The next important indicator of immunobiological reactivity in the study was the content of B-lymphocytes in the blood of experimental animals (table 3).

Table 3. Dynamics of B-lymphocytes in experimental cows.

| Research time                                      | Animal groups |         |         |
|---------------------------------------------------|---------------|---------|---------|
| On the 1st day of the onset of the estrus stage    | Experienced   | X±Sx    | Cv %    | Control | X±Sx    | Cv %    |
| During fertilization and migration of the embryo  | 1.25±0.06**   | 19.05   | 1.46±0.08 | 26.89   |
| (5-7 days after mating)                           | 1.34±0.08     | 27.01   | 1.14±0.05 | 38.73   |
| During the embryo implantation (12-19 days after  | 1.57±0.04*    | 28.80   | 1.39±0.06 | 32.28   |
| mating)                                           |               |         |         |         |

Note: ** - P <0.01, * P > 0.1 reliability of the difference between the average indicators of the experimental and control groups.

Table 3 shows that the content in the blood of cows of the experimental group of the absolute number of B-lymphocytes on the first day of the manifestation of sexual heat and natural insemination was 1.25±0.06, and in cows of the control group 1.46±0.08, then on 5-7 days after insemination there was a tendency to an insignificant increase in the blood content of the absolute number of B-lymphocytes - 1.34±0.08, and in cows of the control group, a decrease to 1.14±0.05, then in the study on On days 12-19, there was a significant increase in the absolute number of B-lymphocytes in both groups, which was 1.57±0.04 in the experimental group by this period, and 1.39±0.06 in the control group. Such an increase in the content of this indicator in the blood of experimental animals, in our opinion, indicates the activation of the process of transformation of B-lymphocytes into plasma cells synthesizing antibodies. As a result, the content of antibodies in the blood rises. An increase in the level of antibodies negatively affects the developing embryo. Rejection and death occurs. But in practice this does not happen, apparently, this is due to the formation of immunobiological tolerance between the body of the mother and the fetus [3-4].

The difference between these indicators of the experimental and control groups was statistically significant (P <0.01 and P > 0.1). The coefficient of variation (Cv) in the experimental group of animals during the study periods was also insignificant (19.5, 27.01 and 28.80%, respectively) than in the control group (26.89, 38.73 and 32.28, respectively), which also indicates the maximum homogeneity of the reaction of the animals of the experimental group to the exogenous administration of biologically active drugs.
When studying the phagocytic reaction of the organism of experimental animals, the average phagocytic number in the experimental group on the first day of manifestation of the stage of estrus of the sexual cycle and insemination was 67.02±3.59, and in the control group 54.69±3.65 (table 4).

Table 4. Dynamics of the phagocytic number in cows of the experimental group.

| Research time                                           | Experienced X±Sx | Cv % | Control X±Sx | Cv % |
|---------------------------------------------------------|------------------|------|--------------|------|
| On the 1st day of the onset of the estrus stage          | 67.02±3.59*      | 18.43| 54.69±3.65   | 34.97|
| During fertilization and migration of the embryo (5-7 days after mating) | 49.65±3.32       | 28.59| 56.04±4.01   | 29.32|
| During the embryo implantation (12-19 days after mating) | 46.90±3.23       | 28.99| 53.32±3.45   | 26.03|

Note: * - P <0.1 reliability of the difference between the average indicators of the experimental and control groups.

On days 5-7 of the study, there was a decrease in the blood count of the cows in the experimental group of the phagocytic number to 49.65±3.32, and in the cows of the control group to 56.04±4.01. In the study on days 12-19, the blood content of cows in the experimental group decreased to 46.90±3.23, and in the control group there was an increase to 53.32±3.45. This is due, in our opinion, to the fact that T-lymphocytes, by their mediators, activate the immunobiological activity of macrophages in the blood of control animals.

The difference between these indicators of the experimental and control groups was statistically significant at P <0.1. The coefficient of variation (Cv) in the experimental group of animals during the study periods was also insignificant (18.43, 28.59 and 28.99%, respectively) than in the control group (34.97, 29.32 and 26.03%), which also shows the maximum homogeneity of the reaction of the animals of the experimental group to the parenteral administration of biologically active drugs.

Thus, during the research, the best results were obtained in the experimental group when compared with the control group (figure 1).

Figure 1. Insemination results of experimental cows.

When analyzing the data in figure 4, it can be seen that in the animals of the experimental group during the first insemination, the fertilization rate was 80.00%, and in the control group, 53.3%. With the second insemination, the percentage of fertility of cows in both groups was 26.66, however, with double natural insemination of animals, the percentage of fertility of cows in the experimental group was higher and amounted to 100 (n = 15), and in cows of the control group 86.66 (n = 12).
4. Conclusion
Analyzing the results obtained, it should be noted that effective parameters were obtained in the experimental group than in the control group, and this is confirmed, in our opinion, by the fact that the complex action of these drugs is aimed at increasing the level of immunity and the reproductive function of animals. The results obtained convincingly show the interconnection, interdependence and mutual integration of the nervous, immune, endocrine and reproductive systems of the body of female cattle. In order to intensify the reproductive function in beef cows, we recommend using the drug "Estrofan" in combination with the drug "E-selenium".

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