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THE EFFECT OF IMPROVAC ON TESTOSTERONE LEVEL AND LIVE WEIGHT OF BULLS

Isatay T. Jakupov, Dyussen I. Domanov, Kanat M. Kamsaev, Askar A. Terlikbaev

Faculty of Veterinary Medicine and Animal Husbandry Technology, NCJSC S. Seifullin Kazakh Agrotechnical Research University
Research University, Astana, Republic of Kazakhstan

Corresponding author: Isatay T. Jakupov, e-mail: dzhakupov@mail.ru
Co-authors: Dyussen I. Domanov, e-mail: ddi-66@mail.ru
Kanat M. Kamsaev, e-mail: kamsaiev@mail.ru
Askar A. Terlikbaev, e-mail: terlikbaev_askar@mail.ru

Abstract

There are many castration methods of bulls and it is believed that the best ones are those that lead to gonadopause or inhibit the function of the gonads, contribute to a significant increase in the quantity and quality of the products obtained. It is currently considered that immunocastration, compared with chemical and surgical castration, is painless and effectively inhibits testosterone production and spermatogenesis. In order to suppress sexual activity in bulls, it is recommended to accomplish immunocastration with Improvac at a dose of 2 ml subcutaneously, with an interval of at least 4 weeks. After 4 weeks of the first injection of Improvac testosterone level decreased to 7.86 ± 1.9 n.gml. With the second injection of the medication the testosterone level decreased to 1.8 ± 0.6 ng/ml in 80% of the animals.

The immunocastration method in bulls with a live weight of 248.6±11.0 to 268±12.4 kg showed the increase in live weight of 34.9±12.9 kg in 60 days. Based on the data obtained the Improvac can be recommended for suppression of activity in bulls, while this method is less invasive compared to surgical methods of castration. There is a fairly high percentage of decrease of testosterone level. This accordingly affects meat productivity, which tends to increase.

Key words: bulls; castration; chemical castration; growth; immunocastration; testosterone.

Basic position and Introduction

Castration is one of the most common operational effects on the animal body in order to improve the quality of the products obtained. As a result of castration, the function of the endocrine glands changes in animals and affects the metabolic processes. Ultimately there are changes in the biochemical status of animals, and a certain shift in hormonal metabolism. As a result, animals gain live weight

and are fattened, while their meat becomes tender, fine-fibered, contains more fatty layers.

There are many castration methods and the best are those that will lead to gonadopause or inhibit the function of the gonads, contribute to a significant increase in the quantity and quality of the products obtained.

According to I.F Gorlov., A.A. Kaidulina [1], the determining factor defining the level of animal improvement and its meat productivity is the live weight. The results of studies by some authors show that the intensity of growth of castrated and non-castrated bull-calves of the Kalmyk breed under identical conditions of keeping and feeding is not the same in different age periods. If at the initial stage of the experiments the live weight was almost identical, then in the future, non-castrated animals were superior in productivity to castrated peers, but at the same time they were inferior in quality of meat, the yield of internal fat, and marbling. D.M. Henricks and others [2] relate such changes after castration with the corresponding changes in the restructuring of the hormonal status.

According to K. Stafford & Mellor, D. [3], W. Y. Pang and others [4], G. Ripoll, and others [5], after castration the production of reproductive hormones suspends or decreases, which leads to a change in the physiological status of the organism and its behavioral reactions. Males have an increased appetite, do not show sexual activity, less mobile, which ultimately stimulates an increase in live weight.

Choosing a method of castration plays an important role. So according to I.T Dzhakupov., K.M. Kamsaev, D.I Domanov [6], live weight increase was higher when using percutaneous method of castration than the bloody method by an average of 35-40%.

But at the same time, in particular, Moreira and others [7], indicate the beneficial effect of castration on the productivity of animals, including the immunogical method, but the authors believe that the quality indicators of the carcass do not depend on the chosen castration method.

Given that the existing methods of castration performed in most cases are highly painful, it should be considered when choosing a castration method. J.F. According to Coetzee, [8], D. Gellatly and others [9], open bloody methods of castration, in particular the complete surgical removal of the gonads, causes severe pain, which is especially evident in the first two hours. Elimination or reduction of pain during castration performance plays an important role in the subsequent development and growth of bulls. According to the literature data, the pain experienced by animals causes severe changes in the body: vascular tone increases, breathing quickens, secretion of the glands of the gastrointestinal tract is inhibited, all types of metabolism are intensified towards catabolism, acidosis, which leads to a decrease in their productivity.

E. L. Ribeiro, and others [10], note that castration, regardless of the chosen method, reduces the overall growth rate of the body, but at the same time, according to the authors, castrated and immunized animals had a

greater marbling and carcass fat percentage than non-castrated bulls.

In recent years, in order to reduce sexual behavior of bulls, various methods have been used to inhibit the spermatogenic function of the gonads. According to G. Ripoll and others [5], the elimination of the spermatogenic function of the gonads and the preservation of their hormonal activity allows obtaining high quality meat without reducing the growth rate of animals.

According to P.H. Yamada and others and others [11], immunocastration, compared with chemical and surgical castration, is practically painless, effectively suppresses testosterone production and spermatogenesis. In addition, P.H. Yamada and others [12], the authors studying the effect of castration methods, indicate that during immunocastration a decrease in pain reaction favorably affects the general condition of the animal.

P.R. Huenchullan and others [13], studying the effectiveness of immunocastration, came to the conclusion that this method of castration is safer in relation to post-castration complications and has a beneficial effect on the animal's organism.

Materials and Methods

Animals. As a study object 30 heads of bulls at the age of 12-14 months in feeding platform were chosen. The animals were injected with Improvak for immunocastration twice at a dose of 2 ml subcutaneously with an interval of 4 weeks. The effect of the medication on the level of testosterone and live weight of bulls was identified.

In addition to the above, biological castration influences on the quality of the resulting product, which does not lose its appearance and does not contain any impurities that affect the purity of the product. Among medications applied for biological castration of bulls "Bopriva" developed by "Zoetis Inc", USA, is mainly used against Gonadotropin releasing hormone (GnRH), which was proposed for sterilization of males. On its basis the Improvak was developed for pigs which can also be used for bulls according to A. Noya, and others [14].

The proposed medications allow keeping the aggressive sexual behavior of animals under control for a certain time by producing antibodies against gonadotropin-releasing hormone (GnRH), thereby reducing the level of testosterone in the blood of males.

In accordance with the abovementioned, the purpose of our research was to study application of Improvak for biological castration of bulls and to study the dynamics of testosterone in animal's body. Considering the effectiveness of the drug on boars and the absence of contraindications for its use on bulls, it was decided to conduct a study of "Improvak" on bulls.

Blood was taken from the jugular vein before castration and 30, 60 days after it. All analyzes were carried out in the scientific laboratory of veterinary medicine and in the Republican Diagnostic Center.

Detection of testosterone. In order to study the functional activity of the endocrine glands and metabolism in the peripheral blood of animals, the

presence of the testosterone hormone in the blood serum was measured. Studies on testosterone were performed with a Roche C8000 analyzer (Germany) by photometric method.

Statistical analysis. The materials of experimental and clinical studies were analyzed biometrically using Student's test, as well as the constant method. The digital indicators obtained in the process of research were processed by the method of variation statistics according to V.K. Kuznetsov [15], as well as using the statistical functions wizard of Microsoft Excel.

Results

To analyze the effectiveness of castration the Improvak of "Zoetis Inc" for immunocastration was applied at a dose of 2 ml subcutaneously with an interval of at least 4 weeks [16].

The average age of the tested bulls was 15.2±0.26 months, and the average live weight was 263.6±18 kg.

Clinical changes in animals were not observed as a result of using Improvak. The second dose of Improvak was given 4 weeks after the first injection (Table 1).

Table 1 - Interval between injections and duration of Improvak for bulls

Interval between injections, weeks	Minimum duration period, weeks (after 2 injections)
3-4	12
6	14
8	16

Table 1 shows that, subject to the intervals between injections, the period of action of the Improvak allows for a certain time to control the aggressive sexual behavior of animals, producing antibodies against gonadotropin-releasing hormone (GnRH), thereby reducing the level of testosterone in the blood at bulls.

As noted above, the level of testosterone is an important criterion for the effectiveness of the method for reducing sexual activity. It was significantly reduced when using the above method. The research results are shown in table 2.

Table 2 - Dynamics of testosterone levels in bulls after immunocastration

	Before injection	30 days after injection (ng/ml) (M±m)	60 days after injection (ng/ml) (M±m)	
Castrated	14,5±1,2	7,86±1,9	1,8±0,6	
Non-castrated	16,5±1,8	-	-	

When analyzing table 2, in particular, it was found that after using the Improvak 30 days after the injection, the testosterone level decreased by almost two times and amounted to 7.86 ± 1.9 ng/ml. And after repeated injection of the medication after 4 weeks and checking the level of testosterone in the blood 60 days after the first injection, it was 1.8 ± 0.6 ng/ml i.e. decreased by 4.36 times.

It should be especially noted that the use of Improvak did not cause reactive changes at the injection site. The animals took the injection calmly, which indicates a low invasiveness. As it is known, surgical methods of castration cause a pain reaction, which accordingly affects the physiological state of the animal, especially in the first days after the procedure.

Table 3 - Dynamics of the growth rate in bulls after immunocastration

Group	Castration age, month (M±m)	Live weight before castration (M±m)	Live weight after 60 days (M±m)	Live weight gain	
				For 2 months, (kg) (M±m)	Daily (g) (M±m)
After immunocastration with Improvac	15,7±0,29	263,6±4,6	298,5±17,5	34.9±12,9	581±4.6
Non-castrated bulls	15,5±0,21	252,6±21,3	284±11,8	31,4±9,5	523±2.3

When studying the effect of the drug "Improvak" on live weight, according to Table 3, it was noted that before immunological castration, the live weight of bulls averaged 263.6 ± 4.6 kg, and 60 days after the manipulation 320.5 ± 9.2 kg. This amounted to an increase in live weight by an average of 34.9±12.9 kg. It should be noted that the average increase in non-castrated bulls on the farm for the same period was 31.4±9.5 kg (n=30).

Discussion

One of the ways to increase meat productivity is to reduce the sexual behavior of animals. There are various ways influencing the activity of animals. One of the optimal cost-effective methods is castration, orchidectomy of male live-stock animals. The meat of fattening castrates becomes tender, loses its unpleasant odor and taste. In castrated animals loses their violent temper, which facilitates their operation and group housing. Castration methods have both positive and negative aspects affecting both the effectiveness of castration and the increase in the live weight of animals.

Recently, study of various immunological medications that are used to suppress the sexual activity of bulls has been much considered.

There is a lot of literature information about the positive effect of castration on the meat productivity of

animals, in particular Moreira, Aline D., Siqueira, Gustavo R., Lage, Josiane F. and others [7], which indicate the beneficial effect of castration on the productivity of animals, including and immunological method. But the authors believe that the quality indicators of the carcass do not depend on the chosen method of castration.

Medications of the immunological method of castration allow for a certain time to keep the aggressive sexual behavior of animals under control by producing antibodies against gonadotropin-releasing hormone (GnRH), thereby reducing the level of testosterone in the blood of bulls. A decrease in testosterone levels, contributing to a decrease in aggressiveness, reduces injuries among fattening bulls, increases their productivity, and facilitates group housing. In addition, L.S. Leal-Karolewski, and others [17], indicate that the use of immunocastration, in addition to suppressing testosterone production, also affects the size of the testes.

Our studies showed a decrease in testosterone levels to 1.8 ± 0.6 (ngml) at day 60 after injection, which indicates the inhibition of secretion of sexual hormones. Similar results were obtained by J.L Bolado-Sarabia and others [18], who noted a decrease in testosterone levels in Holstein bulls after the application of the Bo-priva vaccine. The decrease in the amount of testosterone to a residual level is reflected in the results of studies by A. Noya and others [14].

J.A. Withoeft and others [19], note that after immunocastration of bulls there is reduction in size of testes and a decrease in spermatogenesis, which is associated with inhibition of testosterone production.

At the same time, P.H. Yamada and others [12] believe that immunocastration is a good alternative to surgical castration, since this method allows suppressing testosterone production and spermatogenesis, but is less invasive.

But at the same time, there are different opinions on the effect of immunocastration on the growth of animals according to A.D. Moreira and others [20], when comparing surgical and immunocastration, the qualitative characteristics of carcasses improve, regardless of chosen castration method.

V. M. De Freitas and others [21], note that immunocastrated animals were similar in characteristics to non-castrated animals, and had lower productive indicators.

The average daily weight gain for 2 months was 581 ± 4.6 g for immunocastrated and 523 ± 2.3 g for non-castrated was identified. The results obtained indicate a favorable effect of the vaccine on the growth and development of animals.

To suppress the sexual activity of bulls a scheme of using Improvac needs to be drawn up. We recommend 1 injection of Improvac at the beginning of May, and the second injection after 4 weeks in June, the sexual activity of bulls will be suppressed from July to September during the grazing of animals on pasture.

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Conclusion

The use of imunnocastration in bulls with a live weight of 248.6±11 to 268±12.4 kg showed that in 60 days the increase in live weight was 34.9±12.9 kg. The testosterone level 4 weeks after the first injection of the drug "Improvac" was 7.86 ± 1.9 n. gml, and after the second injection of the drug, the testosterone level decreased to 1.8 ± 0.6 ngml in 80% of animals. The data obtained allow us to recommend Improvac at a dose of 2 ml subcutaneously, with an interval of at least 4 weeks, to suppress activity in bulls.

At the same time this method is less invasive compared to surgical methods of castration. There is a rather high percentage of testosterone level reduction that accordingly affects meat productivity, which tends to increase.

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