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COMPARATIVE ASSESSMENT OF FERTILIZATION RATE OF HEIFERS AT INSEMINATION WITH SEXED SEMEN

Abstract. The article presents the results of artificial insemination of Holstein-Friesian heifers. The research was performed on a comparative analysis of the fertility of insemination of the Holstein-Friesian mating heifers according to the hormonal stimulation program and natural estrus, and the analysis of the fertility of the heifers inseminated by semen divided by sex over the 2nd estrous cycle was carried out.As a result, 133 animals were inseminated with same-sex seed and after 40-45 days during a rectal examination with an ultrasound scan, 61.6% of heifers were recognized as pregnant and corresponded to the insemination date. In the group of heifers hormonally treated, a pregnancy amounted to 53.9%. According to the results of artificial insemination of mating heifers in two estrous cycles, the average fruitfulness out of 247 recorded inseminations was 59% and the insemination rate at the end of two inseminations was 1.69, of which 1.68 in the first insemination and 1.7 in the second insemination.

Keywords: sexed semen, fruitfulness of insemination, mating heifers, Holstein-Friesian breed, pregnancy, barrenness, artificial insemination, synchronization, estrus, sexual cycle, thawing of semen, prostaglandin.

Introduction. In Kazakhstan the most important direction in the development of animal husbandry is the intensification of production, based on modern scientific achievements ensuring high productivity of animal products. The introduction of advanced technologies for the production of livestock products creates the conditions for the most complete manifestation of the genetic capacity of animals.At the same time, particular importance is attached to the development and mastering of effective methods of bio-technology, the creation on their basis of effective methods of reproduction of high-value farm animals.

Over the past decades, biological science is rapidly developing and setting up new directions that not only help to solve problems, but also outlines the paths of a fundamentally new biological production, which has long been putting production practice in front of science. The rapidly expanding knowledge of life processes not only allows these processes to be adapted for practical purposes, but also to manage them, as well as to create very promising new systems in practical terms that do not exist in nature, although they are similar to existing ones.

A drastic solution to the problem of animal reproduction is currently based on the transition to non-traditional ways of increasing fertility. For this purpose, a number of biotechnological methods are used, based on in-depth studies of reproductive function, the hormonal status of its regulation, and also on the improvement of reproduction techniques. The need to use a sexed semen in order to accelerate the breeding stock expansion in breeding farms is beyond doubt.

Currently, in practice, many farms use it, despite the relatively high cost with low fertility. Relatively average fertility of same-sex semen in comparison with the usual one is below 5 to 25%, which also depends on some external factors, as the qualification of inseminator, the general condition, and level of preparing animals, stress factors. To obtain effective results, semen producers recommend sticking to certain parameters, such as temperature and time of defrosting, terms of artificial insemination, optimal age and live weight of mating heifers, the time limit for introducing semen into the genital tract after defrosting.

Expressly recommend not to inseminate lactating cows, as well as in combination with programs of hormonal estrus synchronization, as this can lead to a significant decrease in results. In this regard, we carried out research work on a comparative assessment of the fertilization rate of mating heifers of the Holstein-Friesian breed upon the hormonal stimulation program and natural estrus, and also we analyzed the fruitfulness of insemination of the heifers with semen divided by sex in 2 estrous cycles.

The basis for performing the research work. State order by the Ministry of Agriculture of the Republic of Kazakhstan for 2018–2020. Budget Program 267 "Increasing the accessibility of knowledge and research", subprogram 101 "Program-targeted funding of research and activities" on the topic "Transfer and adaptation of technologies for automating technological processes of livestock production on the basis of model farms in dairy cattle breeding using 100 cows from different regions of the Republic of Kazakhstan".

Material and research methods. The research work was carried out on the basis of the dairy complex PZ Almaty of Talgar district, Almaty region The main breed of the dairy complex is the cattle of the Holstein-Friesian breed of German and Dutch breeding. The number of mating heifers at the time of the experiment on the farm was 263 animals aged 12 to 16 months old, with a live weight from 350 to 460 kg, of which 196 animals were selected for conducting research from April to July 2019.

The synchronization program for heifers was carried out according to the classical scheme, which provides for the injection of prostaglandin with an interval of 11 days. Artificial insemination was carried out in identifying signs of estrus 12-14 hours after the injection of the drug within 2-4 days. The property of prostaglandin drugs is based on the absorption of yellow body secreting progesterone hormone, which inhibits the subsequent start of the estrus [1, 2].

A considerable aspect of the modern technology of reproduction of cattle is hormonal stimulation [3]. On that basis, before the hormonal treatment, animals were examined rectally to determine the size and shape of the ovaries, the presence, and severity of the yellow body [1, 2]. The luteal phase of the cycle corresponds to the optimal time for an injection of drugs.Prostaglandin is administered intramuscularly at doses indicated in the instructions. This scheme allows to identify in the estrus with subsequent insemination of at least 60% of the treated livestock population with two injections of prostaglandin. As a rule, animals are bulling 48-72 hours after injection of the drug. Non-bulling animals are re-treated 10-11 days after the first injection of PG F^2-α.

Semen thawing was carried out in a water bath at a temperature of 36°C for 35 seconds and the maximum time from thawing to insemination period was no more than 10 minutes. Artificial insemination was performed once without the use of the gonadotropin-releasing hormone. For artificial insemination of Holstein-Friesian heifers, frozen-thawed semen was selected, divided by the sex of a servicing bull Marvel (Sex Ultra 4M) with a concentration of 4 million spermium in a single dose.

Research results. In dairy cattle breeding, the economically feasible efficiency of reproduction of broodstock and the use of genetically healthy livestock are of paramount importance [4]. The issue of using purebred breeding and industrial crossbreeding of cattle have a special value, in order to obtain early maturing offspring during reproduction. [5].

Currently, despite the indisputable achievements in reproductive physiology, the efficiency of reproduction has a steady tendency to decrease. In this regard, the task of the research was to study the effectiveness of artificial insemination of heifers with sexed semen in conditions of farms in Almaty region.

The practical application of frozen, sexedsemenof servicing bulls, has begun in a number of countries since 2000. At the same time, different countries have obtained unequivocal results on the fertility of females and the sex ratio in the offspring. According to researchers, when studying the effectiveness of artificial insemination of heifers with sexed semen, it was shown that fruitfulness from single insemination in three experimental farms was 25.6%, 45.3%, and 52.7% respectively, and obtaining calves from insemination with sexed semen was obtained in offspring 90.6% of females compared to 46.1% of females in the control group, inseminated by common semen [6, 7].

As can be seen from the table, at natural estrus, 133 heifers of Holstein-Friesian breed were inseminated with same-sex semen, of which during two estrous cycles (45 days) after insemination 14 animals returned to estrus. After 1.5 months (40-45 days), during rectal examination with ultrasound, 82 cows were recognized as pregnant animals (61.6% of fruitful insemination) and corresponded to the date of

Table 1 – Comparative results of insemination and pregnancy of heifers during insemination with sexed semen

Indicators	At a natural estrus, animals		Athormonal stimulation, animals	
	n	%	n	%
Selected and undergone artificial insemination	133	100	63	100
Returntoestrus	37	27.8	14	22.2
Pregnant	82	61.6	34	53.9
Dry	14	10.6	15	23.8

insemination, and 14 animals or 10.6% were dry. In the group of hormonally treated heifers, of 63 cows, 14 heifers returned to estrus and 34 heifers were pregnant in the study on ultrasound, which amounted to 53.9%, and 15 animals or 23.8% were dry.

Thus, according to the results of 2 groups of animals inseminated with same-sex frozen-thawed semen in hormonally treated heifers, the fertilization rate was lower by 7.7% - 61.6% versus 53.9% respectively.

It was established that the main factor of grouping during the work was the daily selection from the livestock of heifers as they came to estrus and, accordingly, the group of heifers selected for hormonal treatment consisted of animals which more than 1.5 months have not shown sexual signs. This means some violation of the reproductive function.

Table 2 – Results of insemination of the Holstein-Friesian heifers with sexed semen in two rounds

Indicators	Artificially inseminated, animals	Pregnant, animals	
	n	n	%
Firstartificialinsemination	196	116	59.1
Repeated artificial insemination (repeat breeding after the 1st artificial insemination)	51	30	58.8
Total	247	146	59

According to the results of artificial insemination of mating heifers in two rounds, the average percentage of fruitfulness out of 247 recorded inseminations was 59%, while significant differences in two inseminations were not observed and were 59.1 and 58.8%, respectively. At the same time, the average insemination rate at the end of two inseminations was 1.69, of which 1.68 in the first insemination and 1.7 in the second insemination.

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ЖЫНЫСЫ БОЙЫНША БӨЛІНГЕН ҰРЫҚПЕН ҰРЫҚТАНДЫРУ КЕЗІНДЕГІ ҚАШАРЛАРДЫҢ ҰРЫҚТАНДЫРЫЛУЫН САЛЫСТЫРМАЛЫ БАҒАЛАУ

Аннотация. Мақалада голштино-фриз тұқымдас қашарларды қолдан ұрықтандыру нәтижелері берілген. Гармональды ынталандыру және табиғи жыныстық күйлеу бағдарламасы бойынша голштино-фриз тұқымының шағылыстыру қашырларының ұрықтануының жемістілігін салыстырмалы талдау бойынша зерттеу жұмысы жүргізілді, сондай-ақ 2-ші жыныстық цикл бойынша жыныспен бөлінген қашарлардың тұқыммен ұрықтандырылуының жемістілігіне талдау жүргізілді. Нәтижесінде 133 бас қашарлардың бір жынысты тұқымымен ұрықтандырылып, 40-45 күннен кейін УДЗ ректальді зерттеуінде 61,6 % буаз деп танылып, ұрықтандыру күніне сәйкес келді. Гормондық өңделген қашарлардың тобы бойынша буаздық 53,9% құрады. Қашарларды қолдан ұрықтандырудың екіші жыныстық циклі нәтижелері бойынша есепке алынған 247 ұрықтандырудың орташа пайызы 59% - ды құрады және екі ұрықтандыру қорытындысы бойынша ұрықтандыру коэффициенті 1,69-ды құрады, оның ішінде бірінші ұрықтандыру бойынша 1,68 және екінші ұрықтандыру бойынша 1,7-ні құрады.

Түйін сөздер: жынысы бойынша бөлінген тұқым, ұрықтандырудың жемісті болуы, шағылыстыратын қашарлар, голштино-фриз тұқымдары, буаздық, қысырлық, жасанды ұрықтандыру, синхрондау, жыныстық күйлеу, жыныстық цикл, ұрықты жібіту, простагландин.

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СРАВНИТЕЛЬНАЯ ОЦЕНКА ОПЛОДОТВОРЯЕМОСТИ ТЕЛОК ПРИ ОСЕМЕНЕНИИ СЕМЕНЕМ РАЗДЕЛЕННОЕ ПО ПОЛУ

Аннотация. В статье представлены результаты проведения искусственного осеменения телок голштино-фризской породы. Была проведена исследовательская работа по сравнительному анализу плодотворности осеменения случных телок голштино-фризской породы по программе гормональной стимуляции и естественной половой охоте, а также проведен анализ плодотворности осеменения телок семенем разделенное по полу по 2-м половым циклам. В результате было осеменено однополым семенем 133 гол. телок, и через 40-45 дн. при ректальном исследовании на УЗИ 61,6 % были признаны стельными и соответствовали дате осеменения. По группе телок гормонально обработанных стельность составила 53,9%. По результатам искусственного осеменения случных телок по двум половым циклам средний процент плодотворности из 247 учтенных осеменений составил 59 % и коэффициент осеменяемости по итогам двух осеменений составил 1,69, из них по первому осеменению 1,68 и 1,7 по второму.

Ключевые слова: семя разделенное по полу, плодотворность осеменения, случные телки, голштино-фризская порода, стельность, яловость, искусственное осеменение, синхронизация, половая охота, половой цикл, размораживание семени, простагландин.

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