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Қазақ ұлттық аграрлық университеті

# Х А Б А Р Л А Р Ы

## ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК  
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## NEWS

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## ACCELERATED REPRODUCTION OF BREEDING STOCK USING SEXED SEMEN IN CONDITIONS OF «BAYSERKE-AGRO» LLP

**Abstract.** During the estrus, 63 heifers were inseminated with sexed semen, of which, within one estrous cycle (35 days) after the insemination, 19 animals were bulling again. After 38-40 days at the examination on the ultrasound scanner, 30 animals were determined as pregnant (47.6% of fruitful insemination) and corresponded to the date of artificial insemination, and 14 animals were dry (22.2%). Among 18 heifers treated hormonally within 35 days, 4 animals remained barren and 8 animals were pregnant, which amounted to 38.8%.

**Key words:** sexed semen, hormonal stimulation, mating heifers, Holstein breed, artificial insemination, pregnancy.

Sexed semen is the sperm of servicing bulls, divided by sex (carriage of X or Y chromosomes). The flow cytometry in the late 1970s to separate living cells through a high-speed sorter was a breakthrough in the field of livestock reproduction. In the 1980s, there were attempts to separate sperm containing the X chromosome from those containing the Y chromosome. However, at that time, there were no positive results. In 1992, the first calf was obtained using sperm, divided by sex [1, 2].

Back in the early 80s, scientists began to carry out experiments on the separation of sperm containing the X chromosome (female) or Y chromosome (male). For this, they used various methods: sedimentation, gradient centrifugation, electrophoresis, processing with specific antibodies, etc. However, in practice, the effectiveness of these methods have not been convincingly proven. Tests that were carried out on 211 farms in the United States showed that Holstein heifers fertilized by the X-containing sperm fraction gave offspring, in which there were 89% females [3].

The Cogent (UK) was the first company in the world, which began to use the method of separating the servicing bulls' semen by sex under production conditions (1999). The method of dividing semen by sex was developed by X&Y Inc. (USA). It is based on the fact that gamete (germinal cells) of bulls contain a haploid set of chromosomes. Consequently, some sex cells contain X chromosomes, and others - Y chromosomes. Gametes with the X chromosome contain 4% more of DNA than sperm with the Y chromosome. While staining chromosomes of germinal cells, it was found that gametes with X chromosomes absorb 4-5% more of stain than gametes with Y chromosomes [4].

As it is known, the economic efficiency of dairy cattle breeding is primarily based on feed payment with milk, which, in turn, is ensured by more or less comfortable conditions of housing, balanced diet and reproduction work. Reproduction is the most important task of veterinarians, as only full reproduction can safely fill the mortality or female culling, especially from experience in keeping imported cattle it is impossible to return the full health after serious illness of animals (ketosis, postpartum complications, postpartum paresis, etc.) and it is not effective to keep these animals, since subsequently, they do not pay for themselves the money spent on them (veterinary drugs, feed, etc.) [5-7].

**The foundation for the implementation of research work.** State order by the Ministry of Agriculture of the Republic of Kazakhstan for 2018 - 2020. Budget Program 267 "Increasing Accessibility of Knowledge and Research", subprogram 101 "Program-targeted funding of research and activities" on the topic "Transfer and adaptation of technologies for automatization of manufacturing 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".

**Materials and research methods.** The objects of the research were the Holstein mating heifers of Canadian breeding of the dairy unit of the Bayserke-Agro LLP of the Talgar district, Almaty region.

To carry out artificial insemination with same-sex semen, animals (12 months old heifers, with a live weight of 360 kg) were used naturally during the estrus (63 animals), as well as using hormonal stimulation according to the Ovsynch program (18 animals). The main points of the scheme are the introduction on day 0 of gonadotropin-releasing hormone, on the 7-9 days, the introduction of prostaglandin F<sub>2-α</sub> drugs and artificial insemination after 56 hours. According to this scheme, animals can be inseminated without signs of estrus and mating call. Prostaglandin is administered intramuscularly at doses indicated in the administration manual, as a rule, animals become bulling 48-72 hours after the drug injection.

Artificial insemination of heifers with sexed semen was carried out up to 3 times, after the third unfruitful insemination of heifers, they were taken into account and in subsequent estrus, they were inseminated with ordinary semen.

**Research results.** The effectiveness of the use of semen divided by sex is the main factor of its limited distribution in the production in Kazakhstan. The main reason for this is the lack of highly qualified specialists in the field of reproduction. The concentration of this semen is ten times lower than the ordinary one, and in the course of preparation it undergoes several stress factors that adversely affect the fertilizing ability of sperm. These are the staining of each sperm cell, laser cytometry at the division, cryopreservation and thawing, which ultimately reduce the fertilizing and viable traits, although the semen of the highest quality and high fertility is used for sexing. With the existing methods of insemination in cattle breeding, the fertilization of cow ova reaches, on average, 85%, with fluctuations from 60 to 90%. With these indicators, only 45% of the fruitfully inseminated (after single insemination) cows bring calves. With this in mind, the level of pregnancy, recorded three months after single insemination, reaching 55%, is considered a very good indicator.

In dairy cattle breeding, the economically feasible efficiency of breeding stock reproduction is of exceptional importance. Currently, despite the undoubted achievements in reproductive physiology, the efficiency of reproduction has a steady tendency to decrease. In this sense, embryonic mortality is considered the main factor for the low reproductive activity of the livestock, resulting in significant economic costs.

As can be seen from the table, during the natural estrus 63 heifers were inseminated with sexed semen, of which, within one estrous cycle (35 days) after the insemination, 19 animals were bulling again. After 38-40 days at the examination on the ultrasound scanner, 30 animals were determined as pregnant (47.6% of fruitful insemination) and corresponded to the date of artificial insemination, and 14 animals were dry (22.2%). Among 18 heifers treated hormonally within 35 days, 4 animals remained barren and 8 animals were pregnant, which amounted to 38.8%.

Analyzing, we can come to the conclusion that the result of the fruitful insemination of heifers during the natural estrous cycle exceeds the indices of insemination during hormonal stimulation by 8.8%. At the same time, in 30% of unfertilized heifers, a repeated estrus was revealed, which were further inseminated,

Results in insemination with sexed seed and pregnancy of Holstein heifers

Indicator	At natural estrus		At hormonal stimulation	
	n	%	n	%
Total artificial inseminations	63	100	18	100
In repeated estrus	19	30	4	22.2
Pregnant	30	47.6	7	38.8
Dry	14	22.2	8	44.4

whereas with hormonal stimulation, only 22.2% of animals became bulling again (repeated estrus), and 44.4% of heifers were found barren. It should be noted that the number of heifers for hormonal stimulation was selected from the number of animals that were without signs of estrus for more than 30 days, which is probably the reason for the relatively low percentage of fruitfulness due to some dysfunction of the germ glands. In the future, it is advisable to use a progestogen stimulation scheme for these groups of animals to more effectively use the sexed semen.

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### **ЖШС «БАЙСЕРКЕ-АГРО» НЕГІЗІНДЕ АНАЛЫҚ МАЛДЫ БІР ЖЫНЫСТЫ ҰРЫҚТЫ ҚОЛДАНУ НӘТИЖЕСІНДЕ ЖЕДЕЛТЕТІП БАСЫН ӨСІРУ**

**Аннотация.** Табиғи күйлеу кезінде біржынысты ұрықпен 63 бас қашарлар қолдан ұрықтандырылды, оның ішінде бір жыныстық айналым (35 күн.) ұрықтандырудан кейін 19 бас қайта күйледі. 38-40 күн өткеннен кейін, УДЗ сканерінде зерттеу нәтижесінде 30 бас буаз деп танылды (47,6% тиімді ұрықтандырылды) және де қолдан ұрықтандыруы әдісі өз күніне сәйкес келді, ал 14 бас қысыр (22,2%) болып шықты. Қашарлар тобында, 35 күн ішінде, гормоналды өңделген 18 бастан 4 бас қайта күйледі, 8 бас зерттеу кезінде буаз болып шықты – 38,8% құрады.

**Түйін сөздер:** бір жынысты ұрық, гормоналды ынталандыру, қашарлар, голштин тұқымы, қолдан ұрықтандыру, буаз.

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Москва, Россия

### **УСКОРЕННОЕ ВОСПРОИЗВОДСТВО МАТОЧНОГО ПОГОЛОВЬЯ НА ОСНОВЕ ИСПОЛЬЗОВАНИЯ СЕКСИРОВАННОЙ СПЕРМЫ В УСЛОВИЯХ ТОО «БАЙСЕРКЕ-АГРО»**

**Аннотация.** По естественной охоте было осеменено сексированным семенем 63 гол телок, из них в течение одного полового цикла (35 дн.) после осеменения пришли в повторную охоту 19 гол. По истечение 38-40 дн. при исследовании на УЗИ сканере 30 голов были признаны стельными (47,6 % плодотворного осеменения) и соответствовали дате проведения искусственного осеменения, а 14 голов были яловые или 22,2%. По группе телок гормонально обработанных из 18 гол. в течение 35 дней повторно перегуляло 4 гол. и 8 гол. при исследовании были стельные, что составило 38,8%.

**Ключевые слова:** сексированное семя, гормональная стимуляция, случные телки, голштинская порода, искусственное осеменение, стельность.

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