Reproducing the qualities of cows with different methods of synchronization of sexual hunting

I V Serdyuchenko¹, TA Khoroshailo¹ and YA Kozub²

¹Kuban State Agrarian University named after I.T. Trubilin, 13 Kalinin street, Krasnodar, 350044, Russian Federation
²Irkutsk State Agricultural University named after A.A. Ezhevsky, Irkutsk, 664038, Russian Federation

E-mail: yulia_a72@mail.ru

Abstract. Increasing the intensification of herd reproduction is one of the main ways of increasing the number of beef cattle, increasing beef production, and reducing its cost. The main task in the reproduction of the herd is the annual receipt of a viable calf from each cow and heifer. One of the methods to increase reproductive functions is the use of hormonal drugs, analogues of sex hormones. Synthetic hormonal preparations in dairy cattle breeding are used to synchronize sexual hunting, ovulation and calving, to intensify the sexual functions of uterus (inducing superovulation, shorten the service period, etc.) and to treat pathologies of the ovaries, endometritis, and other disorders of the sexual apparatus of cows and heifers. The article presents the results of applying two synchronization schemes of sexual hunting in Holstein cows in an industrial dairy farm. In the first group, the Pre-synch scheme was used, in the second – «Ovsynch». The schemes differed in that the «Pre-synch» is longer and more costly, but it begins to be used from 21 days after calving. According to the results of the synchronization of sexual hunting of both groups, results were obtained on milk productivity. In the first group, baseline fat milk was produced for 305 days of lactation, 9411.0 kg of milk, in the second - 7785.0 kg. Considering all the costs of synchronizing sexual hunting in Holstein cows, profitability in the control group was 24.8%, in the experimental group - 19.2%.

The global economic crisis associated with the imposition of sanctions makes the country even more dependent on food supplies, especially meat and dairy products. To increase the production of milk and beef, the decisive role is played by breeding, raising the quality indicators of artificial insemination of animals, choosing the timing of insemination of females, methods for identifying sexual hunting, methods of artificial cows and heifers using sperm of various packaging and choosing optimal doses significantly complements the possibilities of increasing production agricultural products. The widespread use of high-quality sperm doses in agricultural production contributes to an increase in animal productivity and the production of high-quality final products. A limiting factor in the intensive development of dairy cattle breeding, both in our country and abroad, remains the realization of the reproductive potential of cows. Reducing the use of cows, reducing the number of young stocks and reducing reproduction rates in most specialized farms requires the search for simple and effective approaches to solve this problem [1].

For the correct solution of the issues of herd reproduction and increasing the output of livestock products, it is important that the herd structure is consistent with the industry's specialization in this
industry. The direction of specialization depends on natural conditions, the level of development of the economy and the state order for the supply of certain types of products [2].

A limiting factor in the intensive development of dairy cattle breeding, both in our country and abroad, remains the realization of the reproductive potential of cows. Reducing the terms of use of cows, reducing the number of young stocks and reducing reproduction rates in most specialized farms requires the search for simple and effective approaches to solve this problem [3].

In conditions of industrial milk production and increased productivity in cows, an increase in the length of the inter-hotel period is noted. This is due to a slightly longer process of uterine involution after calving in highly productive animals and lengthening of the service period due to insufficient detection of animals in hunting [4, 5].

Most of the life of a mature female takes place at the stage of sexual dormancy (anestrus). Puberty, as well as periods associated with pregnancy and lactation, in general, take longer than relatively short periods of sexual activity. However, the focus is on precisely these periods. At this time, a person often intervenes in the reproductive process and therefore identifies most of the problems associated with the reproduction of animals. The course of calving and the postpartum period is one of the main critical periods that determine how quickly the animals show the next sexual hunt, and, accordingly, the probable fertilization [1].

The economic effect of the introduction of artificial insemination is quite high due to the widespread use of valuable producers that can increase dairy, meat and other types of animal productivity [6].

With increasing productivity of cows, it is becoming increasingly difficult to identify signs of sexual hunting. Farms lose a lot of money because the time for artificial insemination of animals is unreliably identified. Scientists advise how to do this most efficiently, at a lower cost [5].

In connection with the foregoing, the aim of the work was to study the reproductive qualities of Holstein cows with different ways of synchronizing sexual hunting. The studies were conducted in a dairy farm on 100 heads of Holstein breed heifers synchronized according to different schemes.

The first group (control) included heifers synchronized by the Pre-synch program, it included 50 goals; the second (experimental) - heifers synchronized under the Ovsynch program with the same number of heifers with a daily productivity of 20-25 liters of milk calving 60 or more days ago. Before the start of synchronization, a selection of suitable heifers was carried out, formed into groups and assigned personally to one specialist in artificial insemination of cows.

In preparation for synchronization, a technical task was generated for each of the formed groups, including information on cow numbers, drug administration date, insemination date and time. All experimental animals were subjected to mandatory rectal examination. First-calves were of optimal fatness, not in a state of negative energy balance and obesity. The dairy farm where the synchronization was carried out was equipped with all the necessary hormonal preparations, syringes, needles and other items necessary for a clear and continuous procedure in accordance with the schemes.

The synchronization of hunting of heifers of both groups was carried out according to the schemes indicated in tables 1 and 2.

| Group | Sex hunt synchronization program «Pre-synch» |
|-------|---------------------------------------------|
|       | Fertagil (or equivalent) 2.5 ml, i/m | Estrumate (or equivalent) 2.0 ml, i/m |
| Control in the morning before 08-00 | in the morning before 08-00 |
|       | Fertagil (or equivalent) 2.5 ml, i/m | Estrumate (or equivalent) 2.0 ml, i/m |
|       | Planned artificial insemination in the morning before 08-00 | |
|       | 20.02.2018 | 04.03.2018 |
|       | 11.03.2018 | 13.03.2018 |
|       | 14.03.2018 | |
Table 2. «Ovsynch» Sex Hunt Synchronization Program.

| Group               | Sex hunt synchronization program «Ovsynch» |
|---------------------|-------------------------------------------|
|                      | Fertagil (or equivalent) 2.5 ml, i/m | Estrumate (or equivalent) 2.0 ml, i/m | Fertagil (or equivalent) 2.5 ml, i/m | Planned artificial insemination in the morning before 08-00 |
| Experienced         | 20.02.2018                   | 27.02.2018                   | 01.03.2018                   | 02.03.2018                   |

The universal basic scheme is suitable both for cows in the period of 60-100 days after calving, and for repeatedly inseminated (150 or more days of lactation).

Currently, in many farms, based on the «Ovsynch» program, several modifications and other more complex programs for synchronizing sexual hunting have been developed and are widely used. At the dairy farm under consideration, the «Pre-synch» synchronization program has been introduced. It is the most time-consuming (artificial insemination of cows is carried out on the 14th day from the start of synchronization), labor and funds (injections are made 4 times). However, it can already be used starting from the twenty-first day after calving.

Given the positive and negative aspects of the «Ovsynch» and «Pre-synch» schemes, we adopted an approach with comprehensive diagnostics before setting up an experiment. On a tethered farm for 480 fodder cows, double milking and mechanical removal of manure. After synchronization, the heifers of both groups inseminated them twice, taking into account signs of sexual hunting by the visocervical method. The paper used materials of primary veterinary accounting; information from sensors, «Afimilk» software.

In conditions of industrial milk production, the problems of reproduction of the breeding stock come first. According to Mironchik S.V. [5] if we want a high yield of calves, it is necessary to learn to clearly identify the signs of sexual hunting, to determine the feasibility of insemination of each specific cow.

The effectiveness of the identification of sexual hunting within 24 days after the start of the planned insemination of cows in the herd should be at least 70-80%. Then we can talk about achieving the optimal level of detection of sexual hunting. But in large dairy complexes, this indicator currently ranges from 30 to 56%. And only for this reason, enterprises receive less than 6 to 12 calves per 100 cows per year [4].

Therefore, many farms are beginning to use the method of synchronizing sexual hunting, believing that this will help to significantly increase the calf yield. Moreover, often without taking into account the factors necessary for the successful application of this method and, as a rule, the result is a negative result [5].

In our studies, the yield of calves, depending on the use of different synchronization schemes for sexual hunting of Holstein cows, is presented in table 3.

Table 3. The efficiency of insemination of cows in their synchronization.

| Indicator                                         | Group experienced | Experienced to control, ± |
|---------------------------------------------------|-------------------|--------------------------|
| It was inseminated in all, goals                   | 50.0              | -3.0                     |
| Fertilized cows from 1 time, goal                  | 36.0              | 15.0                     |
| % fertilization from the first insemination, goals | 72.0              | 16.0                     |
| Fertilized cows from 2 times, goal                 | 11.0              | 8.0                      |
| % fertilization from the second insemination, goals| 22.0              | 8.0                      |
| Not fertilized, goals                              | 3.0               | 2.0                      |
| The output of calves,%                             | 94.0              | 8.0                      |
According to the experimental design, artificial insemination of first-calf cows was carried out. Then it was revealed that the first time 36 were fertilized in the first group and 28 goals in the second. The percentage of fertilization was 72.0 and 56.0 percent, respectively.

Continuing the analysis of Table 3 and Figure 1, we see that the group of cows synchronized according to the Pre-synch pattern fertilized 11 goals (22.0%) the second time, and in the group of cows synchronized according to the Ovsynch program 15 goals (30.0%). However, the indicator of productive qualities of Holstein cows indicates that in the first three heads were not fertilized at all, in the second - 5 heads, after which they were rejected from the broodstock.

Differences in milk production are due to the conditions of feeding, keeping, exploiting animals and the level of breeding with each herd. The potential of breeds bred in the farms of our country is high [2]. Data on milk productivity for the second lactation are presented in table 4.

| Indicator                        | Group       | Experienced | Experienced to control |
|----------------------------------|-------------|-------------|------------------------|
| Live weight of cows, kg          | control     | 557.0±9.2   | 543.0±10.6             | 97.4%                  |
| Milk yield for 305 days of lactation, kg | experienced | 7619.0±11.6 | 6966.0±14.8 | 91.4%                  |
| Fat content, %                   | control     | 4.2         | 3.8                    | -0.2 abs. %            |
| The protein content, %           | control     | 3.4         | 3.2                    | -0.2 abs. %            |
| Base milk yield, kg              | experienced | 9411.0      | 7785.0                 | -1626.0 kg             |

From table 4 we see that in the second lactation, the cows of the control group also had an advantage in milk yield, 7619.0±11.6 and 6966.0±14.8 kg, respectively. The difference with the peers of the experimental group was 653.0 kg of milk.

When analyzing the second lactation, we see that the quantitative and qualitative indicators of milk productivity are increasing. But the advantage remains for the cows synchronized according to the «Pre-synch» scheme, as they had a reduced service period and calving to a greater extent occurred earlier.

In the vast majority of cases, postpartum diseases arise as a result of a violation of normal conditions of keeping, feeding animals and caring for them. In the absence or deficiency of vitamins and minerals in the feed, pathologies such as retention of the placenta, prenatal and postnatal bedding of cows, etc. [4] arise.

Feeding and keeping cows at the dairy farm where the studies were conducted meets all feeding standards and keeping requirements in conditions of loose housing. But upon completion of our research, we established some observation in terms of the occurrence of any postpartum pathologies in cows.
In general, in both groups of the studied cows, the incidence was not observed in animals after calving. Only one cow from the control group suffered from prolapse of the uterus, after which she was provided with timely assistance. Apparently, this was due to large-fruited. And in the experimental group after calving, one cow had a delay of the afterbirth for 22 hours, but this ailment was also eliminated by a veterinarian.

The appearance of mastitis in cows is facilitated by washing the udder with contaminated water, incomplete delivery of milk, violation of the vacuum regime, various malfunctions of teatcups, overcooling of the udder and other reasons. In our case, in both groups isolated cases of mastitis were detected, but to a mild degree.

The calculation of the economic indicators of milk production shows that more profit was gained from the cows of the control group as a whole. Therefore, 7619.0 kg was received from them of basic fat content, which is 653.0 kg more than from experimental cows. The money spent on milk was also greater in the first group, since the veterinary drugs were spent more for synchronization according to the Pre-synch scheme. This figure was 6.2 thousand rubles higher. Other direct costs of maintaining one cow of the control group were 0.6 thousand rubles higher than in the control. Hence, the profitability level in the control group was 24.8%, in the experimental group - 19.2%; the difference is 5.6 absolute percent.

References
[1] Khakimov I N, Yunusheva T N and Mudarisov R M 2011 Improving reproductive qualities and synchronizing sexual hunting of cows and heifers Bulletin of the medical institute «REAVIZ»: rehabilitation, doctor and health 2 32-6
[2] Kuznetsova E A 2011 The use of new hormonal agents to synchronize sexual hunting in cows of meat breeds Integration processes in science, education and agricultural production - the key to the successful development of the agro-industrial complex materials of the International Scientific and Practical Conference 4 284-6
[3] Garbuzov A A, Yushkovsky E A and Rubanets L N 2009 Comparative effectiveness of various methods of synchronizing sexual hunting in cows Scientific notes of the educational institution of the Vitebsk Order Badge of honor State Academy of Veterinary Medicine 45(2-1) 157-9
[4] Mironchik S V 2019 Synchronization of sexual hunting in cows using the Ovsynch 48 and Ovsynch 56 protocols Epizootology, immunobiology, pharmacology and sanitation 1 10-4
[5] Gavrichenko N 2014 Synchronization of sexual hunting in cows Belarusian agriculture 11 48-51
[6] Podoinitsyna T A and Kozub Y A 2019 Regular changes in hematological and biochemical indicators and immunogenetic certification of yak blood introduced in new conditions IOP Conf. Series: Earth and Environmental Science 315 042007