Veterinary and hygienic methods of directed reproduction in formation of healthy herds of cows

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Abstract. Our work provided for the study of the impact of directed reproduction of cows on the formation of highly productive healthy herds in the basic farms of the Republic of Kazakhstan. For accelerated replacement of herd and increase of number of highly productive cows in large farms for milk production one uses sexed semen at the first and the second insemination of primiparous cows obtained from highly productive mothers. The efficiency obtained from using this technique is 65-95% of individuals of the desired sex. Insemination was carried out by recto-cervical method using a tool AlphaVision frozen-thawed sexed semen divided by sex. The highest results of the fruitfulness of insemination with sexed semen in Agricultural production cooperative “Breeding Plant Almaty”, Individual entrepreneur “Karimov” and Kakpatas Kordai were obtained in the autumn-winter period and ranged from 58.1 to 65.2%, with an insemination index of 1.58-1.72. Economic efficiency when using the technology of artificial insemination of calves with sexed semen amounted to 10,040.2 tenge. When using sexed semen, an average of 92% of calves were obtained from bovine. Less insemination costs, the profit from calf production amounted to 76,109.2 tenge.

1. Introduction

Intensive animal husbandry involves annually replenishing the dairy herd with replacement heifers by 25-30%, therefore, science and practice have always been faced with the task of obtaining the maximum number of calves in offspring [1]. One of the modern methods used in animal husbandry is the use of sexed semen. Analysis of the literature shows that this method has both advantages and disadvantages. Therefore, the study of the effect of the sexed semen on the reproduction qualities of animals is relevant [2].

Sexed semen is produced by sorting X- and Y-chromosome bearing sperm. Revolutionary in the field of livestock reproduction was the invention in the late 1970s of the flow cytometry method for separating living cells through a high-speed sorter. In the 1980s, there were attempts to separate sperm cells containing X chromosomes, but at that time they did not receive positive results. In 1992, when using semen divided by sex, they received the first calf [3].

The effectiveness of the use of the seed, divided by sex, the main factor of its limited distribution in production practice, the main reason for this is the lack of highly qualified specialists in the field of reproduction. The concentration of such seed is ten times lower than usual, and the seed undergoes several stress factors during preparation that adversely affect the fertilizing capacity of sperm. This is staining of each sperm, laser cytometry at division, cryopreservation and thawing, which ultimately reduce fertilizing and viable properties, although the seed of top-quality and high-fertilizing bulls is
used for sorting sperm. With existing insemination methods in cattle breeding, the fertilization of cow eggs reaches an average of 85%, with ranges from 60 to 90%. With these indicators, only 45% of fruitfully inseminated (after a single insemination) cows are brought by calves. Pregnancies from a single insemination averaging 55% is a good indicator of insemination success.

For accelerated replacement of herd and increase of number of highly productive cows in large farms for milk production one uses sexed semen at the first and the second insemination of primiparous cows obtained from highly productive mothers [4]. But sexed semen has one important feature: the concentration of such a seed is ten times lower than usual and undergoes several stress factors during preparation that adversely affect the fertilizing ability of sperm. This is staining of each sperm, laser cytometry at division, cryopreservation and thawing, which ultimately reduces the fertilizing properties and viability of sperm, although the seed of top-quality and high-fertilizing bulls is used for sorting sperm. With existing insemination methods in cattle breeding, the fertilization of eggs reaches an average of 85%, with ranges from 60 to 90%. With these indicators, only 45% (with a single insemination) of fruitfully inseminated cows bring calves. With this in mind, the percentage of steeliness recorded three months after a single insemination, reaching 55%, is considered a good indicator [5].

In this regard, before insemination, the heifers undergo a thorough selection: at 12 months the fatness is determined and the height in the sacrum is measured, at 12.5 months an ultrasound examination of the genitals is done to detect gynecological diseases [6]. Thus, for insemination, healthy heifers aged 13 months with sufficient growth and strength are selected. Heifers with gynaecological diseases are not allowed for insemination with sexed semen.

Against the background of the intensification of the dairy cattle breeding industry, the reproductive qualities and terms of economic use of cows, especially foreign breeding, are decreasing, and there is also insufficient receipt of repair calves for herd turnover in farms [7].

For dairy cattle breeding, it would be more profitable for more calves to be born to cows in offspring. This problem is especially relevant for the current state in dairy cattle breeding, since due to the intensification of this industry and a decrease in productive longevity, in particular the reproductive qualities of imported cows, there is insufficient receipt of replacement calves in farms necessary for the expanded replenishment of the herd [8]. Therefore, the introduction and widespread use of sexed semen in the reproduction of dairy cattle is the most effective solution [9].

The purpose of this work is to study the influence of the use of sperm divided by sex on the formation of highly productive healthy herds of cows in the basic farms of the Republic of Kazakhstan.

2. Materials and methods

Research work was carried out in the basic farms of the Republic of Kazakhstan: Agricultural production cooperative (APC) “Breeding Plant Almaty”, Individual entrepreneur (IE) “Sadykov”, Individual entrepreneur “Karimov”, Limited liability partnership (LCC) “Tastobe AgroFood” of Almaty region, Limited liability partnership “Kakpatas-Kordai” of Zhambyl region, Limited liability partnership “Borte Milka” of the Turkestan region and Collective farm “Zaitenov” of the East Kazakhstan region. For artificial insemination, a calf of 12-14 months of age was chosen with a body weight of 360 kg and primiparous cows of Holstein, Simmental, Schwitz and black and mothe breed. Insemination was carried out by a recto-cervical method by means of the device Alfavision it is frozen – the thawed seed divided on a floor: Marvel (551HO03444), DENALI Reg (151HO000769), BALDWYN Reg (151HO000731), ECHO-RED Reg (551HO03547), MEGA-JET Reg (151HO03262), SHUT-OUT Reg (076HO00712), JACKNIFE Reg (551HO03357), OPTIC Reg (151HO03478) of production ST Genetics, USA.

Rectocervical insemination method provides artificial insemination of cows or calfs, in which sperm is introduced with the help of sterile disposable tools into cervix, fixing it by hand through rectum. This method enables to obtain a high percentage of fertilization – up to 75%. Before insemination, you can examine the condition of the internal genitals. In addition, the possibility of
infection of animals is significantly reduced, since mainly disposable instruments used.

AlphaVision is a tool for insemination of cows and calves. This insemination gun is equipped with a camera that allows the operator to diagnose before the insemination process. Using the AlphaVision system, for example, it is possible to diagnose metritis or vaginitis. This tool is intended for insemination technicians.

Insemination of cows and calves with the tool AlphaVision is carried out as follows:

- Before insemination, make sure that there is a leak, check the presence and quality of cervical mucus.
- Locate the cervical entrance and administer Alpha sheath cannula without difficulty.
- Without difficulty, pass the cervical rings due to the fact that the absence of rectal palpation limits cervical contractions.
- Place the seed in the proper position: after the introduction of the cannula, Alpha sheath does not leave the cervix.
- Limit the risk of intrauterine infection with vaginal bacteria due to the fact that the cannula does not contact the vaginal walls.

In addition, the following preventive measures can be carried out using the AlphaVision system:

- Cervical diagnosis: visualize metritis, tissue damage, pus, cervical involution, etc.
- Keep photos and share them with reproduction consultants to regularly and accurately monitor the health of your herd.
- If infected, use the AlphaVision system for simple and reliable use of drugs.
- Monitor the signs of the leak by checking the quantity and quality of cervical mucus.
- Choose the best time for insemination and shorten the interval between births by looking for cervical repair.

The AlphaVision tool allows reducing the risks of musculoskeletal pain in animals, reducing the number of rectal palpations and their duration, reducing the level of stress of animals, reducing the number of uterine contractions during insemination, limiting injury during insemination of animals, using an image of the cervix on the screen to guide its actions.

For insemination of cows and calves, a sexed seed was used. The production of sexed semen is based on the difference in DNA (deoxyribonucleic acid) content between male and female chromosomes, as a result they are of different sizes.

Staining occurs with a Hoechst 33342 (H33342) staining agent that penetrates the cell membrane and binds selectively to A/T (adenine/thymine) the pairs of nitrogenous bases. This staining agent shows relatively high accuracy for determining the amount of DNA in living cells by flow cytometry. A flow cytometer is used to quantify the DNA content of sperm.

DNA molecules bound to H33342 dyes are excited by the laser while the sperm passes two fluorescent detectors that measure fluorescence intensity. The strength of fluorescence signals depends on the number of fluorescent molecules associated with DNA, which allows the differentiation of X- and Y-sperm. Gametes with the X chromosome contain DNA 4% more than sperm with the Y chromosome. The amount of dye absorbed depends on the level of fluorescent radiation that is captured by the computer, which allows you to determine the X and Y chromosomes.

Every month, an obstetric-gynaecological examination of cows is carried out in farms. Obstetric and gynaecological medical examination is a set of diagnostic, therapeutic and preventive measures aimed at preventing, early detection and treatment of animals with diseases of the genital organs and breast, increasing their fertilization and productivity.

When performing the reproduction analysis, herds of cows are divided into 8 groups: 1) pregnant; 2) in the postpartum period (2-3 weeks after childbirth); 3) inseminated but not tested for pregnancy; 4) those who do not come into sexual hunting after childbirth after 25-30 days or more; 5) with regular sex cycles, repeatedly inseminated, but not fertilized; 6) with impaired sexual cycle; 7) with clinically pronounced genital pathology; 8) with clinical signs of mastitis. This segregation allows for a more skilled and differentiated approach to the diagnosis and prevention of infertility and adulthood. This
grouping allows for a more skilled and differentiated approach to the diagnosis and prevention of infertility.

A history is collected and a clinical examination of animals is carried out. Information is obtained from persons who constantly monitor animals (milkmaids, operators, orderlies) and checking entries in books, magazines and cards. Clinical examination of the animal is external and internal genital examination.

During obstetric-gynecological examination of animals laboratory studies are carried out: bacteriological and serological control of exudate from vagina, uterus, cervix in order to detect pathogenic and conditionally pathogenic microorganisms.

Analyze reproduction of herd, investigate infertile cows through a rectum, using the device ultrasonography DRAMINSKI iScan to establish the causes of infertility. When diagnosing mastitis, clinical examination of udder with detailed milk milking is carried out. To diagnose hidden mastitis in milking cows, 5 % aqueous solution of dimastin or 2% aqueous solution of mastidine is used.

Diseases such as endometritis, follicular cyst and ovarian hypofunction in cows were determined by clinical examination of animals. Endometritis in cows is inflammation of the lining of the uterus. The disease most often occurs after childbirth, on day 3-10 when a pathogenic microflora enters the sexual tract. Diagnosis of endometritis is carried out as follows: external examination of the genitals, vaginal palpation of the genital tract or palpation of the genital tract through the rectum.

In endometritis, the following clinical signs are observed:

- In the secretions there are elements of tissues with a rotten smell and uncharacteristic yellow color.
- The animal loses its appetite, the body temperature drops sharply, by 1-2 degrees.
- The cow is in the same position for a long time, bends and groans.
- With the development of pathology, secretions become cloudy gray, with impurities of pus.
- Gray dried crusts are noticeable on the external genitals.
- Vaginal examination shows that the walls of the uterus are dense and swollen, the organ itself is enlarged and lowered, the uterus is not shrink.
- In acute fibrotic disease, there is fibrin in pus, which crunches when pus is rubbed with fingers.

Diagnosis of follicular cysts and ovarian hypofunction is made with palpation of the ovaries through the rectum and their ultrasound. The clinical signs of these diseases are characterized by nymphomania and anaphrodisia (lack of stages of the sex cycle) in cows.

Ovarian cysts are rounded spherical cavities formed in the ovary from follicles or yellow bodies as a result of rebirth and atrophy of their elements. Ovarian hypofunction is a dysfunctional ovarian condition that occurs with a weakening of hormonal and generative ovarian function.

The insemination index of cows and calves is the number of inseminations before fertilization. It is calculated by dividing the total number of insemination by the herd by the number of pregnancies. To identify cows in the hunt, bulls-samplers were used. For this, the sampler was released daily in the morning and evening into the sunbeds, where barren cows, recently inseminated and recently breeders, are located. At this time, animals are carefully monitored. If the female admits the garden of a bull-samplers, hunting is considered identified. Such a cow is removed from the chase so that the sampler can find other females in the hunt.

Before insemination, cows were subjected to hormonal stimulation. The method of stimulating the sexual function of cows with hormonal drugs gives positive results. When causes of infertility are detected, depression of sexual functions sometimes continues. In this case, it is advisable to use means to activate the sexual function of cows and calves. Hormonal drugs from the group of gonadotropins (surphagon) and prostaglandins (estropane) proved to be good. Various regimens for the use of these drugs for the treatment of obstetric and gynecological diseases of cows and the stimulation of sexual function make it possible to reduce the time for the restoration of the genital organs of cows after calving and prepare the ovaries for insemination.

Fruitfulness of insemination of cows and calves is determined rectally by means of ultrasound of
apparatus on 40-45 day after insemination. Using an ultrasound scanner, you can make an early diagnosis of pregnancy, observe changes in the genitals of the cow: in the uterine cavity you can see a developing embryo, in one of the ovaries there is a yellow body of pregnancy, the cervix is tightly closed, it has neck mucus. The digital data of the experiments were processed a personal computer in Microsoft Excel.

### 3. Results and discussion

The effect of artificial insemination of calves and primiparous cows with sexed semen is presented in table 1. Against the background of hormonal stimulation of sexual hunting, there is a decrease in the fruitfulness of insemination by an average of 4.72 % (51.43 % versus 56.15 %).

**Table 1. Results of artificial insemination of calves and primiparous cows with sexed semen.**

| Indicator | APC "Breeding Plant Almaty" | IE "Sadykov" | IE "Karimov" | LLC “Tastobe AgroFood” |
|-----------|-----------------------------|--------------|--------------|------------------------|
| In natural hunting, goal | | | | |
| calf | n | % | heifer | n | % | calf | n | % |
| Selected and insemination performed | 53 | 100 | 63 | 100 | 41 | 100 |
| Repeated libido | 13 | 24.5 | 30 | 47.6 | 14 | 34.1 |
| Pregnant | 35 | 66.03 | 17 | 26.9 | 24 | 58.5 |
| Non-pregnant | 5 | 9.43 | 16 | 25.4 | 3 | 7.3 |
| Against the background of hormonal stimulation, goal | | | | |
| Selected and insemination performed | – | – | 37 | 100 | – | – |
| Repeated libido | – | – | 19 | 51.35 | – | – |
| Pregnant | – | – | 10 | 27.03 | – | – |
| Non-pregnant | – | – | 8 | 21.62 | – | – |
| Selected and insemination performed | 54 | 100 | 34 | 100 | 12 | 100 |
| Repeated libido | 7 | 12.96 | 15 | 44.12 | 2 | 16.66 |
| Pregnant | 31 | 57.40 | 15 | 44.12 | 7 | 58.34 |
| Non-pregnant | 16 | 29.64 | 4 | 11.76 | 3 | 25 |
| Selected and insemination performed | 54 | 100 | 27 | 100 | 19 | 100 |
| Repeated libido | 12 | 22.22 | 14 | 51.85 | 4 | 21.05 |
| Pregnant | 29 | 53.70 | 7 | 25.93 | 8 | 42.10 |
According to the results of artificial insemination of primiparous cows during the first sexual hunt, the fruitfulness of insemination with a sexed semen amounted to 29.11%, which is significantly lower than the fruitfulness of insemination with ordinary seeds, which in farms ranges from 39 to 47%. The results show that insemination of cows by seed divided by sex is low.

The sex to live weight ratios of the offspring obtained by insemination with sexed semen are shown in table 2. Weighing of calfs and gobies was carried out on scales for weighing animals Hener-2.0 (1000x2000). Weighing of calfs and gobies is done 6 hours after birth.

From the presented table 2 it follows that for 2019-2020 in the APC “Breeding Plant Almaty” out of 222 head, 207 head were fruitfully inseminated with sexed semen, which amounted to 93.3% of the herd. The insemination index turned out to be 1.66, with an average fruitfulness of artificial insemination of 60.7%. In IE “Karimov” out of 98 heads, 90 heads, or 91.5% of the total number, were fruitfully inseminated with sexed semen. The insemination index was 1.72, with an average fruitfulness of artificial insemination of 58.6%. In LLC “Kakpatas-Kordai”, of 72 heads, 67 were fruitfully inseminated, or 93.0% of the total number. The insemination index was 1.69, with an average fruitfulness of artificial insemination of 59.1%.

| Non-pregnant | 13 | 24.07 | 6 | 22.22 | 7 | 36.85 |
|--------------|----|--------|---|--------|---|-------|
| LLC “Kakpatas-Kordai” | 43 | 100 | 27 | 100 | 30 | 100 |
| Selected and insemination performed | 12 | 27.90 | 13 | 48.15 | 5 | 16.66 |
| Repeated libido | 21 | 48.86 | 7 | 25.93 | 13 | 43.34 |
| Pregnant | 10 | 23.25 | 7 | 25.92 | 12 | 40 |
| Non-pregnant | 61 | 100 | 25 | 100 | 14 | 100 |
| LLC “Borte Milka” | 8 | 13.11 | 12 | 48 | 2 | 14.29 |
| Selected and insemination performed | 38 | 62.29 | 6 | 24 | 6 | 42.86 |
| Repeated libido | 15 | 24.56 | 7 | 28 | 6 | 42.85 |
| Non-pregnant | 52 | 100 | 24 | 100 | 24 | 100 |
| KF “Zaitenov” | 8 | 15.39 | 10 | 41.67 | 3 | 12.50 |
| Selected and insemination performed | 24 | 46.15 | 7 | 29.17 | 14 | 58.33 |
| Repeated libido | 20 | 38.46 | 7 | 29.16 | 7 | 29.16 |
| Pregnant | 317 | 100 | 237 | 100 | 140 | 100 |
| Non-pregnant | 60 | 18.93 | 113 | 47.68 | 30 | 21.43 |
| Repeated libido | 178 | 56.15 | 69 | 29.11 | 72 | 51.43 |
| Pregnant | 79 | 24.92 | 55 | 23.21 | 38 | 27.14 |

Note: A calf is a cow that has never given birth, not inseminated. Heifer is a young cow who gave birth once.
Table 2. Sex-to-live ratio of the offspring.

| Group                                      | Ratio young growth | Living mass, kg |
|--------------------------------------------|--------------------|-----------------|
|                                            | calf | bull-calves | calf | bull-calves |
|                                            | n    | %       | n    | %       | n    | X±m       |
| **APC "Breeding Plant Almaty"**            |      |          |      |          |      |           |
| Cows of the Holstein breed                 | 16   | 94.1     | 1    | 5.9     | 16   | 29.1±1.1  |
| Calves of the Holstein breed               | 191  | 93.2     | 14   | 6.8     | 191  | 27.8±1.2  |
| **IE “Karimov”**                          |      |          |      |          |      |           |
| Cows of the Holstein breed                 | 11   | 91.7     | 1    | 8.3     | 11   | 28.5±1.2  |
| Calves of the Holstein breed               | 79   | 91.8     | 7    | 8.1     | 79   | 27.8±1.2  |
| **LLC “Kakpatas-Kordai”**                 |      |          |      |          |      |           |
| Cows of the Schwitz breed                  | 13   | 92.9     | 1    | 7.1     | 13   | 27.5±1.1  |
| Calves of the Schwitz breed                | 54   | 93.1     | 4    | 6.9     | 54   | 26.8±1.2  |

The highest results of insemination fruitfulness in the presented farms were obtained in the autumn-winter period and ranged from 58.1 to 65.2%, with an insemination index of 1.58-1.72.

Comparative rates of use of sexed semen and common seed in artificial insemination of calves of accidental age APC “Breeding Plant Almaty” are presented in table 3. Using the technology of artificial insemination of calves with seeds divided by sex in APC “Breeding Plant Almaty”, in comparison with the use of ordinary seed, the economic efficiency taking into account insemination costs amounted to 10,040.2 tenge (tg). When using sexed semen, an average of 92% of calves were obtained from primates. Less insemination costs, the profit from calf production amounted to 76,109.2 tg, while with the use of ordinary seed and the production of 50% calf – 66,069 tg. The total cost from the sale of the offspring at the age of 12 months with the use of sexed semen left 79,852.5 tg. And when using a regular seed (66,622.5 tg) is lower by 13,230 tg.

Preliminary calculations were carried out only from the market value of animals, while maintenance costs were not taken into account, since at the moment the calculations of the cost of maintenance are not objective due to the depreciation and credit load of the cattle base and other equipment of the dairy complex. But if these costs are taken into account, the use of reproduction intensification methods will exceed profitability.

The introduction into the production of the obtained research materials reduces the cost and significantly increases the economic efficiency of biotechnological measures in the conduct of dairy cattle breeding. Reduced level of culling of highly productive cows due to loss of fertility and intensification of reproductive activity, in turn, significantly accelerate accumulation and realization of valuable selection and genetic potential of dairy cows [10].
Table 3. Comparative indicators of the use of sexed semen and conventional semen in artificial insemination of calves of accidental age of APC “Breeding Plant Almaty”.

| Indicator | When using semen divided by sex | When using regular semen |
|-----------|-------------------------------|--------------------------|
| Ratio of calves to gobies, % | 92-98 | 49-51 |
| Number of netels, heads | 205 | 205 |
| Number of calves received including up to 5% case, heads | 195 | 195 |
| Number of calves, heads | 182 | 98 |
| Number of gobies, heads | 13 | 97 |
| Total value from the sale of gobies at 12 months of age, tg | 3,412.5 | 25,462.5 |
| Total market value of calves, tg | 76,440 | 41,160 |
| Total cost of artificial insemination, tg | 3,743.3 | 553.5 |
| Profit, tg | 76,109.2 | 66,069 |
| Difference, tg | 10,040.2 |

The results of the clinical examination and treatment of cows are shown in table 4. Medical examination of cows and calves in APC “Breeding Plant Almaty”, IE “Sadykov”, IE “Karimov”, LLC “Tastobe AgroFood” Almaty region, LLC “Kakpatas-Kordai” Zhambyl region, LLC “Borte Milka” Turkestan region and KF “Zaitenov” East Kazakhstan areas in number of 2,539 heads.

Table 4. Results of clinical examination and treatment of cows in basic farms.

| Indicator | Animal | Endometritis | Follicular cyst | Hypo-ovaria |
|-----------|--------|--------------|----------------|-------------|
| | | revealed | cured, % | revealed | cured, % | revealed | cured, % |
| APC “Breeding Plant Almaty” | 756 | 14 | 13 | 92.85 | 7 | 7 | 100 | 21 | 20 | 95.23 |
| IE “Sadykov” | 67 | 2 | 1 | 50.0 | 1 | 1 | 100 | 3 | 3 | 100 |
| IE “Karimov” | 382 | 8 | 7 | 87.5 | 11 | 9 | 81.8 | 17 | 15 | 88.2 |
| LLC “Tastobe AgroFood” | 346 | 11 | 10 | 90.9 | 10 | 9 | 90.0 | 8 | 7 | 87.5 |
| LLC “Kakpatas-Kordai” | 182 | 12 | 9 | 75.0 | 7 | 6 | 85.7 | 16 | 14 | 87.5 |
| LLC “Borte Milka” | 385 | 10 | 7 | 70.0 | 15 | 12 | 80.0 | 12 | 12 | 100 |
| KF “Zaitenov” | 421 | 7 | 5 | 71.4 | 2 | 2 | 100 | 8 | 7 | 87.5 |
| Total | 2,539 | 64 | 52 | 81.25 | 53 | 46 | 86.79 | 85 | 78 | 91.76 |

In order to study the functional state of reproductive organs in cows and calves, an ultrasound scanner was used. At the same time, 202 heads with impaired reproductive functions were identified, which amounted to 7.95% of the total number. Endometritis was found in 80 heads, or 2.52%, follicular cysts in 53 heads, or 2.08%, ovarian hypofunctions in 85 heads, or 3.35%.
According to the data the following results were obtained: 202 heads (7.95% of the total number) with impaired reproduction, 176 heads, or 87.13%, with endometritis – 81.25%, with follicular cysts – 86.79%, with ovarian hypofunction – 91.76%.

When analyzing the gynecological state of the herd in the LLC “Kakpatas-Kordai” in the years compared, it should be noted that 80% of the livestock do not register the pathologies of the breeding organs. There is a significant decline in endometritis cases by 1.53%, follicular cysts – by 0.72%, but ovarian hypofunctions began to be recorded more often – by 1.69%. Table 5 shows a comparative analysis of the gynecological state of milking cows in herd 2019-2020.

**Table 5.** Comparative analysis of the gynecological state of milking cows in the herd of 2019-2020.

| Indicator                                      | LLC “Kakpatas-Kordai” | IE “Karimov” | APC “Breeding Plant Almaty” |
|------------------------------------------------|-----------------------|--------------|-----------------------------|
| Endometritises                                 | 16 (8.12%)            | 4 (1.0%)     | 38 (4.76%)                  |
| Follicular cyst                                | 9 (4.57%)             | 5 (1.25%)    | 18 (2.25%)                  |
| Hypo-ovaria                                    | 14 (7.10%)            | 8 (2.0%)     | 62 (7.76%)                  |
| Normal condition of the genital glands and uterine mucosa (including pregnant) | 158 (80.2%)          | 383 (95.75%) | 680 (85.21%)                |
| Total                                          | 197 (100%)            | 400 (100%)   | 798 (100%)                  |

| Indicator                                      | LLC “Kakpatas-Kordai” | IE “Karimov” | APC “Breeding Plant Almaty” |
|------------------------------------------------|-----------------------|--------------|-----------------------------|
| Endometritises                                 | 12 (6.59%)            | 8 (2.09%)    | 14 (1.85%)                  |
| Follicular cyst                                | 7 (3.85%)             | 11 (2.88%)   | 7 (0.93%)                   |
| Hypo-ovaria                                    | 16 (8.79%)            | 17 (4.45%)   | 21 (2.78%)                  |
| Normal condition of the genital glands and uterine mucosa (including pregnant) | 147 (80.77%)         | 346 (90.58%) | 714 (94.44%)                |
| Total                                          | 182 (100%)            | 382 (100%)   | 756 (100%)                  |

In IE “Karimov” more often there were cases of diseases of reproductive organs, which is associated with an increase in the age of animals: cases of endometritis increased by 1.09, follicular cysts – by 1.63, ovarian hypofunctions – by 2.45%.

As a result of medical and preventive measures in APC “Breeding Plant Almaty” the indicators of gynecological condition of cows improved by 9.23%. There was a significant decline in endometritis cases by 2.91%, follicular cysts – by 1.32%, but cases of ovarian hypofunction increased by 4.98%. The treatment regimen for endometritis cows is shown in table 6.

Oxycline is a drug for the treatment of cattle for all inflammatory infections, pain and fever, systemic and local infections. The preparation is administered intramuscularly, once in a dose of 1 ml per 10 kg of animal’s live weight. If necessary, the injection is repeated after 2-3 days. Oxytocin is a synthetic polypeptide analogue of the hormone of the posterior lobe of the pituitary gland. It has a stimulating effect on the smooth muscles of the uterus, especially at the end of pregnancy, as well as during childbirth. Oxytocin stimulates milk secretion, enhancing the production of prolactin of the anterior pituitary gland. It reduces myoepithelial cells around the alveoli of the mammary glands, stimulates the flow of milk into large ducts or sinuses, helping to strengthen the separation of milk. Oxytocin is injected into female farm animals: with poor birth activity, retention of placenta, reflex agalacteria, mastitis and uterine bleeding. Oxytocin is administered to animals subcutaneously or
intramuscularly in dose 30-60 IU (International units) per animal, intravenously – 20-40 IU per animal.

### Table 6. Treatment regimen for cows with endometritis.

| Name of drugs       | Place of administration and dosage | Group First | Group Second | Group Third |
|---------------------|------------------------------------|-------------|--------------|-------------|
| Oksiklin            | 1ml/10kg, intramuscularly          | +           |              |             |
| Oxytocin            | 50 units of action, intramuscularly| +           |              |             |
| Tetravitum          | 10 ml, intramuscularly             | +           |              |             |
| Furasolidone        | 3 candles, intrauterine            | +           |              |             |
| Furacilin           | Intrauterine irrigation            | +           |              |             |

Tetravitis is a complex of vitamins A, D, E, F in oil. Tetravitis makes up for vitamin deficiency in animals. Administration of the drug to the body leads to a rapid increase in the concentration of vitamins in the blood and their accumulation in the liver and other tissues. The drug is used for the prevention and treatment of hypovitaminoses; increased endurance in stressful situations: during pregnancy; during lactation, in case of impairment of reproductive function; for infectious diseases, etc. The preparation is administered intramuscularly, subcutaneously or orally to animals at a dose of 5-6 ml per animal per day. For prophylactic purpose the preparation is administered to animals once every 2-3 weeks, with therapeutic purpose – once every 7-10 days.

Furazolidone is an antibacterial drug that has an antimicrobial effect on gram-positive and gram-negative microorganisms. Furazolidone is used for treatment and prevention of bacterial infections in animals caused by microorganisms sensitive to the preparation. Furazolidone is used orally in mixture with food or individually in dose 4-5 mg/kg of live weight for 3-5 days.

Furacillin is an antimicrobial agent. Active against pathogens of anaerobic infection, gram-positive and gram-negative bacteria (staphylococci, streptococci, dysentery stick, paratif stick). To prepare an aqueous solution (1:5000), 0.1 g of furaciline or a tablet thereof (0.02 g) was added to 500 ml of boiled hot water or to 100 ml of water. Furacilin solution is used for washing mucous membranes with metrites, vaginitis.

In IE “Karimov” implemented the software system “Herd Management”, which is aimed at increasing productivity by accurately accounting for fatigue, which is one of the key points of control over the efficiency of the dairy business. One of the main functions of the system is preclinical diagnosis of cow diseases.

One of the main functions of the “Herd Management” system is preclinical diagnosis of cow diseases. For example, the often occurring disease as mastitis does not pose a special threat to the life of animals, but requires investment in treatment, and milk for a rather long period will be unsuitable for consumption and processing, which is also a loss.

Preventing mastitis and identifying it early helps avoid additional/unforeseen costs [11]. The follicular cyst of the ovary is a fairly common dishormonal pathology, which is the main reason for the decrease in reproductive ability in cows and significant economic losses in dairy production.

Cow ovarian cysts are spherical cavities that occur in the ovary from non-ovulated follicles as a result of fluid accumulation in them. Simply put, these are follicles that could not ovulate and remained in the ovary. These follicles have a diameter of at least 2 cm, are present in one or two ovaries and prevent the normal course of the sex cycle. The formation of cysts is one of the reasons for cow infertility. Follicular cysts have thin-walled spherical cavities filled with yellow liquid. The cyst has such a thin shell (less than 3 mm) that it can be easily crushed [12].

With the follicular cyst, the level of estrogen secretion increases. Over time, the secretion of estrogens can stop. In this case, the cyst may be replaced by a new follicular structure or converted into a new cyst. With the preservation of the ovarian cyst for a long time, the secretion of estrogens
increases and multiple formation of follicular cysts occurs, as a result of which an extension of the stage of sexual hunting – nymphomania can be observed. In nymphomania, signs of sexual hunting are observed every 2-5 days. Distinctive signs of nymphomania are: relaxation of the sacral-sciatic ligaments (depressions between the sciatic hump and the root of the tail), excessive swelling of the vulva, long and abundant discharge from the vagina, frequent restless roar, aggressiveness. Table 7 shows the treatment regimen for ovarian follicular cyst cows.

Table 7. Treatment regimen for cows in follicular ovarian cyst.

| Procedures, preparations, dose, place of administration | Treatment days |
|---------------------------------------------------------|---------------|
|                                                         | 1  | 2  | 3  | 4  | 11 |
| first group (n=6)                                       |    |    |    |    |    |
| Surphagon, 25 µg (5 ml), intramuscularly                | +  |    |    | +  |    |
| Estrophane, 2 ml, intramuscularly                       |    | +  |    |    | +  |

First of all, when treating an animal, good conditions of maintenance, feeding are created, other pathologies are eliminated, if they are available. Treatment can include 2 methods: operative and medicinal. Operative methods (crushing of the cyst, puncture) are ineffective and are not recommended, as they can lead to complications in the form of injuries, hemorrhages, the development of adhesions in the ovaries, reverse restoration of the cysts and, as a result, lead to infertility.

Drug treatment is a safer method and involves the use of hormonal drugs. A complex treatment involving the sequential use of gonadoliberin and prostaglandin is well established. The BAG-Surphagon (BAG – BelAgroGen Research and Production Center, Republic of Belarus, Gorki) based on the gonadotropin releasing hormone analogue is administered three times with an interval of 24 hours, which causes luteinization of the cyst with its subsequent transformation into a lutein cyst. On the 11th day after the first introduction of this preparation, BAG-Estrophan (BAG – BelAgroGen Research and Production Center, Republic of Belarus, Gorki) based on prostaglandin is introduced. BAG-Estrophan causes resorption of lutein tissue, which by this time becomes sensitive to the action of prostaglandins [13].

Table 8. Treatment regimen for cows in ovarian hypofunction.

| Procedures, preparations, dose, place of administration | Treatment days |
|---------------------------------------------------------|---------------|
|                                                         | 1  | 3  | 7-14 | 11 |
| first group (n=3)                                       |    |    |    |    |
| Multivit, 15 ml, intramuscularly                         | +  |    |    |    |
| Ovarian massage                                         | +  | +  |    |    |
| When hunting 8-10 hours before insemination, intramuscularly Surfagon 2-5 ml |    |    | +  |    |
| In case of non-sexual hunting intramuscularly Surfagon at a dose of 10 ml, Folligon 500-1000 international units |    |    | +  |    |
| When hunting for 8-10 hours before insemination, Surfagon 2-5 ml intramuscularly, Multivitis 15 ml intramuscularly, Sedimin 15 ml intramuscularly |    |    |    | +  |

Cows with ovarian hypofunction exhibiting ovulation delay or anovulation are injected intramuscularly with surphagon at a dose of 2.0-2.5 ml on the day of occurrence of phenomena of the stage of sexual cycle excitation (before or after the first insemination of the animal).
Table 8 shows the treatment regimen for cows in ovarian hypofunction. Animals with anovulatory sex cycles are also prescribed serum gonadotropin, which is introduced subcutaneously 2-3 days before the expected onset of the next stage of arousal (17-19 days after the previous sexual cycle and insemination) in a dose of 2500 International units (5-6 IU per 1 kg of body weight). In anovulatory sex cycle accompanied by luteinization of non-ovulated follicle, determined in ovary during rectal examination on 6-8 days in the form of cavity formation with fluctuation, one of prostaglandin preparations is introduced intramuscularly once – multivitis 15 ml intramuscularly, estrophan in dose 2 ml, and in case of excitation stage manifestation (at osmascular) surphagon or folligon 2.0-2.5 ml.

4. Conclusion
It was established that in the basic farms of the Republic of Kazakhstan: APC “Breeding Plant Almaty”, IE “Sadykov”, IE “Karimov”, LLC “Tastobe AgroFood” Almaty region, LLC “Kakpatas-Kordai” Zhambylskaya region, LLC “Borte Milka” of Turkestan region and KF “Zaitenov” of East Kazakhstan regions, the highest indicators of the fruitfulness of insemination were noted in bodies during natural sexual hunting, and against the background of hormonal stimulation of sexual hunting, there is a decrease in fertilization by an average of 4.72% (51.43 versus 56.15%).

According to the results of artificial insemination by the sexed semen of the primiparous cows at the first sexual hunt, the fruitfulness was 29.11%, which is significantly lower than the fruitfulness of the usual seed, which by farms is from 39 to 47%. The results show a low fertilization capacity of the sexed semen, which is not cost-effective.

The efficiency of using sexed semen from bulls producing American breeding averaged 52.04% for three farms, which meets permissible standards for insemination of animals. The use of sexed semen provides an average of 70 to 90% of the desired sex. Therefore, we recommend using sexed seed for dairy cattle breeding in order to increase the dairy stock of herds not only in the Republic of Kazakhstan, but also in foreign countries.

During the medical examination of cows and calves with the help of ultrasound scanner and instrument, 202 heads with impaired reproduction functions AlphaVision detected, which amounted to 7.95% of the total number, including endometritis found in 64 heads (2.52%), follicular cysts in 53 heads (2.08%), ovarian hypofunction in 85 heads (3.35%). According to the data the follow results were obtained: 202 heads (7.95% of the total number) with impaired reproduction, 176 heads cured (87.13%), 52 heads (81.25 %) with endometritis, 46 heads (86.79%) with follicular cyst, 78 heads (91.76%) with ovarian hypofunction.

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