



Ovarian Disorders Treatment in Dairy Cows with Infertility

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Abstract | The rationale for the present study is explained by the need in monitoring and searching for new methods of treatment and prevention of infertility in dairy cows. The purpose of the study was to evaluate homeopathic treatment plan in comparison with hormonal therapy for ovarian disorders in dairy cows. The diagnostics was performed by clinical methods and by means of portable ultrasound scanner AcuVista RS880b with rectal linear probe. During the study infertile animals were divided into the three groups: group I (control) cows were not given any treatment, group II cows received homeopathic treatment and group III cows received hormonal treatment. By the results of the study, the animals with follicular cyst and hypovarianism were identified. Results of homeopathic and hormonal treatment plans are presented in the article. Modern diagnostics methods and reproductive organs diseases therapy contribute to the increase of insemination rate, calf crop and cows milk productivity.

Keywords | Endometritis in cows, Cysts in cows, Homeopathic treatment plan, Hormonal treatment plan

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INTRODUCTION

Modern technologies, applied in animal breeding, are associated with stressful factors impact on animals that differ by their character, intensity and duration. Because of worsening of live-stock handling conditions, feeding quality and veterinary care, the number of cows with health issues increases, which inevitably leads to live-stock reproduction rate reduction, and as a result, to decrease of milk yield. High level of extreme factors and conditions impact leads to functional disorders development in cows, in particular, reproductive function disorders. Infertility in breeding stock is the main factor that limits the breeding of dairy live-stock. Damage to farm economics, caused by infertility, is a sum of income losses from acute reduction of milk productivity, under-delivery of calf crop and stranded costs on feeding, handling, care, treatment and numerous infertile inseminations. Thus, in dairy live-stock production calf crop per 100 cows is not more than 60-

70 heads. It is established that cows that remain infertile within a year, have their milk yield reduced by 30-50% and sometimes by 70%. In such conditions under different levels of technologies development, these issues in live-stock reproduction are still not solved. These conditions determine acute demand in studies focused on reproductive functions disorders in dairy cows (Anzorov and Eldarov, 2009). Reproductive organs pathology is one of the reasons of uterine infertility in bovine live-stock, under-delivery of calf crop and decrease of its survival rate. Primarily, reproductive organs diseases in cows develop during delivery and in postpartum period. But the most important fact is the decrease of insemination rate and milk productivity because of pathologic delivery and postpartum period. It is established that insemination rate decreases by 17-40% and calf crop and milk productivity - by 12-18% (Goncharov and Karpov, 1991).

The above mentioned facts determine the present demand

Table 1: Cows gynecological examination results

Farm	Total amount of the examined cows after delivery	Infertile cows											
		Normal reproductive organs		Uterine inflammation		Ovarian dysfunctions		Including					
		h/c	%	h/c	%	h/c	%	h/c	%	h/c	%		
“Kamyshikhinskoe”	214	160	74.7	18	8.4	26	12.1	21	9.8	2	0.9	3	1.4

in developing new methods of treatment and prevention of dairy cows infertility.

It is believed that hormonal therapy, in particular, started without thorough diagnostic investigations, is an expensive procedure that is not always economically feasible, but what is more important, increased rate of hormone therapy indication leads to the development of ovarian cysts, autoimmune events in uterus and agglutination of semen during insemination. Homeopathy is one of the oldest, but not obsolete, types of therapy. At present, it is widespread both in medicine and veterinary (Kupatadze and Kizilöz, 2016). Russian scientific literature review showed the lack of data on evaluation of homeopathic complexes influence on general health status of animals. There is no data either on their efficiency in correction animals health status, organism and structural dysfunctions and, in particular, ovarian disorders (Smirnov, 2008). During the treatment of infertility, caused by hypovarianism, positive outcome was observed after indication of homeopathic agents (Khetagurova, 2014).

Thus, development and implementation of modern homeopathic complexes, produced in Russia, in veterinary is very relevant because of their significantly lower cost in comparison with synthesized drugs.

The main aim of the present study was to evaluate homeopathic treatment plan in comparison with hormonal therapy for ovarian disorders in dairy cows.

MATERIALS AND METHODS

Cows aged from 8 to 11 years old with average annual milk yield of more than 6,000 kg were selected for the study. 278 cows were examined for ovarian pathologies. The diagnostics was performed by portable ultrasound scanner Acu-Vista RS880b with rectal linear probe. By the results of the examination, cows with follicular cyst and hypovarianism were identified. The animals were divided into the three groups. Group I (control) cows did not receive any therapy. Group II cows had follicular cyst treated by the following plan: sulfagon 5 ml injections (OD for 3 days) + estrofantin 4 ml (OD on the 12th day), and had hypovarianism treated

by the following plan: progesterone 4 ml (three injections in total, on day 0, 2 and 4) + estrofantin in 2 ml + follimag 1000 IU (6th day). Group III cows had the same treatment plan for both diseases: Gabivit 15 ml, Ovariovit 5 ml for cows with hypovarianism 1-3 injections with 5-day interval, Liarsin® 5ml single dosing in the beginning of the therapy, for cows with cysts Ovariovit 5ml 1 time per week 3-4 injections combined with Liarsin® 5ml.

The study was conducted on the facility of “Kamyshinskoe” farm in Shemonaikhinskiy region of Vostochno-Khazakhstanskaya oblast in the Republic of Kazakhstan.

The study design included three stages:

1. The first stage included the review of scientific literature and other studies on the investigated issue and theory and methods of the studies, as well as development of study design, definition of rationale, purpose, methods and plan of tests.
2. The second stage included tests design development, tests performance, analysis and revision of the obtained test results.
3. The third stage was dedicated to practical conclusions summary and obtained results arrangement and systematization.

RESULTS

The present study results showed that out of 214 cows 160 had normal reproductive organs (74.7%), 18 had uterus inflammation (8.4%) and 26 had ovarian dysfunctions (12.1%). As it shown in Table 1, hypovarianism was the leading ovarian pathology. Hence, the treatment should be primarily focused on hypovarianism in cows. The rest ovarian pathologies in this farm cow live-stock were less widespread. The authors believe that this factor is explained by the selection of older animals that had higher morbidity rate.

Cows with hypovarianism were divided into the three groups. Cows from group I did not receive any treatment, so they did not show any activity of reproductive system during the observation period.

Table 2: Results of hypovarianism therapy in cows

No	Name	Diagnosis	Group	Number of days	Number of inseminations
1	Tusya	Hypovarianism	1	44	1
2	Tsaplya	Hypovarianism	1	14	1
3	Zina	Hypovarianism	1	13	1
4	Druzhina	Hypovarianism	1	45	1
5	Ezhevika	Hypovarianism	1	36	2
6	Osen	Hypovarianism	1	10	1
7	Gulena	Hypovarianism	1	32	1
Total:				27.7 ± 6.17	
1	Gaga	Hypovarianism	2	2	1
2	Zukhra	Hypovarianism	2	29	1
3	Kurochka	Hypovarianism	2	29	1
4	Italiya	Hypovarianism	2	21	1
5	Maska	Hypovarianism	2	41	2
6	Kukushka	Hypovarianism	2	57	2
7	Murka	Hypovarianism	2	48	2
Total:				32.4 ± 7.45	

In cows from group II, that received hormonal therapy, average parameter value was equal to 27.7 ± 6.17 days. In cows from group III, that received homeopathic therapy in combination with vitamins, average parameter value was 32.4 ± 7.45 days. Therapy results are shown in Table 2.

drugs influence on reproductive organs in a natural way, so animals do not develop tolerance and their functions are not inhibited. These facts are confirmed by the results of the present study.

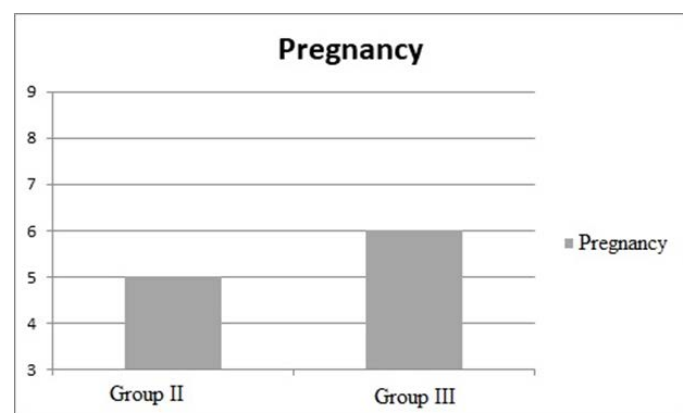
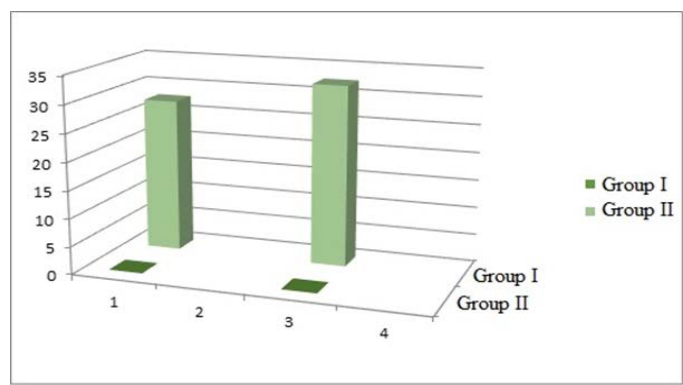


Figure 1: Therapy results in cows from groups II and III

Figure 2: Therapy results in cows from groups II and III, pregnancy rates

DISCUSSION

The results of the present study showed the efficiency of hormonal and homeopathic therapy and the efficiency of hormonal therapy (Figure 1). Homeopathic treatment plan was significantly less efficient in estrum stimulation in animals. At the same time, the pregnancy check showed different results that are presented in Figure 2.

Since hormonal drugs have reduced efficiency during subsequent indications, homeopathic drugs appear to have a major potential due to their natural components. These drugs influence on reproductive organs in a natural way, so animals do not develop tolerance and their functions are not inhibited. These facts are confirmed by the results of the present study.

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Infertility is a reproductive function disorder that develops as a result of abnormal keeping conditions of stud bulls and cows or reproduction organs and other organs and systems diseases. Infertility is a biological event that indicates on a

Table 3: Infertility types in farm animals

	Cause
Congenital	Results from under development (abnormality) of reproductive organs due to closely related breeding, wrong selection of breeding couples and improper replacement stock handling during their prenatal development. It appears in a form of infantilism, freemartinism and hermaphroditism, that are characterized by the presence of male and female anatomical structures in one animal.
Older age-related	Results from older age-related alterations in reproductive and other organs of the animal. Cows and stud bulls develop it at the age of 12-13 years old. This form of infertility does not threaten live-stock reproduction because such animals leave the stock much earlier than the specified time.
Alimentary (nutritional)	Results from qualitative and quantitative nutrition deficiency (deficiency of proteins, carbohydrates, vitamins, minerals and microelements; feeding animals with poor quality feed mill that contains toxins, nitrates, salts of heavy metals, excess of oleic acid), incomplete nutrients digestion and uptake or other reasons.
Artificially induced or acquired	It is divided into artificially induced and artificially acquired. The first subtype does not threaten live-stock reproduction because it is intentionally induced by zootechnic and veterinary specialists (bulls castration and cows sterilization, change of insemination time for increase of lactation period up to 305 days and more). Artificially acquired infertility is the result of improper organization of artificial and natural insemination, poor artificial insemination centers management (improper feeding of stud bulls, excessive bacterial contamination of semen) and mistakes in artificial breeding technicians work.
Climate-related	Results from reproductive function inhibition by unfavorable macro and micro climate factors (excessive humidity and insufficiency of light and insolation, and lack of exercise).
Exploitation-related	Results from improper handling that causes inanition of the body, and primarily, anaphrodisia (reproductive cycles cessation). Cows develop this form of infertility because of improper or excessive milking and reduction of interlactation period up to 3-4 weeks, machine milking procedures violation, insemination of immature heifers. Uninterrupted (before delivery) lactation especially unfavorably influences on delivery, postpartum period and insemination capacity in cows.
Symptomatic	Symptom (sign) of reproductive or other organs diseases.

fetus absence in an animal's uterus. Infertile cow is a cow that was not inseminated after 30 days of delivery, and infertile heifer is a heifer that was not inseminated after 30 days of physical maturity (Nekrasov and Sumanova, 2007). During investigation of infertility causes in cows, it should be considered that it is only a symptom of interrelation disturbance between an animal and its keeping conditions. Infertility causes in cows are diverse and complicated. In the majority of cases, cows infertility is a consequence. It can have expressed clinical symptoms of reproductive organs diseases or does not show any symptoms at all (Goncharov and Karpov, 1988).

There are numerous classifications of factors that cause infertility, but the most detailed one was described by A.P. Studentsov, V.S. Shipilov and V.Ya. Nikitin (2000). Within this classification the factors, that interfere with fertility, are divided by the causes that are combined into forms of infertility. The author classifies infertility into 7 main types (Table 3):

Considering the above mentioned information, the authors studied this issue in the present research. Before the study, the authors reviewed other researchers published works on treatment and prevention of infertility in cows. Many researchers agree that pathological processes are localized in endometrium and reproductive glands. Cows infertility

therapy is based on elimination of the disease causes.

Etiotropic therapy, that inhibits pathogenic microflora in animal's uterus and organism in general, includes nitrofurans, sulfanilamides and antibiotic agents in different combinations that can be indicated as solutions, emulsions, suspensions or foaming suppositories. Unfortunately, these drugs indication does not always bring positive results (Rastrizhenkova, 2009). Decrease of therapeutic effect due to long-term application of antibiotic, sulfanilamide and nitrofurans containing drugs is explained by the adaptation of resistant microorganisms strains. Hence, the relevant and acute task of the present work is development of efficient treatment and prevention plans for postpartum diseases and increase of insemination capacity in cows.

Lately, new methods and drugs appeared for treatment and prevention of reproductive system disorders in cows. Many authors implement complex treatment plans or complex drugs. One of such drugs is "Bioinformation elixir" that contains ASD-2, thymalinum, gamavit and Ringer-Lockes solution and exerts its action through acupuncture points. ASD-2 component acts as immunomodulatory agent, gamavit optimizes water-mineral and other types of metabolism, compensates deficit of vitamins and protein, neutralizes intoxication, activates intracellular enzymes; thymalinum modulates disturbed immune responsiveness,

stimulates processes of regeneration and hematopoiesis and improves metabolic processes in cells. It should be noted that "Gamavit" is an acidic hydrolysate of placenta, which indicates on high specificity of the drug. According to the authors data, the injection of "Bioinformation elixir" drop into acupuncture points induces resonance response in reproductive organs of an animal, that stimulates reproductive function and contributes to the disease resolution (Gavrilenko, 2011).

In modern veterinary the importance of homeopathic drugs is increasing. Indication of homeopathic drug mastometrin for treatment of endometritis brought positive results. The study results showed that 3 preventive injections of mastometrin 5 ml i.m. or s/c (one week before delivery, on the day of delivery and 3-5 days after delivery) enhances prophylactic effectiveness for placenta retention by 10.25%, for postpartum endometritis by 11.05%, reduces days of infertility per head by 52 days, decreases the index insemination by 1.33 and increases the stability of first insemination by 10.1% (Fomenko, 2005).

Apart from homeopathic drugs, the authors determined positive tendencies in new generation antibiotics application. Oxytetracycline-200 is an example of such antibiotic agent. It was established that indication of oxytetracycline-200 after one missed estrum before artificial insemination allowed the specialists to use less semen material and enhance insemination capacity (Musabaev et al., 2013).

Such drugs as ovariovit and monogestan were effective in treatment of infertility caused by hypovarianism. According to the authors data, ovariovit 5 ml restores reproductive cycles in 93.33% of cows and contributes to insemination in 73.33% of cows with insemination index 2.2. Single dosing of monogestan 2 ml contributes to enhancement of reproductive cycle excitement stage in 76.67% of cows and insemination of 73.33% conception rate (Semivolos, 2010).

The study, conducted by S.R. Mirzakhmetov, brought some interesting results. The author proved that the most effective treatment plan for endometritis and ovarian cyst in cows was cyst squeezing, massage of the other ovary and i.m. injection of oxacillin, gentamicin, lincomycin and especially ciprofloxacin. Restoration of reproductive capacity in cows was observed in 80-100% of cases in 23.0 – 62.3 days from the treatment start. 95.8% of cows got pregnant (this is by 38.7% more than in the control group) (Mirzakhmetov, 2006).

The described ways and methods are based on the results of Russian and CIS-countries scientists researches. The results of the non CIS-countries scientists researches should

also be highlighted.

W. Heuwieser, B-A. Tenhagen, M. Tischer, J. Lühr, H. Blum compared three management programs of dairy live-stock reproductive efficiency improvement. 542 cows were examined for endometritis within 22-28 days after delivery and were divided into three groups of treatment. Cows in group I with endometritis signs had 100 ml intrauterine infusion of 2% formaldehyde solution of polycondensate m-cresol sulphuric acid. Cows from group II with signs of endometriosi had 125 ml intrauterine infusion of 20% eucalyptus composite solution. Cows from group III had i.m. injections of 0.75 mg of tiaprost, analogue of prostaglandin F₂ (PGF₂α) with two-week intervals, starting on the 43rd day and continuing until successful insemination. 34% of cows had signs of endometriosi. In group III the effectiveness of estrus identification was significantly higher than in groups I and II (p <0.05), time to first estrum was shorter and cows had less days than cows from groups I and II (p <0.05). The results indicate on the effectiveness of therapy, that is based on strategic application of PGF₂α, and feasible alternative to conventional treatment plans, based on rectal palpations and intrauterine infusions, for endometritis control in live-stock (Heuwieser et al., 2000). Turkish scientists Amiridis G.S., Fthenakis G.C., Dafopoulos J., Papanikolaou T., Mavrogianni V.S. conducted the study that focused on evaluation of therapeutic and preventive efficiency of ceftiofur hydrochloride, oxytocin and PGF₂α (prostaglandin) in cows with postpartum pathologies in postpartum period. The cows were divided into three groups. Cows in group I and II were treated daily with ceftiofur hydrochloride and oxytocin within 5 and 3 days after delivery, respectively. Group III was designed as the group receiving prostaglandin, and group IV was designed as control. Cows from groups I, II and III received PGF₂α analogue on days 15 and 26. Each group was subdivided into groups with normal and complicated delivery. The results of the study showed that first values of pregnancy index in subgroup of complicated pregnancy were significantly higher in subgroup II (76.9%) than in subgroup I (30.0%) and IV (37.5%). It was established that cows in group II had the lowest parameters of endometritis because the treatment plan, that included ceftiofur and oxytocin in combination with PGF₂α introduced on days 15 and 26, was associated with improved involution of uterine structures and reproductive parameters. These results prove the effectiveness of this treatment plan for prophylactics of reproductive organs diseases in cows (Amiridis et al., 2003).

Foreign researchers in their studies deny the efficiency of homeopathic drugs. S. Arlt, W. Padberg, M. Drillich, W. Heuwieser evaluated the efficiency of homeopathic drugs Lachesis compositum (Lachesis), Carduus compositum (Carduus), Traumeel LT (Traumeel) in their study, which

showed the absence of prophylactic effect in cows with endometriosis (Arlt et al., 2009).

D. Voigt proved the therapeutic effect of flunixin-based non-steroidal anti-inflammatory drugs (NSAID) in their study. This drug was used in combination with other conventional drugs (Voigt, 2004).

CONCLUSIONS

The results of the present study showed that monotherapy for infertility in cows is inefficient, so it is necessary to develop and implement new methods of treatment. The authors studied the necessity of complex treatment plans development that included antibiotic and homeopathic drugs.

Efficiency of combined hormonal and homeopathic therapy was observed along with the efficiency of hormonal drugs. At the same time, homeopathic treatment plan showed lower effect than conventional treatment plan.

Considering the reduced efficiency of hormonal drugs at subsequent indications, homeopathic drugs have higher potential because they are made from natural components. These drugs influence on reproductive organs in a natural way and so animals do not develop tolerance and their functions are not inhibited.

The materials of this article can be useful for veterinary doctors occupied on dairy farms and for other veterinary specialists that monitor and treat infertility in cows.

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CONFLICT OF INTEREST

The authors declare they have no conflicts of interest with regard to the work presented in this report.

AUTHORS CONTRIBUTION

Dauletbek M. Muratbayev and Zeinolla K. Tokayev designed the model and the computational framework and analysed the data. Oralgazy N. Akhmetzhanov and Akerke S. Ygieva carried out the implementation. Nurzhamal N. Mukhamadiyeva performed the calculations. Dauletbek M. Muratbayev and Akerke S. Ygieva wrote the manuscript with input from all authors. Zeinolla K. Tokayev and

Dauletbek M. Muratbayev conceived the study and were in charge of overall direction and planning.

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