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PRODUCTIVE AND REPRODUCTIVE QUALITIES OF SHEEP OF THE KAZAKH FINE-WOOL BREED

Abstract. In the southern zone of breeding fine-wool sheep with a hot climate in order to intensify fine-wool sheep breeding, increase the reproductive qualities of sheep, and also increase the production of young mutton, the use of multiple-type sheep is recommended. To carry out purposive selection, breeding and mating them according to the type of birth, taking into account the number of lambs in the first lambing.

Keywords: reproductive ability, ovaries, uterus, follicles, luteum, placenta, selection, breeding, ovariocytotoxical cytotoxic serum, ewe, Kazakh fine-wool breed.

Introduction. In conditions of Kazakhstan, the most common breed is the Kazakh fine-wool, which is bred in semi-desert and desert areas of the South-East of the Republic. However, the bulk of the sheep of this breed in terms of productivity and, especially in terms of reproductive ability do not meet the relevant requirements of the breed standard. Consequently, the increase in fertility and yield of business lambs are urgent problems in fine-wool sheep. Therefore, the tasks of scientists and agricultural specialists are to develop effective methods to improve the reproductive ability of fine-wool sheep and the preservation of lambs up to one year of age.

Ways to increase the fertility of sheep are the selection and breeding of multiple pairs, aimed at accelerating the rate of selection for the named type of products [1].

In Kazakhstan, under relatively prosperous conditions, the fertility of Kazakh fine-wool breed sheep reached up to 126-144%, that is, among the fine-wool breed sheep there are a sufficient number of individuals capable of bringing multiple fertility throughout life. The consolidation of this trait through breeding and appropriate selection is not only theoretical, but also of great practical importance, especially for the southeast of Kazakhstan, where sheep of the Kazakh fine-wool breed are widely used. The study of the influence of the type of sheep birth on the development of economic and useful traits, in them and in the offspring, is of definite scientific and practical interest in the selection of multiple fetuses. Consequently, in the fine-wool sheep breeding of the republic, selection and breeding work should be aimed at improving the productivity of existing breeds and lines, that is, increasing the shearing of wool and improving their wool qualities, as well as increasing the natural fertility of sheep through breeding.

The sexual cycle is a hormone-dependent rhythmic change of various processes, providing optimal conditions for reproduction, namely, the readiness of the female body for sexual intercourse and fertilization of the egg. The sexual cycle includes organs and glands of internal secretion: hypothalamus, ovaries, uterus, follicles, luteum and placenta. The imbalance or dysfunction of any of these interrelated mechanisms causes a disruption of the whole system. Usually the secretion of hormones by the glands is carried out on the principle of feedback, in which the increase in the concentration of the subordinate hormone leads to a decrease in the concentration of the regulated hormone in the blood [2, 3].

The reason for the low impregnation capacity of animals are inadequate or low concentrations of gonadotropins (LH, FSH) and estrogen hormones (estradiol-17β, progesterone) in preovulatory period and the day of estruation, as well as disruption of the interaction of gonadotropins and ovarian hormones [4].

Currently, worldwide attention is paid to the directed regulation of metabolism of animals, which is of great theoretical and practical importance and is one of the most important problems. Artificial

stimulation methods allow to mobilize the reserve forces of the body, to activate metabolism and on this soil create favorable conditions for the restoration of the physiological state of the body, and thus improves the growth and development of young animals in prenatal and postnatal ontogenesis[5].

Ovariocytotoxical cytotoxic sera (OCS) belongs to drugs of a similar row. The ovaries of ewes with ripe follicles or at the stage of maturation served as antigen for obtaining OCS (figure 1, 2). As producers for immunization, healthy and well-fed animals were selected (ram-cocks, donkeys, horses).

Figure 1 – Ovaries at different stages

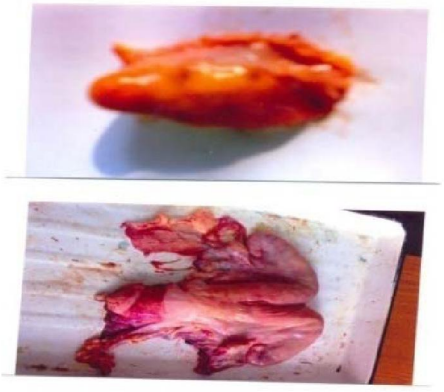

Figure 2 – Ovaries ripening

It should be noted that in recent years, various types of cytotoxic sera of directional and general stimulating action have been widely tested and introduced in production conditions. [6]. Cytotoxic sera are sera specific to the corresponding cells of the body. An active specific beginning in them is an antigen (cell) -antibody (cytotoxin). The degree of this effect depends on the intensity of the antigen-antibody reaction, which is the main mechanism of effect.

The reproductive ability of queen bees was determined by their fertility, the birth of the living and dead lambs, the number of abortive and juvenile males, the safety of offspring at the exit of business lambs to beating per 100 females. Economic efficiency was established by taking into account the cost of labor, feed per unit of production (meat, wool, skin) according to the generally accepted method [7].

Methods. Research and production experiments were carried out in the "R-Kurty" farm of the Zhambyl district, Almaty region, Republic of Kazakhstan on ewes of the Kazakh fine-wool breed of the 1st and 4th-5th lambings. Experiments were carried out on 20 ewes, selected on the basis of analogs (live weight, productivity, feeding, maintenance).

The animals were divided into 10 goals in two groups: experimental and control. Animals of the experimental group on the 5-10th day after calving was introduced a stimulating dose of OCS, twice two weeks before the campaign of artificial insemination, with an interval between injections of 5-7 days. No serum was administered to the control group of sheep.

Blood for research was taken before the introduction of OCS and after administration of the drug on the 7,14 day, on the days of the phenomena of estruation and two weeks after the fruitful insemination.

Concentrations of sex hormones (estradiol-17β, progesterone) and gonadotropins (FSH, LH) were performed by radioimmunological analysis (RIA) on a γ-analyzer with a scintillation counter. The advantages of RIA are: high sensitivity, specificity, reliability, accuracy, simplicity, high performance and versatility [8].

For the determination of hormones of the gonads used ready-made reagent kits for the production of the Institute of chemistry, Academy of Sciences of Belarus Republic "SteronE^{125}", "Steron – E^{125}". Reagent kits are designed for analysis of 100 samples intended for direct (non-extractive) determination of hormones in small amounts of blood serum. Calculations were carried out by using mathematical calculations and graphical construction in semi-logarithmic coordinates.

To determine the concentration of gonadotropins (follicle-stimulating and luteinizing), ready-made reagent kits manufactured in France by FSHK-PR and LHK-PR 100 invitrotests were also used.

Discussion. Table 1 shows the dynamics of sex hormones and gonadotropins in the blood of ewes in different periods of reproductive function.

The obtained data show that the content of estradiol-17β in the blood serum of ewes before administration of the drug in both groups was approximately equal (6.11±0.29 and 6.09±0.24 ng/ml, respectively). In subsequent periods of the study, up to the manifestation of induced estruation, there is a rapid increase in the level of estradiol. This is a natural physiological process, since estrogens have a direct effect on the ovaries, which are necessary for the normalization of follicle development, significantly increases the sensitivity of the ovaries to the effects of gonadotropins. On the other hand, estrogens are necessary to maintain the life of oocytes.

The highest content of estradiol-17β was observed in injected FCS-ewes. Thus, 7 days after administration of the drug, the concentration of estradiol-17β increases by 68.2% compared to the baseline, and in the control group - by 36.2% ($P<0.01$). The maximum level of estradiol-17β in blood serum was observed on the day of induced estruation.Under the influence of the drug, the concentration of estradiol-17β on the day of estruation was 3.2 times higher than the initial level, and in controls - 2 times ($P<0.001$).

The maximum increase in the concentration of estradiol on the day of estruation, apparently, due to increased preovulatory release into the blood luteinizing hormone (LH), which leads to rapid maturation of follicles, followed by ovulation of eggs. Secondly, the follicle begins to intensively synthesize the production of estrogens. Third, high levels may be associated with an increase in the total amount of both endogenous and exogenous estrogen.After ovulation and fertilization, the level of estradiol begins to decrease. Thus, 7 and 14 days after insemination, estradiol concentration in the experimental group decreased by 36.7 and 25.9%, respectively, compared with estruation day, and in the control group by 49.4 and 42.0% ($P<0.001$).

The follicular phase of the sexual cycle is replaced by the luteal phase. This phase lasts from the moment when the place ovulated follicles formed luteum until its lysis. At this time, intensive preparation of the uterus for pregnancy.

Progesterone is a hormone produced by granulosa cells of the follicular epithelium, luteal cells of the luteum, and the placenta. From this point of view, the informative value of its concentration in blood serum is of great scientific and practical importance.

According to the results of our studies, we found a low content of progesterone in the blood until ovulation and fertilization. The lowest levels of progesterone in the experimental groups were recorded on the day of estruation (0.06±0.01 and 0.11±0.02 ng/ml, respectively). A small amount of progesterone is necessary in order for normal ovulation to occur in the blood at certain ratios of FSH and LH. A sharp decrease in its concentration on the day of estruation, apparently, due to the fact that the peak of LH before ovulation causes a restructuring of steroidogenesis: estrogen production slows down, and progesterone synthesis gradually increases, which corresponds to the initial period of luteinization.

A week after insemination concentrations of progesterone in stimulated ewes reaches to 11.06±0.12 ng/ml compared to the day of the estruation 0,06±0,01 ng/ml. In the control group the progesterone level increased slightly (7,12±0.11 vs. 0,11±0,02 ng/ml on the day of the estruation).

From these studies it is clear that the concentration of progesterone reaches its maximum value on 30-days or 2 weeks after insemination. At the indicated time, the concentration of progesterone in the experimental group reached 18,19±0,20, and in the control group 12,08±0,14 ng/ml. It is known that the main function of progesterone is to ensure the implantation of blastocytes and the subsequent development of the embryo, and in general a favorable course of pregnancy.

LH is a key hormone in stimulating the synthesis and secretion of sex steroids. Upon reaching a certain degree of development, follicular cells under the direct control of LH begin to intensively synthesize sex steroids, primarily estrogens.

The biological effect of LH on the ovaries is to stimulate the development and maturation of follicles, secretion of estrogen, the implementation of the ovulation, the transformation of the ovulatory follicle into the luteum and secretion of progesterone them.From the obtained data, it is clear that LH from the hypophysis enters the bloodstream continuously, but the quantitative values in different periods of sexual function vary significantly.

Baseline data in the experimental groups were approximately equal (3.31±0.21 and 3.29±0.19 ng/ml, respectively). The use of the drug significantly activates the production of LH. Thus, 7 days after injection, the level of LH increased from 3.31±0.21 to 8.81±0.24 ng/ml, and in the control group – from

3.29±0.19 to 5.18±0.13 ng/ml (P<0.05). The highest peak of LH is marked during estruation. During this period, due to increased pre-ovulatory release, the concentration of LH reached its maximum value (14.28±0.22 ng/ml), that is, the amount of LH 4.3 times higher than its original level (P<0.001). In unstimulated animals exceeded the baseline only 2.5 times (8.15±0.12 ng/ml).

After ovulation and fertilization, the concentration of LH in the blood of the experimental group decreases to 5.39±0.18 against 14.28±0.22 ng/ml of the estruation day, and in the control group to 3.90±0.16 against 8.15±0.12 ng/ml of the level of the day of estruation (P<0.001).

FSH ensures the growth and differentiation of follicles in the ovary and is necessary for the formation of the follicle cavity. However, the process of maturation of follicles can be completed only in the presence of LH, i.e. with the close interaction of both hormones.

Elevated levels of FSH in the blood of ewes occur in the pre-ovulatory period, on the days of estruation and ovulation. In stimulated animals, the concentration of FSH on the 7th day after the administration of the drug rises 2.2 times compared to the baseline, and on the day of the estruation 3.7 times, and in the control the increase was not high, i.e. at the indicated time increases by 1.76 and 2.48 times respectively (P<0.05). After insemination, the level of FSH in both groups gradually decreases, reaching the initial level [8, 9].

Analysis of the dynamics of gonadotropic and ovarian hormones in the blood of sheep showed that for each stage of development of the ovary a certain interhormonal relationship is characteristic. So, if before the manifestation of estruation and ovulation, the estradiol – progesterone (E/P) ratio prevailed, after ovulation, on the contrary, the P/E ratio prevails.

The relationship of LH/FSH had a dynamic course from the moment the experience was set through to its completion. But it should be noted that the hormonal relationship in stimulated animals far exceeded the values of the control group.

Thus, the above data on the study of endocrine status in ewes shows the dynamics of gonadotropic and sex hormones in peripheral blood, the production of which is subject to the close interaction of the system: the hypothalamus-hypophysis-ovary-uterus, providing regulation of the generative and endocrine activity of the ovaries. Experimental data indicate that, under the influence of the OCS, there is a maximum increase in the concentration of estradiol-17β. Increased pre-ovulatory release of LH, increased levels of progesterone and LH during the luteal period, which all together contribute to a more complete estruation and ovulation [10, 11].

Therefore, it should be assumed that the use of the drug increases fertility and favorably affects the formation of the embryo and the course of pregnancy.

As a result of purposive research work on the development of technologies and methods of breeding to create intensive-type sheep, allowing to increase the profitability of fine-wool sheep breeding in climate conditions of the "R-Kurty" Almaty region, and also on the introduction of intensive technologies for the production of sheep products adapted to the new economic conditions, allow us to draw the following conclusions. The introduction of intensive technology allows to achieve the most efficient management of the economy, with the most effective return on investment. Multi-type sheep breeding allows to increase fertility by 37.0-44.0% and increase profitability by 27.0-35.0%, meat production by one the uterus is increased by 13.1-14.8 kg and the profitability is 26.0-28.5%. Using the target standard for selecting multiple sheep and applying the method of selecting sheep of the Kazakh fine-wool breed by cutting wool contributes to an increase in the rate of selection, increase accuracy assessment of the phenotype.

Proceeds from the sale of meat and wool per uterus with the introduction of intensive technology amounted to 15 030 tenge, which is more by 3840 tenge or 25.5% when compared with the extensive technology of the industry. The cost of maintaining one uterus is reduced by 800 tenge or 12.2%, the profit per uterus reaches 9230.0 tenge, which is more than the extensive system by 4640 tenge or 50.2%.

The effectiveness of the use of ovariocytotoxical cytotoxic sera (OCS) to improve the reproductive parameters of the uterus.

Analyzing the obtained data of accounting for insemination, it can be noted that OCS in stimulating doses increases the reproductive ability of the uterus. They are more intensive, more friendly come to estruation and more effectively and fruitfully inseminated, the duration of the artificial insemination campaign is reduced by 6-7 days (table 3). It came to estruation and fruitfully inseminated on the 20th day after processing 40%, on the 25th day 49.9%, on the 30th day 7.85% and more in 30 days - 2.35% uterine

Table 1 – Effect of ovariocytotoxical cytotoxic serum (OCS) on the dynamics of the content of ovarian and gonadotropic hormones in the blood serum of ewes during different periods of sexual activity (M±m, n=10)

Hormones	Unit of measurement	Groups	Before the injection of OCS	Days after drug injection			
				7	14	21	30
Estradiol -17ß	ng/ml	experience	6,11±0,29	10,28±0,31^{xx}	19,36±0,32^{xxx}	7,11±0,14^{x}	5,01±0,12^{x}
		control	6,09±0,24	8,30±0,34^{x}	12,44±0,25^{xx}	6,14±0,30^{x}	5,23±0,16
Progesterone	ng/ml	experience	0,43±0,08	0,21±0,04^{x}	0,06±0,01^{xx}	11,06±0,12^{xxx}	18,19±0,20^{xx}
		control	0,45±0,06	0,32±0,05	0,11±0,02^{x}	7,12±0,11^{xx}	12,08±0,14^{x}
LH	ng/ml	experience	3,31±0,21	7,81±0,24^{x}	14,28±0,22^{xx}	6,61±0,15^{xx}	5,39±0,18^{x}
		control	3,29±0,18	6,03±0,13^{x}	8,15±0,12^{xx}	4,18±0,09^{x}	3,30±0,16^{x}
FSH	ng/ml	experience	2,88±0,10	6,44±0,38^{x}	10,55±0,19^{xx}	3,34±0,08^{x}	2,03±0,08^{x}
		control	2,91±0,11	5,12±0,14^{x}	7,23±0,17^{x}	5,51±0,11^{xx}	3,05±0,09
E/P	ng/ml	experience	14,21	48,95^{x}	322,7^{xx}	0,67^{x}	0,28^{x}
		control	13,53	25,94^{xx}	113,1^{x}	0,86	0,43
LH/FSH	ng/ml	experience	1,15	1,21	1,35^{x}	1,98	2,66^{xx}
		control	1,16	1,17^{x}	1,13	0,76^{x}	1,08
Note: ^{x}P<0,05; ^{xx}P<0,01; ^{xxx}P<0,001 – regarding the beginning of the experience.							

Table 2 – Dynamics of arrival of sheep processed ovariocytotoxical cytotoxic sera (OCS) in the estruation

Age of the ewes	Groups	Livestock	Days of registration of arrival of ewes in estruation and insemination							
			on the 20th day		on the 25th day		on the 30th day		more than 30 days	
			Num.	%	Num.	%	Num.	%	Num.	%
4,5 years	Experimental	520	208	40,0	259	49,9	41	7,8	12	2,3
	Control	552	215	38,9	177	32,0	121	22,0	39	7,1
18 months	Experimental	672	168	25,0	248	36,9	215	31,0	41	6,1
	Control	683	61	8,9	192	28,1	308	45,2	122	17,8

of experimental group fourth livestock. In the control group, respectively - 38.9%; 22.0% and 7.1% of the uterus. It should be noted that by the 25th day of insemination in the experimental group was inseminated 90% of sheep, which is 17.9% more than in the control group.

Conclusion. At ewes of first livestock the results of the arrival in estruation and insemination of uterus were as follows: in the experimental group on the 20th day -25.0%, on the 25th day – 36.9%, on the 30th day – 31.0% and more than 30 days – 5.1% of the livestock were fruitfully inseminated. In the control group, respectively, 8.9%; 28.1%; 45.2% and 17.8%. The impact of OCS is especially noticeable when comparing these indicators in the first 15 and 20 days. The experimental group of inseminated first-livestock exceeds the control by 16.1% and by the 25th day the number of inseminated uterus reached 62.0% in the experimental group and 37.0% in the control group.

The obtained results indicate that in the experimental groups of sheep an increased fertility is observed (by 14.1%), which reached 118% in adult females, and 92% in first livestock females. The use of milk diluent semen rams.

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ҚАЗАҚТЫҢ БИЯЗЫ ЖҮНДІ ҚОЙЛАРЫНЫҢ ҰДАЙЫ ӨСІРУ ҚАБІЛЕТТІЛІГІ МЕН ӨНІМДІЛІГІ

Аннотация. Оңтүстік аймақтағы ыстық климатта өсірілетін биязы жүнді қой шаруашылығын интенсивтендіру мақсатында, қойлардыңұдайы өсіру қабілеттілігін арттыру, сондай-ақ жас қой еті өндірісін ұлғайту үшін,көптөлдегіш қой тұқымы сүлесінің қошқарларын пайдалануды ұсынылады.

Бірінші рет қоздаған қой қозыларының санын есепке ала отырып, олардың туылу неше түріне қарай мақсатты түрде іріктеу, жұптау және шағылыстыру жүйесін жүзеге асыру.

Түйін сөздер: ұдайы өсіру қабілеттілігі, аналық безі, жатыр, шаш қайратты, мықты, сары дене, плацента, іріктеу, таңдау, овариоцитотоксикалы, цитотоксикалық сарысулар, саулықтар, қазақтың биязы жүнді тұқымы.

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ПРОДУКТИВНЫЕ И ВОСПРОИЗВОДИТЕЛЬНЫЕ КАЧЕСТВА ОВЕЦ КАЗАХСКОЙ ТОНКОРУННОЙ ПОРОДЫ

Аннотация. В южной зоне разведения тонкорунных овец с жарким климатом в целях интенсификации тонкорунного овцеводства, повышения воспроизводительных качеств овец, а также увеличения производства молодой баранины, рекомендуется использование баранов многоплодного типа. Проводить целенаправленный отбор, подбор и спаривание их по типу рождения, с учетом количества ягнят в первом ягнении.

Ключевые слова: воспроизводительная способность, яичники, матка, фолликулы, желтые тела, плацента, отбор, подбор, овариоцитотоксическая цитотоксические сыворотки, овцематка, казахская тонкорунная порода.

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