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REPRODUCTIVE PERFORMANCE OF THE KAZAKH FAT-RUMPED COARSE-WOOLLED SHEEP IN THE “RAZAKHUN” FARM OF JAMBYL REGION

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The article deals with the issues of productivity and reproductive ability of Kazakh fat-tailed coarse-wooled sheep. The studies were carried out on the Razakhun farm in the Zhambyl region in three herds in October-November 2022. Based on the insemination of 1935 ewes, the following results were obtained. In total, 1,494 out of 1935 inseminated queens calved on time, which averaged 77.2% with fluctuations in herds from 74.1% to 79.7%. A total of 1,662 lambs were born, or an average of 1.11 lambs per lamb. In the spring of 2022, the live weight of sires and ewes was 111.9±0.66 and 64.4±0.20 kg, fatness – 2.71±0.10 and 2.62±0.05 points, in the spring of 2023 d. – 108.8±0.63 and 58.7±0.19 points. kg and 2.44±0.12 and 2.11±0.06 points, respectively. The body weight of single rams and lambs at birth was 4.89±0.06 and 4.44±0.07 kg, and that of twin rams and lambs was 3.82±0.08 and 3.53±0.09 kg, respectively.

Key words: fat-rumped sheep, reproductive performance, sperm, artificial insemination, prolificacy, single, twin, body weight.

ВОСПРОИЗВОДИТЕЛЬНАЯ ПРОДУКТИВНОСТЬ КАЗАХСКИХ КУРДЮЧНЫХ ГРУБОШЕРСТНЫХ ОВЕЦ В ХОЗЯЙСТВЕ “РАЗАХУН” ЖАМБЫЛСКОЙ ОБЛАСТИ

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В статье рассматриваются вопросы продуктивности и воспроизводительной способности казахских курдючных грубошерстных овец. Исследования проведены в фермерском хозяйстве «Разахун» Жамбылской области в трех стадах в октябре-ноябре 2022 г. На основании осеменения 1935 овцематок получены следующие результаты. Всего из 1935 осемененных маток 1494 окотились в срок, что в среднем составило 77,2% при колебаниях по стадам от 74,1% до 79,7%. Всего родилось 1662 ягненка, или в среднем 1,11 ягненка на окот. Весной 2022 г. живая масса баранов-производителей и маток составила $111,9 \pm 0,66$ и $64,4 \pm 0,20$ кг, упитанность – $2,71 \pm 0,10$ и $2,62 \pm 0,05$ балла, весной 2023 г. – $108,8 \pm 0,63$ и $58,7 \pm 0,19$ балла. кг и $2,44 \pm 0,12$ и $2,11 \pm 0,06$ балла соответственно. Масса тела одиночных баранов и овец при рождении составила $4,89 \pm 0,06$ и $4,44 \pm 0,07$ кг, а баранов-близнецов и овец – $3,82 \pm 0,08$ и $3,53 \pm 0,09$ кг соответственно.

Ключевые слова: курдючная овца, воспроизводительная продуктивность, сперма, искусственное осеменение, многоплодность, одинок, двойня, масса тела.

ЖАМБЫЛ ОБЛЫСЫНЫҢ "РАЗАХУН" ШАРУАШЫЛЫҒЫНДАҒЫ ҚАЗАҚТЫҢ ҚҰЙРЫҚТЫ ҚЫЛШЫҚ ЖҮНДІ ҚОЙЛАРЫНЫҢ КӨБЕЮ ӨНІМДІЛІГІ

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Мақалада қазақ құйрықты ірі жүнді қойлардың өнімділігі мен көбею қабілеті мәселелері қарастырылады. 2022 жылдың қазан-қараша айларында Жамбыл облысының "Разахун" фермерлік шаруашылығында үш табында зерттеулер жүргізілді. Барлығы 1935 ұрықтандырылған аналықтың 1494-і белгіленген мерзімде қазылды, бұл орташа есеппен 77,2% – 7 құрады, отар бойынша 74,1% – дан 79,7% – ға дейін. Барлығы 1662 қозы немесе бір қойға орта есеппен 1,11 қозы дүниеге келді. 2022 жылдың көктемінде қошқарлар мен аналық қошқарлардың тірі салмағы $111,9 \pm 0,66$ және $64,4 \pm 0,20$ кг, майлылығы $2,71 \pm 0,10$ және $2,62 \pm 0,05$ балл, 2023 жылдың көктемінде $108,8 \pm 0,63$ және $58,7 \pm 0,19$ балл болды. сәйкесінше кг және $2,44 \pm 0,12$ және $2,11 \pm 0,06$ балл. Туған кездегі жалғыз қошқарлар мен қойлардың дене салмағы $4,89 \pm 0,06$ және $4,44 \pm 0,07$ кг, ал егіз қошқарлар мен қойлар сәйкесінше $3,82 \pm 0,08$ және $3,53 \pm 0,09$ кг болды.

Түйінді сөздер: құйрықты қой, репродуктивті өнімділік, ұрық, қолмен ұрықтандыру, көптәлділік, бір, егіз, дене салмағы.

Introduction. An important task of the Kazakhstani sheep industry is an increase of lamb and mutton production. The meat productivity in sheep is depends directly on a prolificacy of the ewe. Increase of the number of lambs produced per ewe reduces feed costs of the lamb production. Thus, the consumption of digestible feed nutrients per 1 kg of carcass weight in two twin lambs reared by one ewe is by 26-36% less than one in single lamb reared by the same ewe. Therefore, increasing of the economic efficiency in the sheep industry by intensification of the ewe reproduction, increasing ewe prolificacy and lamb survival are of particular attention [1, p.63].

Kazakh fat-rumped coarse-wooled sheep is popular in all regions of Kazakhstan. Animals of this breed are well adapted to year-round pasture grazing in the continental climate with very hot summers and severe cold winters. They have excellent meat performance. Their lambs are strong and viable at birth. They are able to survive even if they were born in the winter outside on the snow. If they were born on the pasture, they are able to follow the ewe for a distance of about 1 km to get from pasture to the barn.

The main direction in the selection and genetic improvement of the Kazakh coarse-wooled sheep is increasing of the body weight, growth speed, improving of the body conformation and meat quality while maintaining their strong constitution, viability and adaptability to severe local climate and production conditions. Meat productivity of sheep relates directly to the prolificacy of the ewe. Prolificacy is an

economically important trait, it is very significant at the present time. Therefore, the development of the effective methods for increasing fertility is an urgent national economic task.

At present, the world sheep breeding has accumulated a lot of experience and knowledge, indicating the expediency of increasing the prolificacy in sheep. There are several ways to achieve this goal, each one has its own specifics, its pros and cons, and the appropriateness of use in the particular case. Many researchers give preference to the type of birth of the animal [1, p.31, 2, p.85, 3, p.12, 4, p.64]. There are numerous reports indicating that within each breed there are individuals with high fecundity. Purposeful selection of such animals, their intensive raising and accelerated reproduction are the main ways to increase the prolificacy of sheep of any breed [5, p. 323, 6, p.54].

Kazakh fat-rumped coarse-wooled ewes have relatively low prolificacy of 105-120% [7, p.68]. Alishev [8, p.16] explained this by the fact that shepherds select large young rams as replacement sires thus excluding from the flock reproduction rams born as twins. Twin rams at year-round pasture grazing were smaller and weaker than singles. People prefer one strong vital lamb than two twin lambs that are weaker than singles and may represent some risk of losses. Such selection principle is justified fully in the harsh conditions of year-round pasture grazing, especially in the central and northern regions with long cold winters.

In Kazakhstan, sheep breeders who raise fat-rumped sheep in thousands quantities on year-round pasture grazing prefer the birth of large and strong single lambs, since the birth of twin lambs requires additional financial, time and labor costs. That is why to date the prolificacy of Kazakh fat-rumped sheep has been studied insufficiently and not very deeply. Reports in this area provided only data on general prolificacy or number of lambs born per lambing, which varied within 105-122% [7, p.98]. Actually, there is no information on reproductive performance and prolificacy of the offspring from parents born in the twin litters.

Zhumadilla et al. [9, p.152] studied the reproductive performance of Kazakh fat-rumped sheep in the "Makash" farm in the Atyrau region and in the "Kokzhyra" farm in the Abai region depending on the type of birth of a ram and ewe. In their study, 537 twin-born ewes gave birth to 641 lambs, while 519 single-born ewes gave birth to 564 lambs showing the prolificacy of 119.4% and 108.7% respectively with a statistically significant difference between groups ($P < 0.001$).

Increasing prolificacy by crossing with prolific breeds of sheep, like Finnish and Romanov, produced good results in the countries with a temperate climate and good forage supply [1, p. 413]. However, such crossbreeding was not suitable for the harsh conditions of Kazakhstan, because the resulting crossbred lambs were not as strong and viable as Kazakh fat-rumped lambs. Finnish and Romanov crossbreeds are more susceptible to lung diseases, do not withstand 40°C heat and dust in summer and -40°C frosts in winter, do not show a strong flock instinct during grazing on the pasture, separate, lag behind the flock and eventually become victims of wolves.

"Razakhun" farm, Shu district, Jambyl region was established in 2005. It specializes on sheep and fodder production. Farm raises 6000 heads of sheep, including four flocks of the breeding ewes of Kazakh meat-wooled breed and three flocks of the breeding ewes of Kazakh fat-rumped coarse-wooled breed. The average flock size is 650 heads. The main agriculture land is located on the low-mountain plain. Total, the farm has 3000 hectares of agricultural land, including 2800 hectares of pastures and 200 hectares of arable land. Wheat, barley and alfalfa are produced on the arable land. In the low-mountain zone, there is the main pasture massif called "Terekty" with an area of 2800 hectares, where two flocks of fat-rumped coarse-wooled breeding ewes and one small flock of sire-rams are kept year round. Other sheep flocks come here and graze in spring, summer and autumn. During the rest of the year, sheep flocks graze on the pastures of the Moinkum sands leased from the forestry office. Sheep flocks move to the sands after deeping in late September, early October. They stay in the sands in winter until mid-April, early May. The distance from the Terekty area to the city of Shu is approximately 60 km, while distance from the pastures in the Moinkum sands is around 80-100 km.

Kazakh fat-rumped coarse-wooled sheep was introduced to the "Razakhun" farm in 2015, when one flock of 1.5-year old hoggets was bought, including 300 heads bought from the Saryagash district of the South Kazakhstan region and 300 heads bought from the Abay district of the East Kazakhstan region. Gradually, by 2020, the number of the Kazakh fat-rumped sheep was increased to three flocks, mainly due to their own replacement ewe lambs, additional 200 heads of the one-and-half-year-old hoggets were bought from the same farm in the Saryagash district of the South Kazakhstan region. The reason for the increase in the number of Kazakh fat-rumped sheep was that: 1) in comparison with Kazakh meat-wooled breed of sheep, they are better adapted to the local climate and year-round pasture grazing conditions, 2) they have higher meat performance, lower waste and mortality rates, 3) they need less costs on fodder, veterinary drugs and additional labor to care after animals and lambs during the lambing period.

This investigation was carried out to study the productivity and reproductive performance, including the prolificacy of Kazakh fat-rumped sheep belonging to the "Razakhun" farm in the Jambyl region.

Materials and methods. A study was carried out in three flocks of the breeding ewes of the Kazakh fat-rumped coarse-wooled breed in the "Razakhun" farm, Shu district, Jambyl region.

The detection of ewes in sexual heat, collection of the sperm and its quality assessment, double cervical inseminations were performed according to the instructions on artificial inseminations of sheep and goats [10, p.33]. Ewes in natural estrus were detected once daily in the morning from 7 to 8 o'clock with the aid of the teaser rams, in which prepuce was covered with a 50 x 50 cm apron to prevent coitus. Sperm from 4 sire-rams was collected with the aid of an artificial vagina. After semen collection its quality was assessed under a microscope at 400-x magnification, motility and density were evaluated. Sperm with a motility of at least 8 points and a concentration of at least 2.5 billion/ml was diluted at a ratio of 1 : 2 (semen : solution) with a diluent based on sodium citrate and ammonium sulfate according to a recipe published by Platov [11, p.26].

Double cervical insemination with total dose of 0.2 ml (0.1 + 0.1 ml in the morning and evening respectively) of diluted semen per head was performed from 9 to 10 am and from 4 to 5 pm with the aid of a LLT-57-M semi-automatic syringe, on the body of which a flashlight was attached with electrical tape.

The live body weights of rams and ewes during mating and lambing periods were measured early in the morning before the movement of the flock to the pasture with the aid of an electronic scales TV-M-600.2-A1 (made in Russia) with a weighing limit of up to 600 kg and an accuracy of 100 g. The body condition of the animals was assessed immediately after weighing by palpation the thickness of fat and muscles on the lumbar vertebrae according to a 5-point scale [12, p.77]. Newborn lambs were weighed a few hours after birth using electronic scales with a weighing limit of up to 50 kg and an accuracy of 1 g.

The obtained experimental data were processed using the ANNOVA data analysis package in Microsoft Excel and analyzed according to Plokhinsky [13, p.364].

Results and discussion. Data in table 1 shows that 77.8%, 74.1% and 77.2% of ewes lambled after cervical insemination with fresh diluted semen and delivered 559, 517 and 586 lambs in the first, second and third flocks respectively.

Table 1. Indicators of reproductive performance in the Kazakh fat-rumped coarse-wooled ewes

Indicator	Flock 1	Flock 2	Flock 3	Total
Number of ewes inseminated	650	640	645	1935
Number of ewes lambled: n	506	474	514	1494
%	77.8	74.1	79.7	77.2
Including lambled with twins: n	53	43	72	168
%	10.5	9.1	14.0	11.2
Number of lambs born: total	559	517	586	1662
per lambing	1.10	1.09	1.14	1.11

Total in three flocks after cervical insemination of 1935 ewes 1494 heads lambled showing fertility rate of 77.2%. Lambled ewes delivered 1662 lambs. Thus, the prolificacy of Kazakh fat-rumped coarse-wooled ewes was 1.11 lambs/lambing in average varying from 1.09 to 1.14 lambs/lambing in the different flocks.

According to data shown in the table 2, during the mating period in November of 2022, the body weight of Kazakh fat-rumped rams and ewes were 111.9±0.66 and 64.4±0.20 kg, while body condition scores were 2.71±0.10 and 2.62±0.05 points, respectively. In April of 2023 during the lambing the live body weights in the rams and ewes decreased to 108.8±0.63 and 58.7±0.19 kg, and body condition scores decreased to 2.44±0.12 and 2.11±0.06 points, respectively.

Table 2. Live body weights and body condition scores in the rams and ewes during mating and lambing periods

Group	n	Mating (November 2022)		Lambing (April 2023)	
		body weight, kg	body condition score	body weight, kg	body condition score
Sire-rams	20	111,9±0,66	2,71±0,10	108,8±0,63	2,44±0,12
Breeding ewes	100	64,4±0,20	2,62±0,05	58,7±0,19	2,11±0,06

The data of table 3 show that the body weights of single ram-lambs and single ewe-lambs at birth were 4.89±0.06 kg (n=137) and 4.26±0.06 kg (n=125), while the body weights of twin ram-lambs and twin ewe-lambs were 3.82±0.08 (n=42) and 3.53±0.09 kg (n=38) respectively. Moreover, the differences between bodyweights of the ram-lambs and ewe-lambs, both singles and twins, were statistically significant, P<0.001 and P<0.01, respectively.

In our experiment after cervical insemination with fresh diluted ram semen 77.2% (1494/1935) of Kazakh fat-rumped ewes lambled in three flocks on average. Total 1662 lambs were born, or averaging prolificacy of 1.11 lambs/lambing. Our data on the fertility of ewes after cervical insemination with fresh semen and the prolificacy of Kazakh fat-rumped ewes are consistent with the data of domestic and foreign

researchers [14, p.157]. Kazakhstani researchers Zhumadilla et al. [9, p.152] reported that the prolificacy of fat-rumped ewes in the “Makash” stud farm, Atyrau Region and “Kokzhyra” stud farm, Abai Region, was 107.0-122.2% and 105.7-120.6%, respectively, and prolificacy was the highest in ewes derived from twin parents. In the studies performed by Tajik scientists Rakhimov and Bobokalonov [14, p.157], the fertility of Gissar breeding ewes after cervical insemination with fresh semen was around 86-87%, while the prolificacy was 116-118%.

Table 3. Body weights at birth of single and twin Kazakh fat-rumped coarse-wooled lambs

Group	Singles		Twins	
	n	body weight, kg	n	body weight, kg
Ram-lambs	137	4.89±0.06 ^a	42	3.82±0.08 ^c
Ewe-lambs	125	4.26±0.06 ^b	38	3.53±0.09 ^d

A difference between a and b in the same column is significant, $P < 0.001$;
a difference between c and d in the same column is significant, $P < 0.01$.

Our data on live body weights and body condition scores of sire-rams and breeding ewes in the spring and autumn periods and body weights of single and twin lambs at birth are consistent with the reports published by domestic and foreign researchers [7, p.142]. For example, in our experiment, the body weights of single ram-lambs and single ewe-lambs at birth were 5.04 ± 0.07 and 4.44 ± 0.07 kg respectively. Kazakhstani researchers Begembekov et al. [15, p.27] published that the body weights at birth of ram- and ewe-lambs of the Degeres breed Aktogai population varied from 4.9 to 5.62 kg and 4.63 to 5.12 kg respectively. Pettigrew et al. [16, p.770] reported about important role of the dams and their milk yields in the growth and development of their lambs. According to Panayotov et al. [17, p.88], very good live body weights of the lambs were observed in Bulgaria: an average 4.516 kg at birth, 15.933 kg at weaning and 26.178 kg at 90 days of age, as well as a slight superiority of male over female lambs at all three ages. The single lambs at all studied ages had a higher live weight, than twin lambs – by 0.760 kg at birth, with 3.13 kg at weaning, and with 3.36 kg at 90 days of age. The factor “type of birth” had a reliable influence on the live weight of lambs at different ages, and that influence was relatively higher on the live weight at weaning.

Freitas-de-Melo et al. [18, p.53] published that single lambs were significantly heavier at birth and at weaning than twin lambs. Early weaning triggered stronger behavioral responses in mothers and their single lamb than in mothers and their twin lambs. In Ireland the heaviest birth, pre-weaning, and weaning weights were associated with single born lambs. The average birth weight in lambs was 4.32 ± 1.36 kg [19, p.82]. Morel et al. studied effects of birth weights on survival of twin born East Friesian crossbred and Romney crossbred lambs in New Zealand [20, p.75]. They found that mean body weights of lambs at birth in three different farms were 4.90, 4.56 and 4.72 kg; while body weights of ewes during the mating period were 58.5, 61.0, and 59.6 kg respectively.

Conclusion. Kazakh fat-rumped coarse-wooled rams and ewes of the “Razakhun”, Shu district, Zhambyl region have high productivity, their live body weights were 111.9 ± 0.66 and 64.4 ± 0.20 kg respectively. The fertility of the breeding ewes in three flocks after cervical insemination with fresh diluted semen averaged 77.2%, the prolificacy was 1.11 lambs/lambing. The body weights of single ram- and ewe-lambs at birth were 4.89 ± 0.06 and 4.26 ± 0.06 kg, of twin ram- and ewe-lambs – 3.82 ± 0.08 and 3.53 ± 0.09 kg respectively.

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ҚАЗАҚТЫҢ ҚҰЙРЫҚТЫ ҚОЙ ТҰҚЫМЫНЫҢ ӨНІМДІЛІК БЕЛГІЛЕРІМЕН БАЙЛАНЫСҚАН КАНДИДАТ-ГЕНДЕРДІҢ АЛЛЕЛЬДІК ПОЛИМОРФИЗМІ

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Соңғы жылдары өнімділіктің көріну деңгейімен байланысты ДНК-маркерлерді пайдалануға негізделген іріктеу әдістерін жасауға бағытталған зерттеулер ерекше маңызға ие болуда. Бұл технологияларды отандық қой етінің өндірісіне енгізу осы саланы дамыту үшін үлкен қолданбалы маңызы бар өзекті міндет болып табылады. Осыған сәйкес қазақтың құйрықты қой тұқымының өнімділік көрсеткіштерімен байланысты өсу гормоны (GH2), инсулин тәрізді өсу факторы (IGF1), миостатин (MSTN) және май қышқылдарын байланыстырушы ақуыз (FABP4) гендерінің аллельдік полиморфизмін зерттеу мақсаты қойылды.

Малдардың ДНК-ларын зерттеу үшін қан сынамалары пайдаланылды. Гендердегі полиморфизмді талдау Л.К.Эрнст атындағы Бүкілресейлік мал шаруашылығы институтының (Ресей) селекцияның молекулалық негіздері зертханасында ғылыми-зерттеу жұмыстарын орындау үшін арнайы әзірленген сынақ жүйелерінің көмегімен жүргізілді.

Қан ақуыздарының полиморфты жүйелерін зерттеу барысында қазақтың құйрықты қой тұқымының генетикалық құрылымдарын полиморфты ақуыздардың аллельдері мен генотиптері бойынша саралау дәрежесі айқындалды. Тестілеу нәтижесінде қазақ құйрықты қойларының популяциясында GH2 және IGF1 гендері полиморфты, ал MSTN және FABP4 гендері мономорфты екендігі анықталды.