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PRELIMINARY RESULTS OF SEPARATE FEEDING TECHNOLOGY IN SUCKING LAMBS OF FAT-TAILED BREEDS OF KAZAKHSTAN

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ANNOTATION

Kazakhstan has a unique geographic location and a vast territory dominated by natural pastures. Therefore, it is necessary to use the results of long-term selection as best as possible. We developed a feeding technology with regard to physiological state, young stock reproduction cycle, growth potential. Separate feeding technology in sucking lambs implies the breeding of lambs in small pens together with the dams from birth to a 20-day age and separate breeding from the 20-day age to the 4- month age. The proposed method for breeding sucking lambs was successfully tested on a herd of mutton sheep (44,5 thousand units) at test farms Bastau and Shaushen (Kazakhstan). We assessed the level of feeding and the content of the reproductive stock in the comparative aspect during the winter stall-feeding and the pasture semi-stall-feeding periods with regard to the specificity of environmental, climatic, and feeding conditions of the northern and southern areas of Kazakhstan.

Keywords: lamb, growth, weaning, carcass composition fatness, separate-sucking feeding, selection, lactation, period, alimentary tract development.

INTRODUCTION

The pre-weaning period of lambs, i.e. from birth to four months, coincides with the period of intensive growth, accompanied by growth potential that ensures the quick growth and low feed consumption rate per unit of gain (Aktaş et al. 2013). Both the lamb growth and the dam lactation are uneven. This is expressed in the varying body mass gain rate and uneven and disproportionate formation of different organs and tissues, which is caused by the regularities of individual development of fat-tailed lambs (Bathaei and Leroy, 1996). Besides age, the body mass gain is affected by dam feeding and lamb supplementary feeding

(Kashan, Manafi Azar, Afzalzadeh, and Salehi, 2005). Early training of lambs to eat nondairy feed allows cutting the feeding of young stock significantly and facilitates the development of the alimentary tract during this period (Revell et al. 2013). Experiments showed that fat-tailed dams adapted to such a diet quickly, since the instinct that developed over several generations and the mobilization of the organism's internal resources to preserve and develop the fetus helped to realize the maximum potential lactation, preservation, and intensive growth of lambs (Walkom and Brown, 2017).

Soon after lambs are born, the dam starts producing a small amount of colostrum, after which the production of milk increases and reaches its peak by the end of the second or third week, after which it gradually decreases (Park, 2007). During the first months of its life, the lamb fully satisfies its needs through the mother's milk; during the following months, especially during the third month (days 84-114), the lamb satisfies only 10-12% of its needs through the mother's milk.

During this time, mother's milk alone is not enough to sustain the growth of lambs, which is why it becomes necessary to use supplementary by dam feeding and lamb supplementary feeding (Kashan, Manafi Azar, Afzalzadeh, and Salehi, 2005). Early training of lambs to eat nondairy feed allows cutting the feeding of young stock significantly and facilitates the development of the alimentary tract during this period (Revell et al. 2013). Experiments showed

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During this time, mother's milk alone is not enough to sustain the growth of lambs, which is why it becomes necessary to use supplementary nondairy feed (Olaizola, Chertouh, and Manrique, 2008). At that, it is important to provide the optimal ratio, namely: lamb growth, dam milk capacity, and

consumption by lambs of pasture feed with appropriate supplementary feed (Tay, Blache, Gregg, and Revell, 2012).

This interrelated complex can be achieved through skillful management of growth regularities, physiology of dam lactation, and physiology of lamb digestion. We developed and studied a method of separate-sucking breeding of lambs from an age of 20 days to the age of 1.5 months. The beginning of ruminal digestion starting with the 20-day age is related to the decrease in the function and significance of abomasum enzymes in the digestion of various pasture grasses and supplementary feed (Adegoke, Machebe, Ezekwe, and Agaviezor, 2015). During this period, sucking dams are turned to pastures, while the lambs remain at the base or pen and graze near the watering point with the supplementary feed.

Taking these factors, especially the lambs' consumption of nondairy feed, into consideration allows intensifying the growth and development of lambs during the pre-weaning period via the implementation of innovative intensive separate- sucking technologies of lamb breeding during the pre-weaning period

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MATERIALS AND METHODS

This study was conducted by researchers from the Saken Seifullin Kazakh Agrotechnical University.

Experimental animals and design

The study focused on a herd of fat-tailed sheep, bred at the basic farms of S. Seifullin Kazakh Agrotechnical University – Bastau LLP, Akmola Region (n=7000) and Shaushen farm household (FH), Jambyl Region (n=37,500).

The technology of separate-sucking breeding of fat-tailed lamb from the age of 20 days is as follows: lambs are bred from birth to the 20-day age in small pens together with the dams; from the 20-day age to the 1.5-month age, the lambs are bred and kept separately form the dams in small pens at the pest sections of pastures, resting near watering points with a supplementary mineral-salt mixture that includes barley stock feed, crushed grain, chalk, bone meal, common salt, and fluorine-free phosphate at a rate of 0.1-0.2 kg with lambs being let onto the pastures to their dams two times, after two-three hours before the morning watering at 12 o'clock, resting at noon (from 12 to 16 o'clock), lambs are kept together with their mothers at the pasture and remain at their side at nighttime; it is best to wean lambs at nighttime; from the age of 1.5 months

to 4 months, i.e. before weaning, lambs are kept in large pens and allowed to go near their dams once per day; up to 0.4 kg of supplementary feed is introduced during this period; lambs remain at their mother's side at nighttime.

The lamb feed included: chalk, common salt, fluorine-free phosphate, bonemeal, and barley stock feed at a rate of 0.1-0.2 kg per unit. The lambs were allowed near their mothers at two- three-hour intervals before the morning watering; after noon (from 12 to 16 o'clock), the lambs were kept together with their mothers and remained with them at night time. It is best to wean lambs at night time; from the age of 1.5 months to 4 months, i.e. before weaning, lambs are kept in large pens and allowed to go near their dams once per day; up to 0.4 kg of supplementary feed is introduced during this period; lambs remain at their mother's side at nighttime.

The adaptability (or survivability, livability) of lambs was determined by registering their adaptation from birth to weaning to the yearlong pasture breeding conditions.

The defining factor in the growth of newborn lambs is the amount of mother's milk they consume.

STATISTICAL ANALYSES

The data were statistically analyzed using the Kolmogorov-Smirnov test for normal distribution with subsequent paired t-test. A statistically significant difference was considered when $P \leq 0.05$ and trends if $0.05 < P < 0.10$. Statistical analyses were performed using SPSS v. 11.0 (IBM, USA).

RESULTS

The obtained live weight indices in lambs during breeding with the implementation of various options of the separate-sucking technology during the pre-weaning period (2015-2017) showed a positive effect in the achievement of a sufficiently high commercial weight of up to 42-43 kg and more at weaning at a 4-month age with varying growth rates, which resulted not only from the innovative technology, but also feeding and genetic factors

Table 1: Live weight gain in test lambs under different conditions and with different variants of separate-sucking feeding

Breed	n	Live weight at	Number of	Live weight at	Average daily	Growth rate,	Growth coefficien

		birth	days	weaning	gain, g	%	t times
Conventional technology							
Bastau	25	5.80±0.13	120	36.30±0.60	254.2	144.9	6.26
Shaushen	18	4.69±0.16	120	35.85±0.52	259.7	153.7	7.65
Separate –sucking technology							
Bastau	20	5.75±0.11	120	40.0±0.75	285.4	149.7	6.96
Shaushen	31	4.42±0.25	120	38.85±0.96	286.9	159.2	8.79
Separate –sucking technology with supplementary feeding							
Bastau	20	5.85±0.1	120	42.70±0.41	307.1	151.8	7.3
Shaushen	21	4.68±0.10	120	41.60±0.34	307.1	159.5	8.89

The implementation of the separate-sucking technology during the pre-weaning period provided for significantly higher indices of commercial weight in all test lambs: Kazakh fat- tailed lambs at Bastau LLP reached42.7 kg at an average daily rate of 213.3 g, growth rate of 162.5%, and growth coefficient of 9.68 (Table 1).

Table 2: Changes in the live weight of test ewes at Bastau LLC and Shaushen FH during the pre- weaning period

Farm name	Age	n	M ± m	Cv, %
Bastau LLP	Birth	20	4.72±0.11	10.71
Shaushen FH			4.31±0.04	4.36
Bastau LLP	45 days	20	19.47±0.27	6.22
Shaushen FH			20.13±0.34	7.37

Bastau LLP	3 month	20	36.04±0.29	3.66
Shaushen FH			33.84±0.38	4.84
Bastau LLP	4 month	20	41.01±0.34	3.69
Shaushen FH			39.40±0.27	2.94

The separate-sucking breeding of test lambs and ewes during the pre-weaning period in different years of the study had a positive effect on their growth and development at weaning at an age of four months. Obtained mass indices in test animals (Table 2) are assessed as good, especially considering that the average live weight of sheep sold for meat across the country did not exceed 40.0 kg in previous years (38.0 kg, to be precise) (statistics for Kazakhstan).

First-line animals are characterized by a pronounced mutton body type: deep torso, straight back, big tail. They are also characterized by good slaughter and meet qualities. The dressed weight of lambs at 4-4.5 months was 20 kg and more, while the dressing percentage of milk-fed lambs at weaning was 51.0% and more. First-line dams had a higher live weight, a more developed mane, length of body, and leg height at elbow. Dams had a higher body length and a developed hip-chest index. The farm had a large (more than 10,000) band of older and more productive ewes; however, these ewes were due to be removed from the herd and used to produce marketable mutton lambs.

Table 3: Live weight and body dimensions of test lambs

Farm name	Age	Live weight, kg	withers height, cm	Hip width, cm	Length of body, cm	Chest depth, cm	Chest width, cm	Leg height, cm	Chest girth, cm	Metacarpu
Bastau LLP	Birth	4.72	37.82	6.05	31.16	12.34	7.42	27.28	37.26	5.79
Shaushen FH		4.31	38.65	6.02	32.15	12.90	8.00	27.65	38.93	5.86
Basta	45	19.47	51.12	12.71	48.90	19.90	13.59	37.39	65.50	5.8

u LLP	days									6
Shaushen FH		20.13	51.85	13.33	49.93	20.48	13.98	38.35	67.53	6.06
Bastau LLP	3 month	36.04	61.10	13.38	65.96	23.96	15.31	39.53	68.72	6.91
Shaushen FH		33.74	61.30	13.42	64.81	23.59	15.84	39.61	68.43	6.98
Bastau LLP	4 month	41.01	61.78	14.93	66.42	25.05	16.95	41.79	70.15	7.46
Shaushen FH		39.40	58.87	17.13	59.62	25.83	18.09	46.08	70.69	7.68

First-line lambs are characterized (Table 3) by a large far mass, extended body, developed chest with pronounced, for fat-tailed sheep, body indices, and had longer legs when compared to second-line lambs. They were better developed, larger, longer, meatier, and had a tighter tail. Due to the high growth rate, the young stock had 40-45 kg of live weight at weaning. First-line ewes were characterized by an extended body, greater girth, deeper chest, excellent length indices, massive body type, and high legs.

The fertility ranged from 95.8 to 104.7%, depending on their condition and age. At that, the highest indices were found in dams from the Shaushen FH aged 5-5.5 years and older. These dams produced more lambs (104.7%) when compared to dams (aged 3-3.5 years) with a higher live weight (98.7%) or 6% more and with the use of rams with higher live weight.

However, old dams that were removed from the herd gave birth to slightly smaller lambs, had significantly lower survivability (87.4%) by the age of four months, despite being more fertile (104.7%) (Table 4).

Table 4: Reproductive capacity of dams, adaptability (survivability, livability) of lambs born to dams of different age at Shaushen FH

Indicator	Removed	Big, aged 3-3.5 years	First-times, 1,5 years
Dam livestock at the start of lambing	727	675	617
Lamb crop	761	666	591
Lamb crop per 100 dams, %	104.6	98/6	95.7
Dams grown and weaned from dams	665	655	580
Livability of lambs from birth to weaning, %	87.4	98.3	98.1

However, old dams that were removed from the herd gave birth to slightly smaller lambs, had significantly lower survivability (87.4%) by the age of four months, despite being more fertile (104.7%) (Table 4). Therefore, farmers were reluctant to use such ewes in reproduction

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DISCUSSION

In sheep farming, the technical solution does not take into account the physiological state of the animals during raising and that 80-90% of milk produced from the mammary gland of the dam over the 120 days of lactation falls within the first two months (Zygoyiannis, 2006). During the first week after birth (up to day 20), the lamb fully satisfies its needs through the mother's milk. From that point on, milk alone is not enough. A three- month-old lamb satisfies only 10-12% of its nutritional needs through the mother's milk. Although mother's milk is the most valuable food for lambs, it becomes cost-ineffective after three months of growth and development of the lamb and lactation of the dam. For instance, on weeks 12-16 (lactation day 80-110), the dam requires four times

more feed to produce 1 kg of milk than during the first four weeks (before day 20) of lactation.

However, the theoretical estimations of the milk producing ability, which seem adequate to the milk producing ability of dams that ensure the sufficiently high intensity of growth and development during the pre-weaning period and produces lambs with 40 kg or more of live weight at weaning at the age of four months, are correct in theory, but often turn out to be deceitful in practice. At that, it is worth bearing in mind that 80-90% of all the milk produced by the mammary gland of the dam over the 120 days of lactation falls within the first two months.

At this time, the organization of supplementary feeding of lambs is three times as effective that using the same feeding method of mother's milk or calf milk replacers. Therefore, the conventional method of raising lambs with four- or five-months-old dams increases the consumption of feed and the cost of the product. At weaning, lambs have a subpar live weight. Test lambs that were weaned and separated from dams in conditions that were more favorable developed an imitation reflex (Ginane, Bonnet, Baumont, and Revell, 2015), which facilitates better consumption of pasture grass, gradual adaptation to weaning, better growth, and better development of the gastrointestinal tract, since when lambs are constantly kept with their mothers, they constantly follow the dams, eat less grass, start grazing at an older age, get tired after covering large distances, and lose weight (Aktaş et al. 2013). The growth of lambs during this period, especially during the first month after birth, largely depends on the milk producing ability of the dam. Later on, this dependency of lambs on the milk production ability of their mothers reduces, while the importance of nondairy feeds increases.

Experiments also showed that fat-tailed dams adapted to such a diet quickly, since the instinct that developed over several generations and the mobilization of the organism's internal resources to preserve and develop the fetus helped to realize the maximum potential lactation, preservation, and intensive growth of lambs. A more intensive live weight gain in lambs during raising at both farms was found at the most critical periods: before the 40-45-day age, live weight of 19.5-20.1 kg with an average daily gain of 327.7-351.5 g, the largest growth rate of 121.9-129.5%, and growth coefficient of 4.1-4.7. During the following period (from 40-45 days to 3 months), the growth intensity remained high (304.6-368.2 g) and increased to 368.2 g depending on the level of supplementary feeding with pasture feed (Bastau LLP), achieving a live weight of 33.0-36.0. At the age

of three months, the growth rate ranged from 50.8% to 60.0%, while the growth coefficient was 1.7-1.8. During the last month of the pre-weaning period (third month to fourth month), the average daily growth decreased significantly – to 165.6-185.3 g, while the growth rate was minimal and ranged from 12.9% to 15.2% and the growth coefficient was 1.1-1.2. At that, test lambs achieved a high live weight, while maintaining their growth intensity by the end of the pre-weaning period, i.e. at the age of four months (up to 38.8-42.7 kg). The dynamics of growth and development of lambs (in batches of 10 and more units, especially the mutton lambs) was studied at birth and during later periods (after 40-45 days and after three and four months) with the implementation of the separate-sucking technology during critical periods of milk-fed lambs (at birth, 45 days, 3 months, at weaning at 4 months).

The investigation of the growth and development of lambs at basic farms found not only different live weight at birth, but also different growth energy during the pre-weaning period, which was directly related to the features of their genotypes and raising conditions (Gaouar, Kdidi, and Ouragh, 2016).

The investigation of the growth and development of fat-tailed lambs and young stock, assessment of the live weight of highly productive rams and their successors, and growth and development intensity found that lambs from different selections (homogenous, heterogeneous) of breeds (Kazakh fat-tailed, edilbay breed) and combination thereof different in terms of live weight at birth and growth energy during postnatal development, which was directly related to the features of their genotypes and raising conditions.

After the development of feeding functions (development of ruminal digestion), test lambs better adapted to independent grazing and started eating the herbage at pastures earlier, thus satisfying their nutritional needs over the course of their growth.

They grew faster than lambs from the control groups, who were raised with dams according to the conventional technology, did, since they were capable of properly digesting and assimilating nutrients from vegetative (and other nondairy) feeds by the age of two months. They adapted to the variety of pasture vegetation and supplementary feeding with a mixture of concentrated feedstock and other supplementary mineral-salt feeds, which was combined with prolonged rest to create the most favorable conditions for the growth and formation of the productive abilities of the young organism.

The new types of fat-tailed sheep, alongside the ability to use

pastures all year long and to produce felt, wool sheepskin, and mutton, present a number of advantages by successfully combining fast growth, good live weight (97-102 kg in rams, 65-69 kg in ewes), main dimensions (74.7-78.8 cm in height in ewes and 80.9-83.5 cm in height in rams, 80.9 and 83.5 cm length of body, respectively, 101-102.6 and 98.5-109.1 chest width, respectively), coarse felt (2.9 kg of shearing from rams and 2.0-2.1 kg – from ewes), up to 45 kg of live weight of lambs at the age of four months in the more favorable years and a live weight of 79.0 kg by the age of 15 months, high meat and fat productivity, and an expressed phenotype that differs from that of original fat- tailed sheep.

CONCLUSION

The development of the scientific framework of and conduction of intensive practical work is necessary for the improvement of the meat industry and the creation of commercial lines with a positive solution for the new achievements of selection in the meat sector of the sheep-breeding industry.

The best results were achieved through the combination of the separate-sucking technology and supplementary feeding with concentrated feedstock. At that, the increase in live weight of crossbreeds at birth was 1.2 kg (25.0%). At weaning (four months), this increase was 5-6 kg; at the age of 10 months – up to 16 kg

This allows using them for reproduction or selling them for meat at an earlier age, which, in turn, allows accelerating the rate of the selection and intensifying mutton production. The comprehensive study of selection attributes, age dynamic of live weight (at birth, after 40-45 days, after three months, at weaning, i.e. after four months), the most characteristic eight dimensions: withers height hip width, length of body, chest depth, chest width, leg height at elbow, chest girth, and metacarpus girth), followed by a measurement of body type indices in the sex and age groups of the reproductive herd and brood young stock of Bastau LLP distinguished two new commercial lines of highly productive animals with a high live weight (97-102 kg in rams and 65-69 kg in ewes), shearing (2.9 kg and 2.4 kg, respectively), and fast-growing young stock. By the age of four months, the live weight of lambs reached 41-45 kg, which was more than 50% of the weight of adult sheep. No. 320 Commercial Line of Fat-Tailed Hair Ram 31030 and No. 321

Commercial Line of Fat-Tailed Hair Ram 28828 were registered at the State Register of Selection

Achievements (Animal Breeds) of the Republic of Kazakhstan

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ПРЕДВАРИТЕЛЬНЫЕ РЕЗУЛЬТАТЫ ПРИМЕНЕНИЯ РАЗДЕЛЬНО-ПОДСОСНОЙ ТЕХНОЛОГИИ ВЫРАЩИВАНИЯ КУРДЮЧНЫХ ЯГНЯТ В КАЗАХСТАНЕ

Казиханов Р., Казиханова С.Р.

РЕЗЮМЕ

В статье обсуждаются результаты раздельно-подсосного выращивания курдючных ягнят в молочный период.

Эксперименты также показали, что курдючные ягнята быстро приспособились к этой технологии, так как она помогла реализовать потенциал лактации маток и интенсивность роста ягнят.

Более интенсивное увеличение живого веса у ягнят наблюдалось в самые критические периоды. В 45-дневном возрасте вес ягнят составил 19,5-20,1 кг при среднесуточном приросте 327,7-351,5 г, максимальный темп роста 121,9-129,5% и коэффициент роста 4,1-4,7.

В течение следующего периода в возрасте трех месяцев интенсивность роста ягнят оставалась высокой (304,6-368,2 г) и увеличивалась до 368,2 г в зависимости от уровня подкормки (КХ Бастау), достигая живого веса от 33,0-36,0 кг. В возрасте трех месяцев темп роста колебался от 50,8% до 60,0%, а коэффициент роста - 1,7-1,8.

В период до отлучения от маток средний дневной прирост существенно уменьшился до 165,6-185,3 г, тогда как темпы роста были минимальными и варьировались от 12,9 до 15,2%, а рост коэффициент составлял 1,1-1,2.

При этом тестовые ягнята достигли высокого живого веса, сохраняя при этом интенсивность роста к концу периода отъема от маток, и в возрасте четырех месяцев достигли живой массы 38,8-42,7 кг.

Ключевые слова: ягненок, рост, отлучение от груди, утяжеление состава туши, раздельно-подсосный, отбор, период лактации, развитие пищеварительного тракта

ҚАЗАҚТЫҢ ҚҰЙРЫҚТЫ ҚЫЛШЫҚ ЖҮНДІ ҚОЗЫЛАРЫН БӨЛІП-ЕМІЗІП ӨСІРУ ТЕХНОЛОГИЯСЫНЫҢ НЕГІЗГІ НӘТИЖЕЛЕРІ

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ТҮЙІН

Мақалада құйрықты қозыларды сүт ему кезінде енесінен бөліп-емізіп өсірудің нәтижелері қарастырылды. Эксперименттер сондай-ақ, қозылардың бұл технологияға тез бейімделуін көрсетті. 45-күнгі қозылардың тірілей салмағы 19,5-20,1 кг болып, орташа тәуліктік өсуі 327,7-351,5 граммға жетті, максималды өсім 121,9-129,5% және өсу коэффициенті 4,1-4,7.

Келесі 3-ай кезеңінде Бастау ЖШС қозыларының өсу қарқыны жоғары болды (304.6-368.2 г) және тірілей салмағы 33.0-36.0 дейін жететін болды. Үш айлық қозылардың өсу қарқыны 50,8% -дан 60,0% -ға дейін, өсу қарқыны 1,7-1,8 болды. Енесінен бөлінген кезеңінде тәуліктік орташа қосылымы 165,6-185,3 г дейін төмендеді, ал өсу қарқыны ең төмен болды және 12,9-дан 15,2% -ке дейін өзгерді, өсу қарқыны 1,1-1,2 болды. Төрт айлық кезеңде тестілік қозылардың салмағы 38,8-42,7 кг-ға дейін жетті.

Кілттік сөздер: қозы, өсуі, дәмдеуіш, қаңқа құрамы, енесінен бөліп-емізіп өсіру, іріктеу, лактация кезеңі, асқорыту жолдарының дамуы