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GRAZING AND FATTENING PROPERTIES AKKARABAS SHEEP

ANNOTATION

This article examines the growth characteristics, pasture-based fattening, and productivity traits of Akkarabas lambs raised at the Kurmangazy Pedigree Sheep Breeding Plant, located in the Kurmangazy district of the Atyrau region.

Currently, fat-tailed meat-and-fat sheep farming remains one of the key sectors of livestock production in the Republic of Kazakhstan, accounting for over 70% of national mutton output. Fat-tailed sheep breeds are distinguished by rapid growth rates; by the age of 12–16 months, the meat-to-bone ratio in lambs approaches that of mature animals. The qualitative indicators of meat productivity are shaped by both breed-specific and individual characteristics and are directly influenced by factors such as breed, age, sex, feeding regimes, husbandry conditions, and genetic potential for precocity.

The growth and development of fat-tailed sheep follow distinct biological patterns. During the first month of life, lambs gain an average of 359–400 grams per day, with some individuals reaching up to 450–500 grams daily, indicating intensive early development. From the second month onwards, growth rates begin to decline, as maternal milk alone is no longer sufficient to meet the nutritional demands of rapid growth. At this stage, lambs require additional concentrated and green forage to maintain their genetic growth potential. As such, a comprehensive and scientifically grounded approach to pasture-based fattening of Akkarabas lambs is essential.

The breeding of Edilbay and Edilbay-type fat-tailed sheep enables efficient and profitable utilization of pasture lands in Kazakhstan's arid, semi-arid, and steppe zones, contributing to the sustainable development of meat sheep farming across the country.

Key words: *meat-fat, pasture, pasture fattening, breed, ram, lamb, live weight.*

Introduction. The vast pastures and diverse climatic conditions of Kazakhstan significantly contribute to the development and productivity of sheep farming. A considerable portion of these natural pastures is located in arid and semi-arid zones, which are especially suitable for grazing [1]. Currently, approximately 25% of all sheep and goats in Kazakhstan are raised in these regions, with over 75% of the sheep belonging to the fat-tailed meat and fat-meat breeds. These environmental conditions create favorable opportunities for further improvement and utilization of such breeds. In many developed countries, lamb meat is primarily consumed from animals weighing 15–18 kg. In contrast, Kazakh sheep breeds raised on pasture typically reach a live weight of 35–38 kg by the age of four months, yielding 16–18 kg of high-quality lamb meat. Improving livestock quality and productivity depends heavily on the use of modern and efficient feeding and management systems [2]. Only by providing animals with balanced nutrition can their genetic potential be fully realized. Edilbay and Edilbay-type sheep are capable of year-round grazing under natural seasonal conditions, with strong adaptations for foraging even under snow cover — a key breed-specific trait [3].

Zootechnical science considers nutrition to be one of the primary environmental factors influencing an animal's development, productivity, and survival. Numerous scientific studies have focused on the effect of feeding levels on livestock physiology, growth, and productivity [4]. Depending on the production goal and feed resources, different sheep breeds should be chosen — either fast-growing meat breeds or fat-tailed meat breeds, depending on pasture conditions. Sheep are anatomically and physiologically well-adapted to forage-based feeding, as evident from their digestive systems and associated organs [5].

It is preferable to raise breeds that have historically adapted to specific types of vegetation and can efficiently convert pasture biomass into meat. In recent years, newly developed Edilbay and Edilbay-type Akkarabas sheep lines in our region have demonstrated strong resilience and adaptation to such conditions [6].

Given that a significant portion of Kazakhstan's rangeland resources lies in arid and semi-arid zones, the development of fat-tailed meat sheep farming remains a highly efficient strategy for utilizing these lands. This is particularly relevant in the current context of increasing demand for meat and meat products. The present study aims to investigate this area, making it a timely and important contribution to livestock science [7].

Materials and methods of research. This research was conducted at the Kurmangazy sheep breeding plant located in Kurmangazy district, Atyrau region, where Edilbay and Edilbay-type white-wool Akkarabas sheep are bred. The population of Akkarabas sheep at the farm is approximately 2,200 animals.

The total pasture area of the farm is 130,000 hectares, mostly consisting of steppe and semi-arid rangelands. During spring and autumn, the pastures include sandy and slightly undulating terrain, gradually transitioning into flat steppe landscapes.

Experimental animals were male lambs aged 4.0–4.6 months and 13 months, selected after weaning. Standard zootechnical methodologies were applied, including weighing and monitoring of live weight and meat productivity at different growth stages: at birth, 4.0–4.6 months, and upon slaughter.

Slaughter evaluations were conducted at the "Makash" mini meat plant in Kurmangazy district. Meat chemical composition was analyzed at the Atyrau branch of the Republican Veterinary Laboratory under the Ministry of Agriculture of the Republic of Kazakhstan. Carcass evaluation followed state-approved methodologies and standards (VIZH, 1958; 1969; 1970 and GOST 7595-55).

The results and their discussion. The targeted improvement of sheep meat production and quality underscores the critical importance of studying the genetic and phenotypic potential influencing meatiness and fattiness traits in sheep. Particular attention was given to determining slaughter indicators and analyzing the morphological composition of the carcass based on the animals' age and fatness [8].

According to Professor K. Kanafin, growth and development of fat-tailed sheep breed proceed according to distinct patterns. Under steppe experimental station conditions, Edilbay lambs attain average daily live weight gains of 350–400g during their first month, reaching up to 450–500g in some individuals. From the second month onward, growth rates decline, as maternal milk alone becomes insufficient to sustain rapid development [9]. At this stage, supplemental nutritious feed becomes necessary to preserve the breed's potential for rapid maturation. When combined with grazing on natural pasture and access to clean water, lambs gradually adapt and begin to fully utilize forage intake. Grazing combined with occasional concentrate supplementation noticeably increases live weight gain and improves fattening efficiency, reducing the unit production cost [10].

In sheep farming, the choice of breeding direction determines the required production approach and type of raw material. For meat production, depending on pasture availability, one may utilize fast-maturing meat-type breeds or meat-fat-tailed breeds. The sheep's adaptation to grazing is first observed in the digestive tract and its related organs, which are instrumental for feed utilization [11-15].

In our region, natural pasture grazing is predominantly employed in meat-fat-tailed sheep farming to enhance lamb meat productivity. At breeding farms, specially organized batches of homogeneous male lambs, separated from ewes, are grazed and supplemented. Two grazing-fattening periods, in spring-summer and summer-autumn, are conducted. Each flock typically comprises 550–600 ewes. Prior to selection and grazing, specialists (especially veterinarians) inspect flocks and exclude sick or lame animals. The weights of grazing lambs are systematically measured and recorded, and condition monitoring is conducted monthly [16-20].

During grazing-fattening, efforts are made to reduce unnecessary walking by positioning watering points near grazing areas. At times, water is brought using cistern trucks to distant pastures. Salt and mineral supplements are placed in troughs at watering points.

In our region, new Edilbay and Edilbay-type fat-tailed breeds show improved grazing efficiency: lambs exhibit reduced movement, quicker satiety, and higher body condition scores. According to long-term data, summer-autumn grazing extends from late May until mid-November, with occasional slight seasonal deviations.



Figure 1 – A flock of Akqarabas sheep grazing during the early days of spring

Nursing ewes adequately support their lambs' needs. Nutritional requirements of lactating ewes vary based on the number of lambs. Lambs receiving insufficient or poor-quality milk experience slow growth and delayed maturation. Maternal milk remains the sole food source for lambs during the first month; from around three weeks of age, they begin to consume solid feed. From this point, lambs can be offered diets including wheat bran and other grain-legume mixtures. By 3–4 months, lambs can be weaned from ewes.



Figure 2 – Lambs of the Akqarabas sheep at the age of 2.6 to 3 months

By weaning, both male and female lambs approximately double their birth weight. At 4.5 months, male lambs reached a live weight of 35.5kg pre-slaughter; by 7 months, this increased to 44.3kg. Considering tail weight, carcass yields were 51.1% and 52.3%, respectively. Muscle tissue primarily develops during the nursing stage; its formation decelerates during grazing. Hence, differences in carcass yield between male lambs and ewes of the same genotype across age groups are minimal.

As lambs grow, significant morphological and chemical changes occur that enhance meat quality: muscle mass proportion increases, especially in valuable cuts; protein content rises, enhancing both nutritional and energy value. Meat quality is largely determined by its chemical composition.

Upon weaning, average live weights ranged from 37.5 to 39.5kg for males and 35.5 to 37.2kg for females, depending on body condition. When slaughtered at this age, male lambs yielded 17–23kg of carcass, with a dressing percentage of 52–55%. At 16 months, carcass weight and yield were 28–31kg

and 51–54%, respectively. The lean-to-bone ratio in carcasses was 79–81%, serving as a phenotypic indicator of breed type and displaying minor variation across developmental stages.

The nutritional and organoleptic properties of sheep meat are comparable to or exceed those of beef, owing to higher levels of protein, minerals, and amino acids, combined with higher caloric value and lower cholesterol. For example, sheep meat has approximately 2,256kcal/kg, compared to 1,838kcal/kg in beef.

The development of the new Edilbay-type pelage sheep strain supports national demand for high-quality young lamb meat and light textile-grade pelage wool, stimulating progress in both livestock and textile sectors.

In our experiment, male lambs aged 6–6.5 months were grazed for 60 days post-weaning to evaluate growth characteristics; ram lambs were selected based on uniform weaning weights. Initial post-weaning weight loss (over 3–4 days) was followed by weight recovery as pastures were consumed. During autumn grazing, these lambs gained on average 1kg of live weight, with daily gains amounting to 75g, reaching an average live weight of 37kg.

Table 1 – Results of pasture fattening of Akkarabas ram lambs at 6–6.5 and 13 months of age

Age (months)	Fattening Duration (days)	Season	n	Initial Weight (kg)	Final Weight (kg)	Total gain (kg)	Daily Gain (g)
6-6,5	60	Autumn	50	32.5± 0.42	37.0± 0.32	4.5	75
13	90	Spring	76	38.0± 0.36	49.9± 0.21	11.9	132

At breeding farm grazing–fattening, ram lambs attained daily gains of 130–150g during 90-day grazing, reaching levels only marginally below those of Edilbay lambs (difference of 5.4kg and 90g). Thus, grazing performance was found to be comparably high.

In supporting data, Kazakh fat-tailed ram lambs grazed until 6–6.5 months achieved 64g/day weight gain post-weaning. Professor Z. Q. Alishev’s work in Aktobe region reported 94g/day and 101g/day gains during 85- and 79-day grazing in spring pastures with diverse herbaceous vegetation.

We also compared these results with sheep-raising operations in neighboring farms, where grazing started 20–25 days post-weaning under similar selection protocols.

Table 2 – Pasture fattening results of 4.5–5 month-old lambs (Edilbay types)

Breeding Farm	n	Initial Weight (kg)	Final Weight (kg)	Total Gain (kg)	Daily Gain (g)
Suyindik	20	37.1 ± 0.27	42.7 ± 0.36	5.6	93
Makash	20	35.8 ± 0.26	41.3 ± 0.34	5.5	91
Kurmangazy	20	34.2 ± 0.24	39.6 ± 0.30	5.4	90

During 60-day grazing with plentiful pastures, Suinidk Edilbay rams achieved the highest weight (37.1kg) pre-grazing, while Makash lambs exhibited 4.7% higher live weights than Suinidk’s white-wool rams. Differences among the groups were significant ($P>0.99-0.999$). Edilbay-type lambs performed comparably (gain 5.4kg, 90g/day), indicating high grazing–fattening potential overall.

Summer grazing provides comparatively complete nutritional protein and vitamins, with pasture yields ranging from 150 to 300kg/ha. Despite variability in pasture density, body condition of adult sheep and lambs remains generally good, without concentrate supplementation. Pasture protein intake is approximately 100–110g per feed portion.

Grazing strategy involves rotational use of different pasture zones. During early spring, ewes with lambs utilise denser, ephemeral vegetation; as lambs mature, they move to sparser pastures. Lactating ewes recover body condition during summer grazing to prepare for breeding and winter. During spring–summer and autumn grazing, fat-tailed meat sheep rapidly regain and gain weight. Their adaptation to local conditions is a distinct advantage.

In conclusion, properly managed natural pastures, particularly for white-fat-tailed sheep, allow young lambs to gain significant weight immediately after weaning. At Kurmangazy facility, grazing of rams in arid and semi-arid pastures during critical rearing periods (winter and spring) involved winter feeding of 2.0–2.5kg hay/day and grazing on mild sunny winter days. However, this forage quantity is

insufficient during growth and rearing stages: at this period, ewes weigh 36–38kg and rams 42–45kg on average.

Slaughter and meat characteristics of edilbay-type white-wool lambs. Meat and fat are the primary products of fat-tailed meat-and-fat sheep breeds. Increasing lamb meat production is largely contingent on delivering animals with high live weight and condition scores for slaughter. Moreover, meat productivity depends on several factors including breed, age, sex, and management conditions. Positive outcomes in lamb meat production are achievable only when all elements of intensive technologies are observed. The key factors include spring lambing, proper management during the suckling period, pasture fattening, and pen finishing. Typically, high results are achieved in farms where production processes are integrated and collectively managed under modern farming systems.

To evaluate the meat traits of lambs, male and female lambs from three stud flocks in the region were slaughtered at ages 4–4.5 and 6.5 months. The obtained data were compared with the slaughter and meat characteristics of adult rams (Table 3).

Table 3 – Slaughter Parameters of edilbay and edilbay-type white-wool lambs at different ages (Atyrau region)

Parameters	Age of the offspring, months	
	4-4,5	6,5
<i>Suyindik factory-type line</i>		
Number of slaughtered lambs, head	3	3
Pre-slaughter live weight, kg	37,4±0,46	41,2±0,60
Carcass weight (with tail), kg	19,75±0,26	21,43±0,32
Carcass yield, %	52,8	52,0
Tail fat weight, kg	3,0±0,12	3,2±0,14
Internal fat weight, kg	0,22±0,06	0,24±0,08
Internal fat yield, %	0,6	0,6
Dressed weight, kg	19,97±0,36	21,67±0,40
Dressing percentage, %	53,4	52,6
<i>Edilbay sheep of the Makash breeding farm</i>		
Number of slaughtered lambs, head	3	3
Pre-slaughter live weight, kg	36,2±0,44	40,0±0,60
Carcass weight (with tail), kg	18,90±0,22	20,73±0,30
Carcass yield, %	52,2	51,8
Tail fat weight, kg	2,8±0,10	3,0±0,12
Internal fat weight, kg	0,20±0,04	0,23±0,08
Internal fat yield, %	0,5	0,6
Dressed weight, kg	19,10±0,34	20,96±0,38
Dressing percentage, %	52,7	52,4
<i>“Akkarabas” sheep of the Edilbay type</i>		
Number of slaughtered lambs, head	3	3
Pre-slaughter live weight, kg	35,0±0,42	38,4±0,56
Carcass weight (with tail), kg	18,44±0,24	19,88±0,28
Carcass yield, %	52,7	51,8
Tail fat weight, kg	2,16±0,08	2,6±0,10

Internal fat weight, kg	0,16±0,04	0,20±0,06
Internal fat yield, %	0,4	0,5
Dressed weight, kg	18,6±0,34	20,08±0,36
Dressing percentage, %	53,1	52,3

The lambs selected for slaughter from each stud flock were chosen based on average body weight and received no special care or supplemental feeding prior to slaughter.

Across all three age groups, lambs from the “Suyindik” stud flock of Edilbay sheep consistently exhibited the best slaughter performance. Lambs from the “Makash” and “Kurmanghazy” stud flocks, respectively, showed 4.5% and 7.1% ($P > 0.95$) higher yields than their counterparts. At 6.5 months, the values were 21.43 kg, 3.4%, and 7.8% ($P > 0.95$). All age groups of Aqqarabas sheep met the meat industry standards. In terms of meat quality, Aqqarabas sheep were not inferior to fat-tailed lambs from other studs.

The carcass and slaughter weights of 4–4.5-month-old lambs significantly exceeded one-third of adult ram values—specifically, 38.0–43.1% for carcass weight and 35.7–39.6% for slaughter weight. This indicates a high growth potential during the suckling period in Edilbay and Edilbay-type Aqqarabas lambs.

At 6.5 months of age, slaughter parameters in male lambs reached 38.4–43.2%, 38.6–43.5%, and 36.1–50.0% of the respective values in adult rams.

Though the Suyindik and Makash edilbay lambs showed slightly better slaughter outcomes than aqqarabas fat-tailed lambs, this was partially due to higher live weights in the selected aqqarabas rams.

In general, the live weight, carcass weight, slaughter weight, and tail fat weight of edilbay and edilbay-type aqqarabas lambs at 4–4.5 months of age exceeded one-third of adult ram values, and by 16 months reached approximately three-quarters of mature ram performance.

Meat characteristics are not solely defined by carcass yield and slaughter weight. The meatiness of a carcass is determined by the ratio of muscle to bone and fat tissues. Understanding the absolute and relative growth patterns of these tissues ensures production of high-quality, nutritionally valuable meat.

The slaughter results of suckling aqqarabas lambs indicate that even under extensive grazing conditions, well-conditioned lambs in the first fatness category can produce sizable carcasses. As growth rate and weight increased, tail and internal fat weight and yield rose from 9.0% to 9.7%, and from 1.08% to 1.52%, respectively.



Figure 3 – Carcass of 4–4.5-Month-Old White-Wool Lamb

An important morphological indicator of carcass quality is the meat coefficient, defined as the ratio of lean meat to bone weight. As shown in the figure, the carcass is dissected, and its components weighed to calculate this coefficient. The ratios of muscle to bone, and muscle to fat tissue are also determined.

The relative proportion of tissues changes with age. Fat tissue develops later than muscle and bone. Studies confirm that fat accumulates in a defined sequence: starting from visceral organs (kidneys, intestines, stomach), then subcutaneous fat in the loin, chest, and intermuscular areas, progressing to fat at the tail root, and finally intramuscular fat.

Across all experimental groups, the highest economic efficiency was observed when breeding rams, ewes, and lambs aged 1.6–4.5 months were sold to other farms for breeding purposes. For instance, during 2015–2020, more than 75 million KZT was earned from breeding stock sales. However, declining demand from light industry for sheep skins and coarse wool has negatively impacted the sector's profitability in recent years.

To improve the economic efficiency and profitability of the Aqqarabas sheep breed, it is crucial to enhance breeding programs, improve the genetic quality of offspring, and focus on increasing productivity.

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ТҮЙІН

Қорытындылай келе, дұрыс ұйымдастырылған табиғи жайылымдарда семіз құйрықты қойлардың, оның ішінде аққарабас тұқымының қозыларын енелерінен айырған соң бірден жақсы жайылымда бордақылау тірілей салмақтың айтарлықтай өсуіне мүмкіндік береді деуге болады. Шөл және шөлейт жайылымдарда жас қойларды өсірудің ең қиын кезеңдері қысқы және көктемгі бордақылау маусымы болып табылады. Қыста үш-төрт ай жас малға күніне 2 келіге дейін шөп беріледі. Бұл кезеңде толық өсіп-өнуге азықтың бұл мөлшері жеткіліксіз екені анық. Бұл жаста әйелдердің орташа салмағы 36-38 килограмм, ал еркектер - 42-45 килограмм. Етті майлы құйрықты қой тұқымдарын өнеркәсіптік шағылыстыру арқылы алынған жас малды өсіру және жайылымдық бордақылаудың әзірленген технологиясы экологиялық таза қозы етін өндіруді және қой өнімдерінің жалпы көлемін арттыруға көмектеседі. Ірі жүнді қойларды өсіру және оларды белгіленген нормаларға сәйкес азықтандыру, жайылымдық азықты және концентрлі қоспаларды пайдалану өнімділікті арттыруға және сапалы жас төл алуға мүмкіндік береді. Тіндердің салыстырмалы үлесі жасына байланысты өзгереді. Май тіндері бұлшықет пен сүйекке қарағанда кешірек дамиды. Зерттеулер майдың белгілі бір ретпен жиналатынын растайды: висцеральды мүшелерден (бүйрек, ішек, асқазан) бастап, содан кейін бел, кеуде және бұлшықет аралық аймақтардағы тері астындағы май, құйрық түбіріндегі майға дейін, ең соңында бұлшықет ішілік майға дейін.

РЕЗЮМЕ

В заключение можно сказать, что на правильно организованных природных пастбищах откорм ягнят курдючных овец, в том числе аккарабасской породы, сразу после отъема от маток на хорошем пастбище позволяет значительно увеличить прирост живой массы. В условиях пустынных и полупустынных пастбищ наиболее ответственными периодами в выращивании молодняка овец являются зимний и весенний сезоны кормления. Зимой в течение трёх-четырёх месяцев молодняку скармливают до 2 кг сена в день. Очевидно, что этого количества корма недостаточно для полноценного роста и развития в этот период. В этом возрасте средний вес самок составляет 36–38 килограммов, а самцов — 42–45 килограммов.

Разработанная технология выращивания и пастбищного откорма молодняка, полученного путем промышленного скрещивания мясо-сальных курдючных пород овец, способствует увеличению производства экологически чистого ягнятины и общего объема овцеводческой продукции. Разведение овец грубошерстных пород и их кормление в соответствии с установленными нормами, с использованием пастбищных кормов и концентрированных добавок, позволяет повысить продуктивность и получить молодняк высокого качества. Относительное соотношение тканей меняется с возрастом. Жировая ткань развивается позже, чем мышечная и костная. Исследования подтверждают, что жир накапливается в определенной последовательности: начиная с внутренних органов (почек, кишечника, желудка), затем подкожно-жировой клетчатки в пояснице, груди и межмышечных областях, переходя к жиру у основания хвоста и, наконец, к внутримышечному жиру.