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Selection on Breeding and Improvement of Milk Goats

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I. Introduction

Owing to biological peculiarities, goats are well adapted to different natural-climatic, soil and fodder conditions. Animals of this species are extensively distributed throughout the whole global world.

At present dairy production is developed in many countries of the world. Large-scale farms, occupied with breeding of Saanen milk goats, are created in several regions of the RF.

More than 1 million hectares of natural pasture areas are available in Kyrgyzstan, difficult to reach, rocky, shrubby and covered with other low-yield grass, which can be used mainly by goats. Development of goat breeding in Kyrgyzstan is stipulated by a relief of the territory, natural climatic and ecological-geographical peculiarities and traditions of population, which since olden times used products of goats. Around the half of the republic territory is occupied with strong highly dissected mountainous ridges with available large massifs of natural alpine and subalpine pastures of different vertical zonality, which since old times contributed to formation here of the trans-humance grazing of the cattle.

However, in spite of extensive natural pasture areas, available in the republic and fit for specific natural and climatic conditions of management of aboriginal and stud breed of goats, potential capacities of the cheap products-producing industry are far from being realized at full scale.

Maintenance of milk goats does not require large expenses. A basic product – goat milk – is a valuable dietary and medical product, which is in great demand. A source of incomes is sale of young goats for breeding purposes and goats for meat.

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In the result of milk goats breeding production of high quality products of goat husbandry will be increased and incomes of population, private and other farms, occupied with milk goats breeding, will also be increased.

II. Material and Investigation Methods

Kyrgyz milk type of goats was bred by reproductive cross breeding of hybrids of the desirable type, manly of the II and III generation, obtained by cross breeding of local rough-haired goats with Saanen male goats.

Milk-yielding capacity of female goats were defined according to the method of Ya. I. Imigeyev et al. (1976).

All digital materials were processed by a method of variation statistics (Plokhinsky N.A., 1969).

Created goat herds were tested as a new selection achievement in cattle breeding – "Kyrgyz milk goats", approved by the Order of the Ministry of Agriculture, Water Resources and Processing Industry of the Kyrgyz Republic No. 296 as of November 10, 2005 (Patent No. 29 issued by "Kyrgyzpatent").

In subsequent years the work on increase of the livestock and improvement of the milk type of goats was continued by means of pure-breeding at "Jorobay" Breeding Farm of Karasu district, Osh region, and accumulation cross breeding at the goat-breeding farm of "Arstanbek" JSC,. Panfilov district, Chui region.

III. Investigation Results

After approbation and approval in 2005 of the Kyrgyz milk type of goats in the Kyrgyz Republic a dairy system of goat breeding together with basic regions – districts of Chui and Issyk-Kul regions – was developed also in many other regions of the republic. Because of export of the significant livestock of Kyrgyz milk goats, especially from districts of Chui region, the areal of breeding and the livestock of milk goats was changed in regions of the republic.

In connection with a large demand for milk goats and their high cost, a significant part of the livestock, especially from large private farms of Chui region, was sold and transported to districts of Batken, Jalal-Abad, Osh and other regions, as well as exported outside the republic – to Kazakhstan and Tadjikistan.

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New farms of milk goats were arranged in several regions based on the pure-breeding of imported animals of Kyrgyz milk type or cross breeding of local coarse- haired and hybrid female goats with male goats of the Kyrgyz milk type and Saanen breeds.

Animals of the desirable type have a strong constitution, a proportional body build, an exterior without defects, well developed udder. The colour is mainly white and grey. Male and female goats are mainly hornless.

Male goats have large values of indices, characterizing the development of chest and skeleton frame. In comparison with male goats, female goats have long legs and a long body. Growth exceeding the quarters or the sacral bone over the shoulder is characteristic both for female and male goats, but there is no significant difference in the overgrowth index between them. Kyrgyz milk goats in comparison with local coarse-haired goats are characterized by a large height of sacral bone and shoulder, they have more extensive chest. The live weight of male goats is 60-70 kg, female goats – 44-48 kg, milk yield during 240-270 days of lactation makes up 450-500 kg with the fat content of 4-5%. The fertility makes up 170-180% and more.

Kyrgyz milk goats are bred at private farms, personal households and other farms in several districts of Chui and Issyk-Kul regions; they are also bread in other regions of the republic and outside.

There are 50 goats of Kyrgyz milk type in the herd of "Jorobay" Breeding Farm, including 28 female goats, 1 male stud goat, 2 rearing goat kids and young goats born in 2013 (Table 1).

Table 1: Number, age and gender composition and productivity of milk goats in the herd of "Jorobay" BF

Age and gender groups of female goats	Number	Including desirable type, %	Live weight, kg	Milk yield per 1 goat, l
Male stud goat	1	100,0	77,0	-
Rearing small goats	2	100,0	35,0	-
Grown up female goats	12	100,0	45-55	2,0-2,5
Female goats born in 2012	8	87,5	35-40	1,2-1,4
Goat kids born in 2013	27	70,0	25-30	-

Pure-breeding is carried out within several years in the herd of the farm, high productive stud male goats of Kyrgyz milk type are used in service. In the result the specific weight in the number of animals of the desirable type was increased up to 80%.

Live weight and milk yield data, indicated in the Table 1, correspond to the established requirements for the Kyrgyz milk type of goats. A number of goat kids per 100 grown up female goats is 160% per 100 female goats, including first lambers – 135%.

In the herd of the goat-breeding farm JSC "Arstanbek" accumulation cross breeding of local coarse-haired and hybrid female goats is carried out since 2008 with male goats of the Kyrgyz milk type. Within the elapsed years a number of hybrid goats was increased in the desirable milk type and productive properties of hybrid and desirable type of animals were studied.

As of November 1, 2013 there were 70 reproductive goats in the herd, including 45 grown up female goats and first lambers. Data on herd characteristics by gender and age composition and other indicators are given in Table 2.

Table 2: Characteristics of reproductive part of herd of the Kyrgyz milk type of goats at JSC "Arstanbek" by gender and age composition and phenotypical features

Groups of goats	Age	Goats, available in herd			Chest girt, cm	Live weight, kg
		Total, nos.	Specific weight, %			
			White colour	Hornless		
Stud goat	3 years	1	100,0	100,0	92,0	63,0
Rearing male goat	Up to 1 year	1	100,0	100,0	67,0	30,0
Female goats	Grown up	30	90,0	50,0	79,0-100,0	42,0-80,0
Female goats (first lambers)	1.5 years	15	60,0	40,0	72,0-86,0	34,5-52,5
Doe kids	Up to 1 year	23	100,0	48,0	48,0-62,0	12,0-23,0

Data, indicated in Table 2, show that a major part (around 87%) of grown up goats and youngsters are of while colour. A specific weight of hornless female goats makes up 50 %, first lambers – 40 % and doe kids born in 2013 – 48 %. In general, breeds of the desirable milk type make up 80%.

A number of youngsters per 100 female goats makes up 176 %, the average daily milk yield – 2.5 kg per 1 grown-up female goat, and 1.6 – 2.0 kg in two-tooth lambing. The chemical composition of milk is studied, the analysis of laboratory investigation data of biochemical composition of selected milk samples is indicated in Table 3.

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Table 3: Indicators of milk biochemical composition in Kyrgyz milk type of goats (n = 6)

Indicators	Meas. unit	In average	Fluctuations	Local coarse-haired	Saanen
Content:					
moisture	%	87,24	87,08-87,85	83,9	87,61
dry substance	%	12,76	10,84-15,77	16,1	12,39
incl. – fat	%	4,08	3,00-4,60	3,6	4,30
protein	%	3,55	3,30-3,80	4,46	2,70
ash	%	0,83	0,77-0,89	0,79	0,70
lactose	%	4,30	3,43-6,88	5,31	4,62
nonfat milk solids	%	8,68	7,84-11,37	10,56	8,15
calcium	g/kg	0,65	0,57-0,71	-	-
phosphorus	g/kg	0,69	0,60-0,72	-	-
Density	units	27,8	25,0-30,0	-	-
Acidity	units	22,0	20,0-24,0	-	-

It is evident from the data of Table 3, that in average the content makes up: moisture – 87,24, dry substance – 12.76 %, including fat – 4.08 %, protein – 3.55 %, lactose – 4.3 %, ash – 0.83. Separate breeds have certain differences by value of the major part of indicators.

It should be pointed out that the major part of indicators of milk biochemical composition of the Kyrgyz milk goats (MG) differs from the local coarse-haired (LCH) and is approaching to indicators of Saanen goats.

IV. Discussion

Based on results of the laboratory analysis of the milk biochemical composition of Kyrgyz milk goats (KMG) it differs from that of local coarse-haired (LCH) and is approaching to indicators of Saanen goats.

"Maksat" Association was organized in Aksy district, Jalal-Abad region on the territory of Karajigachaiylokmotu (village council), which unites amateur goat-breeders, occupied with breeding of the Kyrgyz milk type of goats.

At present 13 members of the Association maintain from 2 to 5 milk goats, 45 goats in total, including 3 stud male goats, 25 female goats, 17 kids in the age up to 1 year. The productivity of female goats is as follows: live weight 30-45 kg, daily milk yield 2.6-3 l.

Almeyev I.A. (1973) points out that a valuable peculiarity of goats is their high ability to fattening. During the maintenance on high mountainous summer grazing (July-September) they not only restore losses in live weight, but also show significant body weight gains.

Rako A. (1987) reports that in France the average milk yield of 1 goat during the lactation period makes up 600-800 l, in separate animals - 1000 l and even 2000 l, a record is 3175 l. Goat's milk is used mainly for production of cheese.

According to data, obtained by Kumar R. et al. (1986), milk yielding capacity of goats of Bengal Djamnopory, Barbare, Saanen and its half-bred hybrids with Bengal breeds differs at double milking per day: the highest milk yield of Djamnopory goats was already within the first month of lactation (23.3 l/month), the remained goats had the highest milk yield within the second month (15.9 l/month), hybrids and Bengal goats - 8-9 l/month, the highest milk yield was in Saanen female goats (392 liters within 272 lactation days), very low milk yield was in Bengal goats (26 – 28 liters within 106 – 110 days).

Chawla D.S., Bhatnagar D.S. (1986) point out that the milk yielding capacity within the first 150 days of lactation in hybrid goats of Alpine and Saanen breeds with a local beetle breed indicate that these two breeds have an advantage in the first and in average in the first four lactations, milk yield in AB goats was increased by 32 and 25%, accordingly, and in ZB goats – by 45 and 30%, accordingly. At cross breeding of AB with Saanen goats milk productivity was increased by 63 kg during the first lactation and by 45 kg in average during all other lactations.

In comparison with cow milk, goat milk has more calories, it contains the increased quantity of dry substance, fat, protein and mineral salts. According to the opinion of Z.F. Nazarov, the amino acid composition of the goat milk is close to the human milk.

According to the data of E.V. Eidrigevich (1939) goats are characterized by strong constitution, high viability and fitness to the all year round pasture management, live weight of female goats is 42.6 kg. Basic products were meat and milk.

Iolchiev B.S., Marzanov N.S., Chalykh E.A. (2000) point out that milk yield of Saanen goats, bred in Moscow region, is characterized by the average level or depending on the lactation varied from 765 kg (4th lactation) up to 435 kg (1st lactation). The impact of age on protein content in milk was also authentic and made up 79.2 % (P 0.95).

According to reports of Dauletov B.S. and Musazhanov E. (1993), cross breeding of coarse-haired female goats with male goats of the soviet wool-bearing breed contributed to the increase of the productivity level and improvement of the goat wool quality, and cross breeding with male goats of Saanen milk breeds –

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increase of live weight and thus to the increase of incomes, obtained from coarse-haired goat breeding.

Bello A., Babiher S. (1989) report that observations over the growth of 20 pure-bred (desert breed – DB), 20 hybrid goat kids (Saanen male goats x DB female goats) and recording of slaughter products indicators allowed to define superiority of hybrid animals by weekly increment of live weight (0.8 in comparison with 0.6 kg in DB), by live weight before slaughter and after fasting (26.9 in comparison with 25.7 kg) and by feed consumption (7.7 kg SV/kg of mass increment in comparison with 8.4 kg, accordingly). At practically equal weight at slaughter (28.2 and 28.6 kg) hybrid goat kids were distinguished by higher mass of cold semi-carcass (7.56 in comparison with 7.07 kg in DB) and less fat mass in the carcass (1.31 kg of carcass in comparison with 1.71 kg) and better ratio of meat-bones (3.0 in comparison with 2.28).

Jaitap D.Z. (1989) reports that hybrid animals at birth were heavier than original animals. Less variability by live weight at birth was observed in animals 3/4A. The breed of stud male goats made influence on the live weight of goat kids. Thus, goat kids from stud male goats, imported from the USA, were heavier than pure-bred goat kids.

Gursoy D., Ozean L., Pekel E. (1988) point out that wool clip in Kil breed is equal to 0.5 kg per year, live mass of female goats: 33-38 kg, of male goats: 55-60 kg. Milk yield of Kil goats in average makes up 225-308 kg, reproductivity is 1.5 goat kids per year. At cross breeding of Saanen x Kil goats, milk yield of the first generation was increased up to 310.1 kg, of the second generation – up to 417.1 kg, third generation – up to 710.2 kg.

Masazhanov E. (1993) reports that at cross breeding of local coarse-haired female goats with Saanen milk male goats and soviet wool-bearing breed, soviet-wool-bearing hybrids by fattening properties were inferior to local kids, and Saanen hybrids had relatively high indicators of body weight gains. Slaughter yield, carcass mass in Saanen hybrids were higher, than in local coarse-haired and hybrid peers.

It should be pointed out that a number of inhabitants, wishing to raise milk goats, is increasing in many mountainous regions, because it is difficult to manage milk-cows due to shortage of fodder, especially within a winter period.

In this connection breeding farms on breeding of milk goats (JSC "Arstanbek", "Jorobay") must be occupied with raising and sale of young breeders, moreover, it brings significant incomes.

V. Conclusion

Kyrgyz milk goats by their size are attributed among other milk breeds to middle and large ones. Live weight of stud male goats is 60-80 kg, of female goats – 46-50 kg, which in comparison with Kyrgyz wool breed female goats by 10-12 kg and in comparison with local coarse-haired breed by 6-8 kg is higher.

Indicators of reproductive capacities of Kyrgyz milk goats is by 40-50% higher than in wool and local coarse-haired goats. Semen answers requirements of artificial insemination. Kid crop per 100 female goats makes up in average 160-170%. Slaughter yield in milk goats is higher. Content of fat in meat of milk goats is by 5.86% lower and content of protein, on the contrary, is by 5.19% higher than in local coarse-haired goat kids.

Milk yield in milk goats makes up in average 450-500 liters, in separate top producers – up to 1000 liters. In comparison with Kyrgyz wool and local coarse-haired goats these indicators are 4-5 times more. A lactation period in milk goats is 8-10 months, in Kyrgyz wool breed and local coarse-haired breed is two times less.

According to the chemical composition of milk in goats of different breeds there are differences. More dry substance is contained in milk of milk goats and makes up 18.02 %, in Kyrgyz wool breeds- 15.2%, in local coarse-haired goats – 16.1%, in Saanen goats – 12.39%. Fat content in milk of milk goats is also higher than in goats of other breeds.

Goats of Kyrgyz milk type are extensively distributed and are bred in many regions of the republic and outside. Breeding of Kyrgyz milk type of goats is economically effective. Earnings from sale of received products of milk goats make up 8,355 soms. A difference with other breeds makes up 4,760 soms and 4,505 soms, respectively, or earnings obtained from milk goats is almost 2 times higher, than in Kyrgyz wool and local coarse-haired goats.

The project is funded by the Islamic Development Bank and the Republic of Indonesia conducted research work in the field of cattle and goat breeding. More than 80 professionals are trained on the reproduction of cattle in the center of Singosari Malang. To improve the productivity of the Kyrgyz dairy goats imported from Indonesia 300 doses of frozen semen from Saanen goats and to increase meat productivity of local coarse wool of goats 500 doses of goat meat breed. At this time, formed herds goats for artificial insemination.

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