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The Current State of the Red Steppe Breed Cattle Gene Pool Conservation in Ukraine

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Review paper

SUMMARY

The article provides historical data on the Red Steppe breed and its current state (available livestock and distribution area) in Ukraine. The monitoring results show that during the period 2012-2019 the number of breeding farms and the total number of Red Steppe cattle decreased significantly - up to 65%. The number of breeding business subjects as of 01.01.2019 is 6, there are 2 of them are big breeding farms and 4 breeding farms have less number of cattle. Breeding herds of this breed are represented in Dnipropetrovsk, Zaporizhia and Kherson regions. The level of cow's dairy productivity is in the range of 3610-5516 kg of milk. According to the genealogical structure, the livestock of the animals in the control herds refers to 18 lines, of which the most numerous are lines of Veselyi Veselyi ZAN-45, Rybak ZAN-39 and

ZAN-45, Rybak ZAN-39 Kazbek ZAN-60.

Miatlik Zan-1430

Kurai ZAN-6.

Kazbek ZAN-60. Work is underway to restore such lines as Miatlik Zan-1430 and Kurai ZAN-6.

To preserve the breed, the authors recommended the following measures: annual monitoring of the gene pools breeding resources, determination of the phenotypic variability level and inheritance of the main breeding traits, formation and management of the breed genealogical structures development, breeding bulls-sires selection and their pedigree quality.

It is also necessary to evaluate the duration and effectiveness of the cows lifelong using, the systematic determination of the compatibility of bulls-sires effectiveness. It is necessary to evaluate the animals by exterior and to determine their resistance, which is the main criterion for selecting animals in gene pools herds.

Key words: Red Steppe breed, gene pool conservation, dairy productivity, bulls

INTRODUCTION

One of the global problems of our time is the conservation of biological diversity, in the context of which farm animals occupy a significant place (Hladii et al., 2018b).

In Ukraine, as elsewhere in the world, the creation of a number of new breeds is accompanied by a simultaneous decrease in the number of local breeds, which are characterized by high resistance, unpretentiousness to feed and living conditions, constitution strength, duration of productive use, optimal reproductive ability, product quality and the like. It is the small local breeds that remain carriers of valuable hereditary traits and gene complexes, without which the further breeds-forming process will be one-sided (Hladii et al., 2018a).

(Hladii et al., 2018b).

(Hladii et al., 2018a).

(Hladii et al., 2018a).

(Zubets et al., 2007).

(Hladii et al., 2018a).

(Huziev, 2013).

The domestic system of conservation of small-numbers breeding resources of farm animals is based on measures that include, first of all, examination and inventory of existing breeding resources (Hladii et al., 2018a).

- That is, obtaining objective information about controlled populations of animals and creating a database to analyze their structure, studying genetic processes and solving a set of issues in the system of conservation of genetic resources (Zubets et al., 2007).

- For this purpose, the results of a population analysis based on zootechnical and veterinary information are taken into account: the potential of productive traits, their variability and combination in the gene pool of the studied object; resistance and adaptation to breeding conditions; determination of the parameters of the ontogenetic development of animals, starting from the early stages - the duration of embryonic development; analysis of their genetic condition (Hladii et al., 2018a).

Also, scientists identified risk statuses for Ukrainian pedigree populations (Huziev, 2013). According to these statuses, the domestic Red Steppe breed, which in terms of number the livestock ranks second in the USSR and first in Ukraine, is in danger.

- The aim of the work is to assess the current state and prospects of conservation the cattle of the Red Steppe breed in Ukraine.

MATERIAL AND METHODS

To study the current state of the Red Steppe breed, materials of primary zootechnical and pedigree accounting, reports on the results of the appraisal animals of controlled flocks in the Zaporizhzhya and Kherson regions, as well as the data of the state register animal breeding pedigree subjects were used.

RESULTS AND DISCUSSION

It is known that the Red Steppe breed developed as local in the middle of the XVIII century. One group of authors connects the origin of the Steppe red cattle with the resettlement of colonists from different parts of Germany to the south of Ukraine. They consider Franconian, Swiss and other German breeds to be its source. There are references to the origin of Red Steppe cattle from Tyrolean and Red Polish. Another group of authors believes that the commonality of type and productivity testifies to the relationship of the Red Steppe breed with the Angelic or Tronder breed. A number of researchers believe that the Ostfries breed was a great influence on the formation of Red Steppe cattle (Ernst et al., 1994; Zubets et al., 2000). Klasen (1966) believes that local cattle had a great influence on the formation of the Red Steppe breed, along with the imported one, mainly Grey Ukrainian and a cross between Grey Ukrainian and Great Russian.

Red Steppe cattle spread throughout the southern steppe strip, first in the Kherson, Yekaterinoslav (Dnepropetrovsk) provinces and in the regions of Donbass, and then in the North Caucasus, Volga Region, Western Siberia, and Central Asia (Lyskun, 1911-1912).

The monograph of Lyskun (1911-1912) contributed to increasing interest in Red Steppe cattle and improving it using purebred breeding. Also, the State Pedigree Book of Animals, founded in 1923, was of great importance in the transformation of the breed.

In 1933, the first state pedigree nurseries of the Red Steppe breed were organized in Ukraine: Molochanskaya, Selidovskaya, Crimean, Kakhovskaya and Tiliguloberezanskaya (Kononenko, 2002).

Methodological center for the improvement of this breed was determined the "Askania Nova" Institute of

” . . . (Kononenko and Salii, 1988).
 1955 . -
 o 3 800 000
 24.3% (Kiselkov, 1957),
 1969 .
 4,5 ,
 39.5% ,
 43.4% (Mokieiev et al., 1971; Kononenko et al., 1977).
 60- ,
 ,
 - ,
 (Peshuk, 2002).
 1963 .
 , 1975 . ,
 1980 . (-
) (Pidpala and Starkova, 2004; Polupan et al., 2007).
 -
 -
 1998 . o ,
 : ,
 2005 . -
 (Polupan et al., 2007).
 o
 , 01. 01. 2019 .
 3949 , 1606
 (1).
 2012 . 64.63%. -
 o

Animal Breeding in the Steppe Regions named by M.F. Ivanov (Kononenko and Salii, 1988).

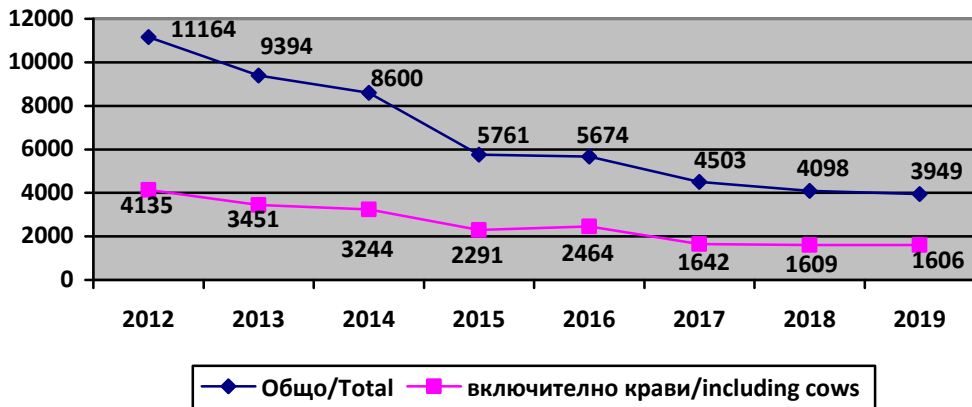
In 1955, the livestock of the Red Steppe breed amounted to approximately 3,800,000 animals, or 24.3% of all cattle (Kiselkov, 1957), and at the beginning of 1969 in Ukraine there were more than 4.5 million animals, that is, 39.5% of the total number of cattle livestock in the republic, or 43.4% of the total number of this breed in the country (Mokieiev et al., 1971; Kononenko et al., 1977).

At the beginning of the 60s, when the zone of irrigated agriculture was significantly expanded in the south of Ukraine and due to this, the forage base improved and stabilized to a certain extent while intensifying the intensification of the dairy cattle industry, they began to search for ways to increase productivity and improve the technological qualities of Red Steppe cattle (Peshuk, 2002).

For this, since 1963 it was crossed with Angler, from 1975 - Danish Red and since 1980 - Holstein (Red-and-White) breeds (Pidpala and Starkova, 2004; Polupan et al., 2007).

As a result of targeted breeding work to improve the productive and technological qualities of Red Steppe cattle, in late 1998, two inbreed types: Fat-Milk and Holstein-type of the Ukrainian Red Dairy breed were tested and approved, which in 2005 were approved as new selection achievements (Polupan et al., 2007).

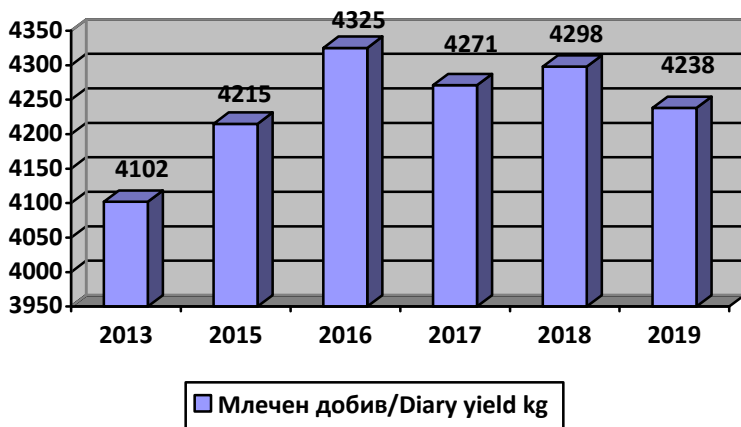
Monitoring of the total number of animals of the Red Steppe breed showed that on 01. 01. 2019 in the breeding farms there were only 3949 animals, including 1606 cows (Figure 1). The reduction in the total population compared to 2012 is 64.63%. Further reduction of the purebred livestock of the Red Steppe breed as a reserve gene pool of cattle is impractical.



1. Fig. 1. Dynamics of the Red Steppe breed on the breeding farms

A significant decrease in the number of pedigree cows of the Red Steppe breed is logically caused by separate pedigree accounting and expanded reproduction of the more productive and competitive Ukrainian Red Dairy breed (Polupan et al., 2010).

According to the state register, the average dairy production of the Red Steppe breed cows as of 01.01.2013 is 4102 kg (Figure 2). In the future (2015-2019), the dairy production of cows is insignificant but they grow - by 113-223 kg or 2.68-5.16%.



2. Fig. 2. Dairy yield of the Red Steppe breed cows on the breeding farms

01.01.2019 . 6 (1), 2
 4
 (TOV AF "Obrii", DP
 "Agrofirm" Mriia ", DP "Nionalional -Plius
 ", PP "Natsional"
 , PP "Moguchii", PSP" Primors'kyi
 SVK "Borozens'ke"
).

The number of the pedigree
 breeding subjects for the Red Steppe
 breed as of 01.01.2019 is 6 (Table 1), of
 which 2 breeding plants and 4 pedigree
 producers (TOV AF "Obrii", DP "Agrofirm
 "Mriia", DP "Natsional-Plius", PP
 "Natsional" of Dnipropetrovsk Region, PP
 "Moguchii", PSP" Primors'kyi"of
 Zaporizhzhia region and
 SVK"Borozens'ke"of Kherson region).

1. (01.01.2019)
Table 1. Subjects of the Red Steppe breed cows breeding work (on 01.01.2019)

The name of the farm	Status	Number of animals		Dairy productivity		
		Total	Including cows	Dairy yield, kg	Fat, kg	Protein, kg
/ Dnipropetrovsk Region						
TOV AF "Obrii"	PZ	832	400	5516	213	182
"Agrofirm "Mriia"	PR	420	201	3567	130	106
DP "Natsional-Plius", PP "Natsional"	R	160	80	5410	209	-
/ Zaporizhzhia region						
PP "Moguchii"	PZ	646	235	3943	161	122
PSP "Primors'kyi"	R	965	390	3610	141	-
/ Kherson region						
SVK"Borozens'ke"	R	926	300	3833	141	127

3567 5516 kg
 130
 213 kg 106 182 kg.
 -
 o -
 - -
 , Veselyi ZAN-45, Visit
 KGN-26 and Rybak ZAN-39 (2).
 ,
 ,
 Ladnyi KMN-
 179 Myatlik ZAN-1430 -

The average milk yield of the cows
 third lactation and older on the farm is
 from 3567 to 5516 kg with a milk fat yield
 and protein from 130 to 213 kg and from
 106 to 182 kg, respectively.

The modern genealogical structure
 of the cattle stock of the Red Steppe breed
 is represented by such more numerous
 lines, such as Veselyi ZAN-45, Visit
 KGN-26 and Rybak ZAN-39 (Table 2).

It should be noted that the number
 of lines is reduced due to the lack of bull-
 sires. To date, work is underway to
 restore the Ladnyi KMN-179 and Myatlik
 ZAN-1430 lines by securing of the bull-
 sires from the control herds for the
 pedigree cows.

-
 Kinza 5210 (6248 kg 3.90%
), Romashka 4672 (5919 kg 3.89%
), Koliaska 5547 (6012 kg 3.81%),
 Strochka 5737 (6453 kg 3.90%).
 (5883 kg 3.98%), Assol' 9742 (6026 kg 4.13%),
 Fanera 2562 (5855 kg 3.97%)
 -
 Primorskiy ChSP, „Borozenskoye“
 Kalina 8207 (5805 kg 4.09%
), Chaika 4189 (5214 kg 4.08%
) Ulia 7042 (5385 kg 4.10%).
 ,
 343-371 kg 16.3-20.1
 69-113 ,
 63-88 ,
 100 80-88%.
 2.9-4.0 .

productivity was obtained from Kinza 5210 cow (milk yield for the sixth lactation 6248 kg with 3.90% fat content), Romashka 4672 (milk for the seventh lactation 5919 kg with 3.89% fat content), Koliaska 5547 (milk yield for the third lactation of 6012 kg with a fat content of 3.81%), Strochka 5737 (milk yield for the sixth lactation of 6453 kg with a fat content of 3.90%).

Cows Khlopushka 2666 (milk yield for a third lactation of 5883 kg with a fat content of 3.98%), Assol' 9742 (milk for a third lactation of 6026 kg with a fat content of 4.13%), Fanera 2562 (milk yield for the seventh lactation of 5855 kg with a fat content of 3.97%) are characterized by the highest productivity in the Primorskiy ChSP Primorsky district of the Zaporizhzhya region. In the SEC "Borozenskoye" of the Veliko-Aleksandrovsky district of the Kherson region, the highest productivity was obtained from Kalina 8207 cow (milk yield for the fifth lactation 5805 kg with 4.09% fat content), Chaika 4189 (milk yield for the third lactation 5214 kg with 4.08% fat content) and Ulia 7042 (milk yield for the sixth lactation of 5385 kg with a fat content of 4.10%).

Analyzing the reproductive qualities of cows on the farms of Zaporizhzhya and Kherson regions, it was found that the live weight of heifers and age at the first insemination are 343-371 kg and 16.3-20.1 months, respectively. The duration of the service period is on average 69-113 days, the dry period is 63-88 days, and the calf yield per 100 cows is 80-88%. The average age of departure of animals from the herd is 2.9-4.0 calving.

CONCLUSIONS

2012-2019 .
 o -
 - 64.63%, -
 - increase in the dairy productivity of cows

2.68-5.16%.

was found to be 2.68-5.16%.

In the work on the revival of the pedigree base of the Red Steppe cattle, line breeding is of great importance. This allows you to clearly monitor the dynamics of the structure of both the breed as a whole and an individual herd, and maintain economically useful traits at a certain level.

Also, the status of "gene pool" should be granted to subjects of breeding work; constantly carry out monitoring studies of breeding and genetic processes in herds to determine the movement of genetic information and population development trends; introduce the labeling of genetic information with microsatellite DNA loci as the main method for identifying breeding animals.

Of great importance is the functioning of the sperm bank gene pool.

Preserving the gene pool of small breeds of cattle should be the most important task for the state, and not the temporary interest of individual communities, and the success of any measures to preserve biological diversity largely depends on state financial support.

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State and Prospects of Goat Breeding in Ukraine

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Review paper

SUMMARY

The results of the analysis the goat breeding current state in Ukraine are presented and trends of its development are determined. In the course of the study, it was found that goat breeding in Ukraine is currently in the process of becoming a full-fledged agricultural industry.

The most popular among goat breeders is the Saanen and Alpine breeds, which are used to increase the milk productivity of local goat populations. In Ukraine, livestock of these breeds was formed from genotypes, which had been imported from Europe. Because of the exchange of breeding material between farms, the animal population has exterior and productivity characteristics that differ from the original forms.

For the successful development of Dairy Goat Breeding, it is necessary to have more pedigree breeds for purebred breeding and crossing, given the diversity of natural and climatic zones of Ukraine.

There are an extremely large number of dairy goats in the world. According to the results of the experience analysis in the Dairy Goat Breeding, four goat breeds of prospect for Ukraine are identified: Saanen, Alpine, Toggenburg, Anglo-Nubian and European breeds and types derived from them.

Many types of products are produced in Ukraine, especially soft and hard goat cheeses, which are in high demand. Products of some farms have been praised at exhibitions and fairs, including international ones. A wide range of products (milk, cheese, sour cream, butter, yogurt, cream, meat, etc.) is sold through shops, restaurants, sanatoriums and private individuals. Although the range of domestic manufacturers is inferior to European.

The market today is free for goat meat products. Therefore, the breeding of goats the meat and the combined direction of productivity is foreseen for the future.

Keywords: goat breeding, livestock, breed, goat milk, goat meat, cheese

INTRODUCTION

High adaptability to the conditions of keeping, a sharp muzzle, and mobile thin lips enable goats, unlike other animals, to eat undersized grasses. They are unpretentious to feed, have strong hooves, get used to a person.

All this contributes to the successful breeding of goats under the various climatic conditions and in almost all countries of the world. The cultivated goat breeds of all productivity directions are well adapted to the industrial conditions and large-scale production, and at the same time, they show high productivity and cost-paying products.

The state and development trends of goat breeding in the world and in

Europe show that its popularity is growing due to the ability of breeding the different goat breeds under any climatic, economic and social conditions.

The dynamics of the goat population shows a clear tendency to increase their number in the world. Recently, there has been an annual increase in the number of goats by 10-15 million, or 1.0-1.5%. The increase in goat milk production in the world has a similar trend.

According to the direction of productivity it is exist such goat breeds: Dairy, Meat, Wool, Down and combined breeds in various combinations. Dairy breeds are characterized by high milk yield, but have poor quality of wool. Today, according to the various sources, there are from 236 to 1200 goat breeds.

By the direction of productivity, they are distinguished: specialized (Dairy, Meat, Down, Wool, Skin, Decorative) and combined (Dairy-and-Meat, Meat-and-Wool and Wool-and-Meat, Meat-and-Wool-and-Dairy, Meat-and-Skin) breeds.

The leading place in the world belongs to Dairy and combined Dairy-and-Meat breeds - respectively 35 and 19% of the total breeds' number. At the same time, Dairy (66.4%) and Dairy-and- Meat (15.9%) goats are prevailing in Europe in numbers; combined breeds (more than 50%) in Asia; and Meat breeds in Africa.

Goat milk is used mainly fresh and processed into sour-milk products, and only about 26% of all goat milk goes to the production of various kinds cheeses. Every year in the world, 480 tons of various types cheeses are produced from goat's milk. The largest producer of goat cheese is Europe.

The dynamics of goat cheese production in Europe and Africa has a positive trend, unlike in Asia and America. More goat

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(74%),
(41%)

(9%).

2011 2017

570 000

(85%)

75%

500 000

((Statistical Collection "Animal Breeding of Ukraine" State Committee of Statistics of Ukraine. 2011-2017; Vdovychenko et al., 2014).

milk is processed into various types of cheeses in Europe (74%), slightly less in America (41%) and very little in Asia (9%).

Among European countries, France produces the largest number of goat cheese. According to this indicator, Ukraine is in sixth place among European countries, and in the thirteenth in the world.

Important for the development of goat breeding in our country is the fact that in Europe a significant amount of goat milk is processed into cheeses of various types.

In general, today the goat breeding industry is in a state of intensive development. The main obstacles to the successful realization of the existing potential, the sustainable development of competitive goat breeding are the small number of livestock (especially high breeding) and the low potential of animal productivity in farms, which have an insufficient level of technological equipment. In addition, negative circumstances are the unsatisfactory condition and use of natural forage land; lack of manufactories for processing products and low economic motivation for agricultural producers.

RESULTS AND DISCUSSION

It was observed that from 2011 to 2017, there has been an increase in the number of goats in Ukraine. At the beginning of 2017, there are about 570,000 goats. Moreover, the main livestock (85%) is contained in the subsidiary farms of the population. At the beginning of the year, 75% of all goats are female goats. Given their prolificacy and fertility, about 500,000 kids are born annually (Statistical Collection "Animal Breeding of Ukraine" State Committee of Statistics of Ukraine. 2011-2017; Vdovychenko et al., 2014.).

It should be noted a positive trend of the development dynamics the goat breeding on the agricultural enterprises and private farms, which is associated

1
2000 .
230 kg/
2019 .
kg/ .
410

amount of milk produced per 1 animal also increased, so in 2000 milk production was at the level of 230 kg / female goat, and in 2019 this figure reached 410 kg /female goat. This fact indicates an increase in the level of the goat's dairy productivity.

2,5 kg (
13,5 kg ()

In different regions of Ukraine, the level of goat milk production is not uniform and varies from 2.5 kg (in the Volyn region) to 13.5 kg (in the Odesa region) per one inhabitant per year, including rural. This fact first proves the need for an individual approach to the development strategy for goat breeding in various regions.

1.9-2.3%.

In the overall milk balance of Ukraine, the level of goat milk production is quite low and amounts to 1.9-2.3%. It should also take into account the peculiarities of the population's consumption of milk of various animal species.

The leader in the use of goat milk is the population of Odessa region, while they consume the least amount of cow milk in Ukraine. At the same time, the amount of milk consumed per capita per year remains far from the norm, which creates the prerequisites and the need for the development of goat breeding throughout our country.

(WTO)

The formation of market relations in the agricultural sector of Ukraine and the country's accession to the WTO necessitate cost-effective livestock farming.

In this regard, to ensure the competitiveness of dairy goat breeding, it is necessary to significantly increase the productive potential of dairy breeds and accordingly create the necessary conditions for feeding and keeping animals for the full realization of their productive potential.

10

Over the past 10 years, thanks to the importation by individual owners of

<p>" 5,0</p>	<p>highly productive goats from Saanen and its derivatives, the productivity of goats has increased. Still, the performance of "local" goats with milk yield of 2.5-5.0 liters is inferior to thoroughbred with milk yield of 3.5-8.5 liters.</p>
<p>3,5-8,5 " (TOV " SK "Dobrynia", FG "Zolota koza", FG "Tatiana 2011", FG "Kozyi dvor"" FG "Kamadhenu Anglo-Nubian kozy").</p>	<p>Today, the breeding base of dairy goats in Ukraine is represented by three breeds (Saanen, Alpine and Anglo-Nubian) and seven reproducers (TOV " SK "Dobrynia", FG "Zolota koza", FG "Tatlana 2011", FG "Kozyi dvor" and FG "Kamadhenu Anglo-Nubian kozy").</p>
<p>100-150</p>	<p>The impetus for the development of dairy goat breeding in Ukraine was to be provided by a functional program. True, the developers still see the main driving force behind goat farming as private peasant and farm enterprises (producers of goat milk). Promising is the creation of technologically equipped small farms for the production of milk for its industrial processing with a phased increase in the number of livestock to 100-150 goats.</p>
<p>70-100 100, 200, 500, 1000</p>	<p>Calculations show that due to an increase in the milk productivity of goats, the gross production of marketable milk in such farms can grow up to 70-100 tons/year. Concessional lending to projects for the construction and reconstruction of complexes and farms for 100, 200, 500, 1000 and more goats, selected on a competitive basis, could significantly help.</p>
	<p>One of the options for investing in the industry could be regional livestock support programs, that is, funds from local budgets.</p> <p>An important component of development is the presence of zoned goat breeds for purebred breeding and crossbreeding. Based on the analysis of world and domestic experience in dairy goat breeding, for purebred breeding and improvement of the local livestock, four main promising breeds of the dairy</p>

direction of productivity for Ukraine were identified: Saanen, Alpine, Toggenburg, Anglo-Nubian and European breeds and types derived from them.

Now in our country there are 7 pedigree farms that have received the status of a pedigree reproducer, which contains about 1000 goats of Saanen, Alpine and Anglo-Nubian breeds. About 10 more farms by the number of goats, their productivity and the level of selection can already be certified for compliance with the status of the pedigree farms.

The first breeding status for breeding goats of the Saanen breed (at least 30 goats) was obtained in 2011 by TOV "SK Dobrynia" in the Kiev region, in 2013 the FG "Zolota koza" of the Kirovograd region and in 2017 the FG "Tatlana 2011" received the status of breeding goats of the Saanen and Alpine breeds, also in 2017 the FG "Kozyi dvor" of the Kiev region for breeding the Saanen goats and the FG "Kamadhenu Anglo-Nubian kozy" of the Zhytomyr region for breeding goats of the Anglo-Nubian breed became pedigree (Masliuk, 2018).

A significant contribution to the development of goat breeding in Ukraine was the creation of a farm for the breeding of goats of the Saanen breed "Babyni kozy". This company imported breeding material, it also has a high level of management culture, attitude to animals and consumers, and most importantly: it began to record productivity and selecting-breeding work with goats. I would like to mention a few rather large farms that are making a lot of efforts to popularize this unique area of animal husbandry: "Dooobra ferma", "Shevret", "Lisova koza", "Persha selektsiina ferma", "Sviatogirska koza", "Lukachivka Eco", "Mukko", "Strekoza", "Eco-Carpathians", "Agrobusiness" and others.

Recently, more and more goat breeders have been paying attention to taking into account the milk productivity of goats, evaluating goats, and raising young

7

1000

10

(- 30)

2011 . TOV „SK Dobrynia“

2013 ., FG

"Zolota koza"

2017 . FG "Tatlana 2011"

2017 ., FG "Kozyi dvor"

FG "Kamadhenu

Anglo-Nubian kozy"

(Masliuk, 2018).

„Babyni kozy“.

:

: "Dooobra ferma", "Shevret", "Lisova koza", "Persha selektsiina ferma", "Sviatogirska koza", "Lukachivka Eco", "Mukko", "Strekoza", "Eco-Carpathians", "Agrobusiness"

- animals. Improving goats through the selection and selection of animals does not give an instant increase in milk yield, in contrast to the level of feeding, but is crucial to increase their dairy level productivity in the next generation of animals.

- As a result of an expeditionary survey, it was found that farms for breeding goats of different breeds have a high level of selection and breeding. They developed programs and plans for selection and breeding work. In these farms, animals have been identified, and zotechnical records are kept. Breeding and selection is carried out according to the indicators of dairy productivity and the exterior, animals with defects in the exterior and defects of the udder are rejected. After a thorough inspection and preliminary selection, the newborn kids are identified and entered into the State Pedigree Register.

Tribal goats are characterized by a strong constitution with a well-defined dairy type. Among animals, there are both hornless and horned individuals (with a distribution close to 50/50%). The coloration of hair usually matches the type of breed.

Quite often, when animals receive significantly more than 1000-1320 kg of milk for 300-400 days of lactation. The fat content of milk in high-milk yield female goats, as a rule, does not exceed 4.0%, and the protein content is 3.0-3.5%. Qualitative indicators of milk largely depend on the breed characteristics and technology of keeping animals.

- The reproductive qualities of female goats in the studied farms are quite high. Fertility of goats on the farms ranges from 150 to 195%. Thus, the multiple pregnancy of young female goats averages 120-124%. Adult goats 150-210%. Single kids weigh 3.5–6.0 kg, twins weigh 2.5–4.5 kg, triplets weigh 1.5–3.0 kg, and

(50/50%).
 300-400 1000-1320 kg
 4,0%,
 3,0-3,5%.
 150 195%.
 120-124
 150-210%.
 3,5–6,0 kg,

2,5–4,5 kg,
1,5–3,0 kg,
kg.

1,0–2,1

kids from a quadruple weigh 1.0–2.1 kg.

- It should be noted that the reproductive qualities of animals and the mass of newborn young animals depend largely on paratypic factors and the age of the animals; therefore, significant fluctuations are observed over years and seasons.

- The duration of productive use of female goats is determined mainly by the level of milk productivity and is on average 4.0 birth giving. The goat-sires use from 3 to 6 years.

4,0

- First, the goat-sire is used for mating at 9-18 months, depending on its live weight. Female goats in the studied herds are allowed to mate for the first time when they reach a live weight of 38-40 kg or more, which meets the requirements of class I for goats aged 8-10 months according to the "Instructions for the Valuation of Dairy Goats."

3 6

9-18

38-40 kg

8-10

10 120

4-7%

- From 10 to 120 female goats are assigned to the goat-sire per year. Mating of goats is carried out once a year. Only 4-7% of female goats are stayed lactating for two consecutive years.

- Mating of female goats begins mainly in August, so the start of lambing occurs in January, which is when 20% of the animals begin to lactate.

20%

- More than half of the female goats give birth to kids in February-March, respectively 29% monthly, another 15% give birth in April-May and only 7% - in other months of the year. The lambing period directly affects the time of birth of animals and determines the main provisions of the technological map of farms.

29%

15%

7%

- The breed composition, the number of breeding animals and the level of breeding work in the herds of goats on the studied farms, combined with favorable conditions for keeping and feeding, allows

18
54-55 kg;
kg,
cm.

51-54 kg,
62-67 cm.

76-77 cm.
80-100
85 92
62-65 kg,
72-75 cm.

to obtain the goats of productivity that according to the first and elite classes.

The live weight of male goats at 18 months on farms is 54-55 kg; height at the withers is 76-77 cm.

The goat-sires weight is 80-100 kg, their height at the withers is from 85 to 92 cm. The live weight of the young female goats on the farms is 51-54 kg, the height at the withers is 62-67 cm. The live weight of adult female goats is 62-65 kg, the height at the withers 72-75 cm.

The average size of breeding animals is higher than the breed standard, and the height at the withers in the all breeding farms exceeds the requirements of the elite class.

Breeding work in breeding and commodity farms is distinguished by breeding methods, selection methods of selection of animals. The leading method of breeding animals in all breeding farms is purebred breeding using breeding along lines and families.

In some cases, introductory is used to improve the breed, and reproducible crosses are used when breeding a new breed. The selection of animals in breeding farms is carried out taking into account the origin, individual qualities of mating animals and the quality of offspring received from them. In this case, an individual homogeneous or heterogeneous selection is used. When creating new breeds, lines, families using moderate and distant kinship mating animals.

On commodity farms, both purebred breeding and various types of crosses are used. On farms where transitional and primitive breeds and crossbreeds are bred, industrial, absorbing and variable crosses are mainly used.

At the same time, a heterogeneous selection of females is used to males. For more valuable females, males are

selected individually. Related breeding on commodity farms is not allowed.

- The remount of herd system for farm categories is identical. Pedigree farms provide remount of herd due to their own reproduction; pedigree farms replenish herds with import from pedigree enterprises and pedigree farms and at the expense of their own reproduction, and industrial reproducers are provided with repair young stock from pedigree farms and grow it on their own farms.
- Thus, a step-by-step system of reproduction and sale of repair (breeding) young stock has been created, which allows to improve breeds, and actively influence the improvement of productive qualities of the commodity part of the herd.

- In dairy goat breeding, under the conditions of modern technology, animals must be characterized by high physiological and productive indicators than with traditional technology. Practice has shown that on highly mechanized farms the greatest economic effect is obtained by using specialized dairy breeds.

- The goat breeding system provides for manning farms with industrial milk production technology by young animals from specialized farms for growing kids, where they are grown under conditions close to the conditions of mechanized dairy farms.

- An important feature of breeding work on highly mechanized farms is the evaluation and selection of young female goats by their own productivity.

- On such farms, linear-group selection with rotation of the lines is used. At least five lines of producers are used in the rotation change in order to prevent related mating.

<p>11-12</p>	<p>In the system of goat breeding in our country, particular importance is attached to the selection of mothers for goat-sires. The initial step in organizing the selection of mothers for male goats is to identify among the most productive parts of the breed pure-bred mothers of future goat-sire. They are presented at each stage of selection with the highest possible requirements. To get one tested male goat, you must have 11-12 potential mothers.</p>
<p>10-15%; - 20-25;</p>	<p>At the next stage, genetic analysis of individual herds and populations as a whole is carried out. Then establish the intensity of selection of goats for milk productivity, which depends on the maximum number of young female goats, which are joined into the main herd.</p>
<p>10-15%.</p> <p>5</p>	<p>The most valuable tribal male goat-sires are selected as parents. At different stages, they are evaluated and selected by origin, their own productivity, health and quality of offspring. Practice shows that at present male goats are rejected due to the lacks of growth and development of 10-15%; sexual activity, fertilizing ability and sperm quality - 20-25; health - 10-15%. According to the quality of the offspring, as a rule, one of the 4-5 male goats selected for evaluation is selected.</p>
	<p>The effectiveness of selection in goat breeding largely depends on the correct assessment (scoring) of animals. Validation of goats is carried out by farm breeders, specialists of pedigree associations, scientists, expert boniters on the basis of data from primary zotechnical and breeding registration and detailed examination of animals. The assessments are held annually. The animals are scoring in accordance with special instructions of the Ministry of Agrarian Policy and Food of Ukraine, in which the procedure for conducting the valuation and standard requirements for each item that is evaluated are</p>

(The Instructions for Assessment Dairy goats. Instruction on Keeping Breeding Records in Dairy Goat Breeding, 2018)..

determined.

Based on the materials of the appraisal, they develop the tactics of work for the next year, draw up a selection plan that provides for the improvement of breeding and productive qualities, a plan for raising young animals, feeding animals, and develop a selection strategy.

Scientists of our institution and the Institute of Animal Breeding of the National Academy of Agrarian Sciences of Ukraine have developed Instructions for the Valuation of Dairy Goats and Instructions for the Management of Dairy Goats (The Instructions for Assessment Dairy goats. Instruction on Keeping Breeding Records in Dairy Goat Breeding, 2018).

In the Instructions for appraising dairy goats, taking into account world standards, the requirements for the most common dairy goats are developed, which are identified as promising for breeding in Ukraine. Male goats should be evaluated for live weight and body length at 18 months, 2, 3, 4, 5 years and older from the date of birth. The assessment of female goats is carried out at 18 months after the first, second, third and more birth-giving on 30-60 days. Growth assessment of young growth begins from the first month of life by live weight, and is carried out monthly up to 12 months. From 13 months when determining live weight of breeding male goats and female goats are additionally assessed for their physique. Based on the assessment results, a complex class of animals is determined.

The main criteria for determining the breeding value of a female goat is its dairy productivity. Complex classes of four breeds are determined by milk yield, the content of fat and protein in milk, the amount of milk fat and protein per lactation. The requirements are established for the first, second, third, fourth and subsequent lactations.

100 2000 ;

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farms with a livestock of 100 to 2000 animals; increase in the proportion of highly productive breeding animals; increase goat productivity and product quality; reduction in production costs and prices for goat products; strengthening staffing and scientific support for the industry.

The main obstacles that significantly hinder the development of goat breeding are: low animal productivity, limited access to the best global gene pool of different directions productivity goats ; imperfection of the state support mechanism; lack of targeted selection of goats and control over the import and use of foreign genotypes.

Natural and climatic features and environmental conditions allow us to effectively develop organic production of goat products.

CONCLUSIONS

After analyzing the above, we can conclude that the prospects for dairy goat breeding in Ukraine are wide. The need in the goat products encourages producers to search for new solutions in the process of goat breeding. The experience of goat farming proves the effectiveness of goat breeding in large farms.

Therefore, in the near future it is necessary to bring in the breeding stock and sperm of goat-sires of promising breeds in order to increase the milk production of local breeds and create high-productive populations of breeding goats in each zone of Ukraine, develop a feed base, produce high-quality feed for their feeding, provide farms with equipment for keeping , feeding, artificial insemination and milking of goats.

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Some Morphological Characteristics of Local Goats and Their Crosses Obtained from Crossing with the Saanen Breed

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Original scientific paper

SUMMARY

It is known that the fastest method of goat improvement is breeding of local goats with crossing breeds such as Saanen, French Alpine, Toggenburg, etc. From 2014-2015, such crossings were made in the Republic of Moldova. The obtained results denote that the metis goats (Local x Saanen), according to the values of the body measurements and the body indices, are superior to the goats in the local population (maternal base), being evident the occurrence of morpho-physiological changes at the metis animals (Local x Saanen), increasing significantly (P 0,05) the height and the length of the body, becoming closer to the specific of the Saanen breed - respiratory physiological type with a dolicomorphic body format. There were also changes in the mammary gland, which at the metis goats has a higher volume (P 0,01) and with essential changes regarding its quality - the shape of the udder and the size of the nipples, which reflects the

(x)

(P 0,01) 1550.91 ml F1
1500.0 ml F2

F2),
3.29-3.62%.
6.1-6.6%

(Tafta, 1996).

Custural, 2010).

(R ducatal and

increase of the potential for milk production and the suitability of the mammary gland for mechanized milking. The average daily milk production per day at the metis goats (Local x Saanen) first and second generation is superior to local goats (P 0,01), being of 1550,91 ml for F1 goats and 1500,0 ml for F2 goats, and milk, regardless of generation (F1 or F2), it is characterized by quite high values of fat content 6,1-6,6% and protein of 3,29-3,62%.

Key words: local goats, cross breeds goats, Saanen breed, productivity, physiological type, morphoprodutive type, mammary gland.

INTRODUCTION

The profitability of goat breeding and exploitation of these in the Republic of Moldova will be carried out taking into account several technical and organizational processes that since long time are performed in the countries concerned by this species, such as France, Spain, Germany, Italy and others. (Tafta, 1996).

For these purposes it is necessary to genetically improve the livestock of local goats, and the numerical increase of goats in the existing or newly created farms. This will lead to the need to modernize the used shelters, to implement mechanization and automation measures of technological processes, to ensure a stable and constant feed base throughout the calendar year of exploitation, a fact which also provides for a change in the way and quality of nutrition of goats. Such guidelines in the breeding and exploitation of goats are realised and increasingly visible worldwide (R ducatal and Custural, 2010).

In the Republic of Moldova, one of the first necessary measures is the organization of genetic improvement of the local goat population based on the testing of the productive performance of the exploited goats, the creation of the selection nuclei and the realization of the cross-breeding infusion and transformation

2012).

2012 . (Mashner,

(Pascal, 2007; Mashner, 2010).

й

(Mustafaeva, 2008; Ngatke, 2008; Perevalova et al., 2011; Vlad et al., 2012).

- of the local goat population with the bucks
- of specialized breeds for increasing milk
- production. This process and activities in
- the direction of obtaining and testing the
half-breed goats from the crossing of the
goats of the indigenous population with
the Saanen bucks have already been
initiated about five years ago, and the first
import of the purebred Saanen and the
French Alpine goats in our republic has
been carried out in 2012 (Mashner, 2012).

Considering that the price for the
high quality and high purity genetic
material of the mentioned breeds
imported from abroad is quite high, and
given the fact that farmers are limited to
buy large herds, the only solution for
breeding goat herds remains the
application of crosses with the use of the
Saanen breed, as a breed most
commonly used for these purposes
worldwide (Pascal,2007; Mashner, 2010).

Due to the unique genetic
characteristics and the high level of
production of the Saanen breed, and the
research on the problems related to adapt-
ing of this breed to crossing and exploitation
under different pedoclimatic conditions, its
selection and use for cross-breeding with
local breeds and the evaluation of the
enhancing effect of the respective crosses
in many countries, represent a constant
topic to the scientists, such as researchers,
geneticists and practical breeders
(Mustafaeva, 2008; Ngatke, 2008;
Perevalova et al., 2011; Vlad et al., 2012).

In the above context, the purpose
of the research carried out aims to reveal
the results of the cross-breeding of the
native goats with the Saanen breed planned
under the conditions of the Republic of
Moldova, to establish in comparative aspect
the particularities specific to the obtained
half-breed goats, on the basis of which
the selection work will be carried out in
order to create a breeding population of
native goats - the local type of the Saanen
breed.

2013)

(Maschner et al.,

(Pascal, 2007).

LACTOSCAN.

"STATGRAPHICS Centurion XV"

(Mercurieva, 1964; Plohinschii, 1969).

the instruction of bonitation of goats bred for milk with selection elements (Maschner et. al., 2013) and the technique of evaluation and assessment of productive performances in sheep and goats (Pascal, 2007).

The chemical analysis of milk was performed on a LACTOSCAN apparatus.

The numerical material obtained from the research was statistically processed using the computer program "STATGRAPHICS Centurion XV" and the assessment of the degree of authenticity of the statistical differences between the indices analyzed in the compared groups was carried out using the Student criterion (Mercurieva, 1964; Plohinschii, 1969).

RESULTS AND DISCUSSION

After the research carried out during the years 2015-2019 on goats from the local population crossed with bucks of Saanen breed and their offspring with mixed goats of the first (F1) and second (F2) generation, it was established that in generation F1 the predominant color of the pilosity in mixed goats was the white one with 85% in kidding (Figure 1), the fact which proves the dominance of the white color of the hair specific to the breeding breed, being transmitted from Saanen bucks.

2015-2019

(F1)

(F2)

F1

85%

(1),



. 1.

(2015)

(

x

) F1,

7-9

Fig. 1. Mixed she-goats (local x Saanen) F1, age 7-9 months (photo 2015 year)

Another aspect that should be mentioned is the prolificity of females. According to the data of the kidding of goats on the farm for the last three years the calculated prolificity constituted on average in local goats 145%. In mixed goats (local x Saanen) of different ages F1 and F2 the prolificity constituted 159%, with higher values of 165% for mixed goats F1 in the third and fourth lactation.

These data indicate a tendency to increase (improve) reproductive functions in mixed goats compared to local ones, in particular the prolificity in females.

During conducting investigations on goats and keeping the evidence of morphoproductive characters at different stages of growth and development, there have been established some peculiarities of the exterior as the body weight of the animals, indices related to the specific characteristics of the conformation and development of the mammary gland (udder), milk production and the chemical composition of the milk collected from different evaluated genotypes.

Therefore, according to the results of the assessment of the body weight of the number of mixed females at different ages (Table 1), it is evident that the body weight of mixed females has relatively low average value, the fact which requires a deeper analysis of the conditions and causes that have undermined the manifestation of this character. It is probably the consequence of the extensive technology of breeding and exploitation of goats in the researched farm.

At the same time, and in this context, it should be mentioned that in comparison with the requirements laid down in the instruction for bonitation of milk goats (Maximovca, 2013), the body weight for mixed genotype females (local X Saanen) of different ages should be much higher, such as: in adult goats (mixed in the type of Saanen – MTS breed) with about 6.0%; in she-goats of 1-1.5 years with about 25.0%; and in she-

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41.0%.

goats of 6-8 months with about 41.0%. The obtained data indicate the existence of major problems in growth technology of youth, which will inevitably affect further the productivity of goats. However, comparing the body weight of adult half-goats with that of the local population goats, which are bred and exploited under the same conditions, it is observed that after this character the half-goats are more heavy with 4,35 kg (11,5%), the difference being statistically authentic with P 0,01.

P 0.01.

1.

, kg

Table 1. Body weight of mixed females at different ages, kg

Specification	/Females by genotype and age groups					
	(2.5 .) Local goats in lactation (over 2.5 years)	(2.5 . Mixed goats in lactation (over 2.5 years)	(12-14 Mixed she- goats (12-14 months)	(7 Mixed she- goats (7 months)	(3 Mixed she- goats (3 months)	(1-2 Mixed she- goats (1-2 days)
X±Sx	37,65±0,65	42,00±0,60**	28,00±0,56	17,65±0,55	10,26±0,29	3,12±0,21
S	5,31	6,47	4,29	3,58	2,64	2,35
V,%	19,7	15,4	15,4	20,2	25,7	10,5
n	63	116	58	62	81	107

** P 0,01

- For the comparative evaluation of the specific body conformation in mixed and local goats, the body measurements in goats of different ages were performed and analyzed (Table 2), being included in each measured batch of 5 representative animals.

(2),
5

2.
(X), X±Sx, cm

Table 2. Body measurements in local and mixed goats (local X Saanen), X±Sx, cm

Genotype	/Height		Chest depth	Chest width	Oblique length of the trunk	/Perimeter	
	/withers	/croup				/chest	/leg
Local goats	67,70±0,78	69,20±0,82	33,20±1,04	23,70±0,42	71,60±1,15	88,90±6,66	8,10±0,27
(Mixed goats Local x Saanen (F1)	*71,40±0,99	*72,30±1,08	32,90±0,45	23,70±0,76	*75,80±1,29	90,30±1,36	8,30±0,14
(Mixed goats Local x Saanen (F2)	*71,00±0,97	*73,17±1,02	33,83±1,43	23,33±1,43	*76,33±2,35	88,67±4,60	8,00±0,15
(F1) 16-18 She-goats(F1) 16-18 months	66,33±0,82	68,67±0,41	28,67±0,41	22,00±0,00	66,67±0,41	78,33±3,56	8,50±0,00
(F2) 16-18 She-goats(F2) 16-18 months	67,00±1,97	68,17±1,95	28,50±2,55	22,83±1,14	69,33±4,14	79,67±7,79	8,50±0,00
(F1) 6-7 She-goats(F1) 6-7 months	54,10±2,06	56,70±1,82	25,70±0,58	19,80±0,72	58,00±1,46	71,60±1,89	7,20±0,34

* P 0,05

(F1)
(F2)
(
)
p 0.05.
67.70 ± 0.78
69.20 ± 0.82 cm,
F1
72.30 ± 1.08 cm
71.40 ± 0.99
F2.
71.60 ± 1.15 cm
75.80 ± 1.29 cm
F1
F2.
76.33 ± 2.35

- From the analyzed data, it follows
, certain peculiarities of the exterior in the
- goats from the compared batches,
- especially between the mixed and the
- local ones. Statistically authentic
(F1) differences were not established between
- first generation (F1) and second
- generation (F2) of mixed goats. Thus the
- half-goats showed significantly higher
values for heights (withers and rump) and
(
) body length with p 0.05. If in the local
goats the height at withers and rump
constituted 67,70±0,78 and 69,20±0,82
cm, so in the mixed F1 these were
corresponding to 71,40±0,99 and
72,30±1,08 cm with practically the same
values for the F2 generation goats. For
body length the trend is the same with
71,60±1,15 cm in local goats and
75,80±1,29 cm in mixed goats F1, and
respectively, 76,33±2,35 in F2. The
- obtained results demonstrate that in the
- mixed goats were produced changes in
the habitus of the animals and

- respectively in the morphoproductive type more similar to the Saanen breed.



2. (2016 .) (x) F1, 17-18
Fig. 2. Mixed goats (local x Saanen) F1, age 17-18 months (photo 2016 year)

- With regard to body measurements in mixed goats, it should be noted that in the young not kidding goats at the age of 16-18 months the body heights and lengths are almost equal to the same measurements established for local goats at adult age. It therefore confirms the above concerning changes occurred after the crossing of local goats with Saanen bucks.

- As a result of the calculations for determining the specificity of body conformation and the values of external indices in the lots of goats, subject to measurement, it can be found that they largely reflect the specificity related to the body size of the animals (Table 3.), and, at the same time, demonstrate peculiarities of conformation related to the age of goats, especially in youth-correports that change with age.

3.

(x), X ± Sx, %

Table 3. Body index values for local and mixed goats (Local x Saanen), X ± Sx, %

Genotype	Lateral body format	Transversal body format	Massiveness	Thoracic	Robustness	Bony
Local goats	106,20±2,97	35,04±0,86	136,52±4,14	71,58±2,24	129,54±5,04	8,74±0,27
Mixed goats Local x Saanen (F1)	106,22±2,10	33,24±1,48	126,62±3,53	72,08±2,44	118,22±2,80	9,20±0,24
Mixed goats Local x Saanen (F2)	107,50±2,33	32,87±1,46	124,93±6,05	68,93±2,70	113,93±0,54	7,90±0,00
(F1) 16-18 /She-goats (F1)16-18 months	100,53±1,66	33,13±0,41	118,03±4,10	76,80±1,10	117,57±5,94	10,87±0,50
(F2) 16-18 /She-goats (F2)16-18 months	103,43±3,74	34,13±2,27	118,83±10,53	81,27±10,32	114,73±7,21	10,80±1,06
(F1) 6-7 /She-goats (F1) 6-7 months	107,44±2,31	36,70±1,52	132,66±3,50	77,16±3,32	123,44±1,19	10,04±0,22

Following the comparative analysis of the data presented in the table, it is highlighted as a conclusion that the crossing of local goats with Saanen goats leads to reduced constitutional robustness of the body in mixed animals, and probably has a certain influence on their resistance to environmental factors.

Among the main characters that are acquired from the crossing made with the Saanen breed is the improvement of goats for milk production, fact closely correlated with the size and conformation of the mammary gland. Thus, the evaluation of the specific conformation of the mammary gland in local goats and half-breeds shows, as in the case of body measurements as well, that after crossing with Saanen bucks certain morphological changes occur at the level of the udder in mixed goats (Table 4).

Analyzing the data presented in Table 4 it is evident that in mixed goats the mammary gland (the udder) supported certain morphological dimensional transformations and became close to the globular shape (aspect specific to the

), , (3).
(P 0,001)
(F1 F2),
43.1 ± 1.4 cm
41.5 ± 3.1 cm

- Saanen breed), a fact produced by reducing the differences between its length and width (Figure 3). It should be noted that it considerably increased (P 0.001) in mixed goats with both genotypes (F1 and F2), and the perimeter of the udder having values of 43.1±1.4 cm in first generation goats and 41.5±3.1 cm in second generation of goats.

4.

(F1), X±Sx, cm

Table 4. Measurements of the mammary gland and of nipples in local goats and mixed goats Local x Saanen (F1), X±Sx, cm

Specification of measurements	/Genotyp		
	Local goats (n-10)	- F1 Mixed goats Local X Saanen - F1 (n-10)	- F 2 Mixed goats Local X Saanen - F2 (n-9)
Length of udder, cm	19,9±1,0	18,9±0,6	18,2±0,2
Width of udder, cm	13,2±1,4	17,2±1,0	16,7±2,2
Ratio: Length/width	1,6±0,2	1,1±0,1	1,1±0,2
Perimeter of udder, cm	35,1±1,5	43,1±1,4	41,5±3,1
Depth of udder, cm	21,7±1,1	20,8±0,6	20,3±1,8
Ratio: Length/depth	0,9±0,04	0,9±0,04	0,9±0,1
Nipple length, cm	6,1±1,4	3,1±0,3	5,2±1,2
Nipple diameter, cm	2,0±0,6	1,6±0,2	1,9±0,4
Volume of udder, cm ³	2138±212	**3077±173	2857±695

**P 0,01

F1 (IV-
)
3077 cm³.
P 0,01
e F1,

- The increase in the size and in width of the udder also favored the increase in its volume in mixed goats. So, in goats F1 (IVth lactation) the volume of the udder reached the average values of 3077 cm³. That is significantly an higher Index with P 0,01 than that of local goats. It should be noted that some positive changes are also observed in the quality of nipples from the point of view of the suitability for mechanized milking. Especially this signification is evident for F1 generation goats, compared to local ones.



3. (2015 .) (x) F1, 15

Fig. 3. Udder shape in primiparous mixed goats (Local x Saanen) F1, 15 months of age (photo 2015 year)

Following the evaluation of the daily milk production of the studied goats (Table 5), it was found that the average daily milk production obtained from local goats and those of the Saanen breed (F1 and F2) is largely individual, being at the same time dependent on several factors, among which breed/genotype is a very important one. Thus, in the research carried out, it was established that in mixed goats this index is higher by about 490 ml/day (P 0.01) for half-breed goats F1 and 443.0 ml/day (P 0.01) for those of F2.

5. , ml

Table 5. Average daily milk production for local and mixed goats Local x Saanen, ml

Specification	Local goats	Local X Saanen ^{F1}	Local X Saanen ^{F2}
X±Sx	1057,00±77,94	**1550,91±57,10	**1500,00±75,66
S	220,45	323,01	107,00
V,%	20,86	20,83	7,13
n	9	32	3

P 0,01

According to the results of the analysis of the chemical composition of milk in goats from the researched groups

6) ,
 6.33%
 , 6.10%
 6.60% F2.
 F2 (X " P 0.01 ")
 (X)

(Table 6), it can be seen that the fat content in milk is quite high in all three analyzed genotypes. Therefore, the average values established being 6.33% for the milk of local goats, 6.10% for the milk of mixed goats F1 and 6.60% for F2. It should be mentioned that the fat content in milk was established statistically authentic differences between the analyzed groups, with P 0.01 in favor of F2 goats (Local X Saanen) compared to local goats and vice versa for F1 (Local X Saanen) in favor of local ones.

6.

, X±Sx (%)

Table 6. Chemical composition and milk density in local and mixed goats Local x Saanen, X±Sx (%)

Genotype	Fat	Degreased Dry Substance	Protein	Lactose	Mineral Substances
Local goats (n-10)	**6,33±0,01	***7,21±0,01	3,13±0,02	**3,23±0,02	0,56±0,01
Local X Saanen - F1 (n-10)	6,10±0,06	6,93±0,01	***3,29±0,01	3,12±0,01	0,50±0,01
Local X Saanen - F2 (n-9)	**6,60±0,08	***7,64±0,04	***3,62±0,02	***3,43±0,02	0,55±0,01

P 0,01; *P 0,001

F2)

(F1

Regarding the protein content in milk, it was established that in mixed goats of both genotypes (F1 and F2) this important component of milk has significantly higher values compared to local goats. At the same time, significant values are established for other components of the studied goat's milk, such as lactose and degreased dry substance. In the context of the analysis of the chemical composition of milk, it should be noted that in all three groups the studied milk has a high fat and protein content, especially in mixed goats, which can be explained as probably an influence of Saanen breed. But this statement requires the involvement of a wider range of studied data as number of animals, samples etc., including the analysis of the particularities of the used bucks, according to their breed passports.

CONCLUSIONS

The crossing of local goats with Saanen male-reproducers allows the improvement of the morphoproductive traits in the obtained offspring, in terms of animal habit, milk production capacity and female prolificacy.

Crossbred goats (Local x Saanen), according to the values of height at the withers, at the rump and the oblique length of the trunk are higher (P 0.05) than at the goats in the local population (maternal base), being obvious the occurrence of morpho-physiological changes that place them close to the specific characteristics of the Saanen breed - respiratory physiological type with dolichomorphic body format.

The mammary gland in mixed goats has a higher volume (P 0.01) than that of local goats, with essential changes in its quality, as the shape of the udder and the size of the nipples, which reflect the increased potential for milk production and the suitability of the nipples for mechanized milking.

The average daily milk production of first and second generation from mixed goats (Local x Saanen) is clearly higher than from the local goats (P 0.01), being 1550.91 ml for F1 goats and 1500.0 ml for F2 goats.

The milk of mixed goats (Local x Saanen) regardless of genotype (F1 or F2) was distinguished by fairly high values of fat content of 6.1-6.6% and protein content of 3.29-3.62%.

,
(x),
(P 0,05),
,
(P 0,01)
(x)
(P 0.01), 1550.91 ml
F1 1500.0 ml F2.
(x)
(F1 F2)
6.1-6.6%
3.29-3.62%.

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Research on Behavioural Reactions of Aberdeen Angus Cows and Suckling Calves in Pasture Conditions

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Original scientific paper

SUMMARY

The purpose of this study was to

- investigate the main behavioral responses
- lying down, standing, grazing, moving, water intake and suckling of the Aberdeen Angus meat cows together with their litters, reared on pastures.

The pasture was encircled by an electric shepherd. The main available grassland consists of: 48% cereals, 8% legumes and over 44% grasses, 10% of which were weeds. Meteorological data were taken from the Meteorological Observatory.

The study was conducted on 24 cows of the Aberdeen Angus meat breed along with their 16 calves up to 6 months of age. The watering pond was on the very pasture with a stone trough (natural water source). The animals were observed (inhabited the terrain) on the pasture for two days in July 2019. Cow

:
- , , ,
, , ,
.
.
: 48%
, 8% 44%
, 10% .
.
24
16
6-
(
) .
)

2001).

(Grandin, 2001).

(Kennedy et al., 2005).

(Edwards, 2003).

(Dardzhonov, 1987; Todorov, 2001).

36 %. Todorov (2001)

vegetation of pastures changed under the influence of natural and economic factors and this required systematic care. In the pasture, animals were given abundant green pasture grass, which was rich in protein, vitamins and minerals. (Grandin, 2001).

Meat production at the expense of grass on hills and mountains seems very appealing. The grassland grazing system for fattening is promising and suitable for organic production.

Provision of sufficient grass mass, timely commencement and completion of grazing of individual parcels and regular height control and yield of green mass guaranteed maximum green mass consumption (Kennedy et al., 2005). Satisfactory nutrition from pastures depends on its nutritional resource, composition and digestibility of grass, and its daily consumption (Edwards, 2003).

Countries with good pastures usually practice permanent or temporary fencing and leaving animals on the pasture round-the-clock. This provides prolonged grazing, which is usually the most intense in the morning and late evening during the summer (Dardzhonov, 1987; Todorov 2001). When using shepherds and rearing cattle on the farm or in the shelter, the animals are deprived of grazing at the most favourable hours and the grazing time is reduced by 36%. Todorov (2001) considered it an important condition for achieving good results by providing day pasture with no shepherd. Animals preferred to feed in the morning and evening.

The purpose of this study was to investigate the main behavioural responses - lying down, standing, grazing, moving, water intake and suckling in cows of the Aberdeen Angus meat breed together with their litters, raised on pastures.

MATERIAL AND METHODS

The study was conducted on two consecutive days in July 2019 in pastures owned by sole proprietorship "St. Jelev". It is located at an altitude of 600 m above sea level on a sloping terrain in the middle of the Pre-Balkan.

The main available grassland consisted of: 48% cereals, 8% legumes and over 44% grasses, 10% of which are weeds. Grazing was done in a haphazard manner.

The meteorological data were taken from the Meteorological Observatory - Targovishte at NIMH - Varna Branch.

The pasture is 38 ha and used by 28 cows, 16 calves and one bull. The study was conducted on 24 cows of the Aberdeen Angus meat breed along with their 16 calves up to 6 months of age. The watering pond was on the very pasture of a stone trough (natural water source).

The animals were observed (inhabited the terrain) on the pasture for two days. The behaviour of the cows was monitored from 7.00 am to 7.00 pm (during the day). In the morning, the animals were taken to the pasture at 7.00 am and taken back at 7.00 pm for security reasons. During the midday heat, animals rested in the pasture, under tree shade. During the night, they were fed with hay.

We observed the following main behavioural responses: grazing; rest (lying down, standing); movement; water intake as well as the number of mammals. The pasture was distant from roads and people and no acts of aggression were reported.

Their registration was recorded each day in protocols. Ethological responses were determined by timing the various acts over 10 minutes according to the method of Velikzhanin (2000).

The results are processed by the methods of variation statistics. The data obtained are presented in diagrams and tables.

RESULTS AND DISCUSSION

Aberdeen Angus bulls are used to improve meat through industrial crossbreeding, with crossbreeds being particularly sought after for grazing and fattening. Another positive quality of the breed is its good adaptability and durability in adverse climatic conditions. When studying behavioural responses, the influence of climatic conditions of the area is of interest.

They are typical of the temperate zone, relatively humid spring with high temperatures and drought in summer and autumn.

Temperature and humidity are the main elements that characterize the climate in the area of experiment having an indirect effect on the periodicity of the studied ethological reactions (Table 1).

1.

Table 1. Climatic characteristics for the area during the continuation of the study

	Temperature, °C			Relative humidity, %	Cloudy, %	Wind, m/s	Rainfall, mm
	max	min					
First day	25.0	33.2	15.6	67	1 (clear skies)	2.3	-
Second day	24.5	35.6	16.2	67	4 (partly cloudy)	4	-

(1)

48%

L.),
(Bromus inermis
(Poa pratensis L.),
(Festuca
arundinacea L.),
(Agropyrum repens
L.),
(Agrostis abba L.).

The botanical composition of the grassland (Figure 1) in the studied pasture was represented mainly by the group of cereals. They were widespread in natural meadows and pastures and occupy 48% of the biomass volume, the main representatives of which were: unpowered oats (*Bromus inermis* L.), meadow broom (*Poa pratensis* L.), and cane fescue (*Festuca arundinacea* L.), Piraeus (*Agropyrum repens* L.), White mulberry (*Agrostis abba* L.).

44 %

(*Anagallis arvensis* L.),
 (*Capsella bursa-pastoris* L.),
 (*Achillea millefolium* L.),
 (*Plantago major* L.),
 (*Cynosurus cristallatum*
 L.), (*Nardus stricta* L.),
 (*Centaurea*), (*Carex*),
 (*Equisetum Palustre*).

The herbaceous group occupied 44% and was represented by scarlet pimpernel (*Anagallis arvensis* L.), shepherd's purse (*Capsella bursa-pastoris* L.), white yarrow (*Achillea millefolium* L.), large honeysuckle (*Plantago major* L.), comb grass (*Cynosurus cristallatum* L.), cartel (*Nardus stricta* L.), whiting (*Centaurea*), pinworm (*Carex*), marsh horsetail (*Equisetum palustre*).

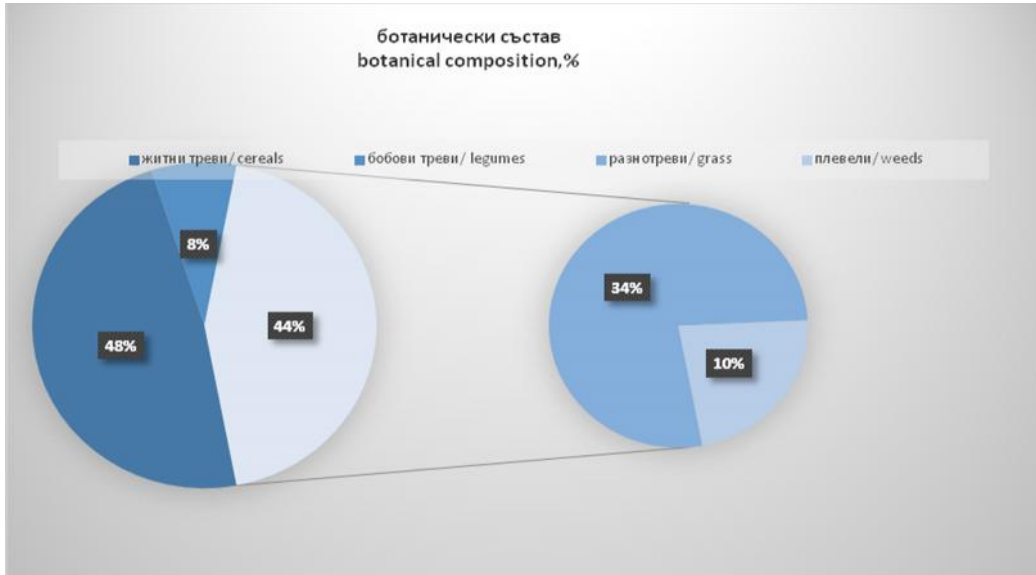


Fig. 1. Botanical composition of natural grassland, %

and Todorova (2004),

2 8%.

corniculatus L.);
 (*Trifolium pretense* L.)
 (*Trifolium repens* L.),

(Todorov, 2001; Markov and Bozhanska, 2018).

Kirilov

8 %, (*Lotus*

According to the studies of Kirilov and Todorova (2004), the share of legumes in natural herbivores was low and ranged from 2 to 8%. In the pasture, the proportion of legumes was 8%, consisting mainly of starfish (*Lotus corniculatus* L.); red clover (*Trifolium pretense* L.) and white clover (*Trifolium repens* L.), which were of high nutritional value and favour the production of balanced feed. The duration of grazing is related to the qualities of the above feed (Todorov, 2001; Markov and Bozhanska, 2018).

(6080 min),
(280 min),
(2).

11 h 12 14 h

16 17 h.

8.00 9.00 h,
15.00

11.00 12.00 h
16.00 h.

4-6

8.00

9.00 h, 11.00 12.00 h, 15.00 16.00 h,
17.00 -18.00 h.

Markov and Bozhanska
(2018).

Behavioral responses of Aberdeen Angus cows and cattle

- During the break, there was a slight difference in duration over the two days of observation. On the first day they rested less as they stood (6080 min) and laid more (280 min) than in the second day (Table 2). The cows were resting under the shade of trees during the day from 10 to 11 am and from 12 to 2 pm, as rest of most animals was expressed in standing and movement, and during the second day of observation they rested also between 4 and 5 pm.

- This may be due to the higher temperature measured during the day. The larger calves rested in the shade between 8.00 and 9.00 am, between 11.00 and 12.00 pm, and between 3.00 and 4.00 pm. During the feeding of the calves, the cows stood and ruminated. During the observation period, calves were breastfed 4-6 times during the daylight hours between 8.00 and 9.00 am, 11.00 and 12.00 pm, 3.00 and 4.00 pm, 5.00 -6.00 pm. The larger calves were grazing near their mothers. Our data corresponded and were similar in value to the established ethological studies of Markov and Bozhanska (2018).

2.

Table 2. Behavior of cows raised on a natural pasture

	Rest-Standing		Rest-Lying down		Grazing		Movement		Water intake	
	Min.	%	Min.	%	Min.	%	Min.	%	Min.	%
First day	6080±57.88	35.19	280±8.60	1.62	9790±58.31	56.65	790±21.37	4.57	340±17.89	1.97
Second day	6920±34.06	40.05	250±10.00	1.45	8180±52.15	47.33	1500±40.82	8.68	430±17.89	2.49
Average	6500±34.06	37.62	265±13.29	1.53	8985±76.03	52.00	1145±40.25	6.63	385±13.04	2.23

P<0.05

52 %, - ,
10.00 11.00 13.00 14.00

- The data from the table show that half of the day was for grazing, the average for the two days was 52%, with the least pronounced grazing observed in the period from 10.00 to 11.00 and from 1.00 to 2.00 pm on the first day, and

10.00 13.00 16.00 17.00 h.
 (1989) Ruseva et al.
 44.03%
 2-3 m
 12.00 14.00 h.
 (7.00 9.00)
 (17.00 19.00)
 450m
 6500 min., 37.65%;
 265 min., 1.53%; - 8985 min., 52%;
 - 1145 min., 6.63%;
 - 385 min., 2.23%.
 8.00-9.00h.; 11.00-
 12.00h.; 15.00-16.00h.

during the second from 10 am to 1 pm and from 4 pm to 5 pm. A study by Ruseva et al. (1989) indicated that animals spent 44.03% of their total time on grazing. We assume that grazing duration was specifically related to meteorological conditions and the available grassland in the pasture complex. Animals grazed at a distance of 2-3 m from each other.

Other behavioural reactions such as lying down, free movement and water intake were relatively the same in value. Single cases of rest were found mainly at noon from 12.00 to 2.00 pm. The greatest movement activity was manifested in the morning (from 7.00 am to 9.00 am) and afternoon (from 5.00 to 7.00 pm).

These periods coincided with the travel time from the farm to the pasture and the watering pond, 450 meters away and returning from them. No aggressive reactions were observed during the observation period.

CONCLUSIONS

The duration of the studied behavioural responses of cows under pasture conditions were: rest-standing - 6500 min, 37.65%; rest-lying - 265 min, 1.53%; grazing - 8985 min, 52%; movement - 1145 min, 6.63%; water intake - 385 min, 2.23%. Lactation of calves was mainly observed between 8.00 and 9.00 am; 11 am - 12 pm; 3.00-4.00 pm.

The low level of aggressiveness indicated that raising cow in pastures with electric shepherd is suitable for suckling cows of the Aberdeen Angus breed.

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Morphological and Dermatoglyphic Features of the Nasolabial Plate of the Bulgarian Red Cattle

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Original scientific paper

SUMMARY

The paper presents the morphological and dermatoglyphic characteristics of the nasolabial plate of cows and heifers of Bulgarian Red Cattle reared in farms in the Northeastern Bulgaria. Morphometric parameters were studied, such as: folds, ridges, furrows, ovals, polygons and ellipses, forming characteristic phenocomplex. As an additional phenone, the colour of the nasolabial plate was studied - the main color, shades, depigmentation.

There are asymmetric and symmetrical images in the studied specimens. The folds with long stripes predominate. Five dermatological types were found.

The studied elements of the construction of the nasolabial plate of the Bulgarian Red Cattle can be used in its identification and passporting, as well as a marker in the selection.

Key words: Bulgarian Red Cattle, nasolabial plate, folds, phenocomplex, dermatoglyph, marker

(Trofimenko and Vininchuk, 1987; Vasiliev, 2005; 2009; Ellis et al., 2010).

phenes of the dermatoglyph of the nasolabial plate are a complex source of genotypic diversity of specimens, herds and populations and therefore their quantitative and qualitative study is imperative (Trofimenko and Vininchuk, 1987; Vasiliev, 2005; 2009; Ellis et al., 2010).

The objective of the present study was to investigate the colour, area, texture, structure and type of dermatoglyph of the nasolabial plate of cows and heifers of Bulgarian Red Cattle.

MATERIAL AND METHODS

The study was conducted in the Northeastern Bulgaria in two farms located near the towns of Veliko Tarnovo and Aksakovo in 2020. The animals in these farms were born in Bulgaria and were well acclimatized to local conditions. Eleven cows, 5 heifers and 4 females, adolescent calves, typical representatives of Bulgarian Red Cattle breed were studied.

The age and information about the milk yield of the studied animals were determined from the records made in the herd records and books. The dermatoglyph images of the nasolabial plate were taken with a Canon 18 x 10 MP camera at a distance of 25-50 cm from the object. Then, the collected database was processed by a computer using Microsoft Excel, Paint and Microsoft Word 2010. The collected information was saved on magnetic media.

Anatomical, morphological, morphometric and photographic methods were applied.

Dermatoglyphic images were studied according to the method of Trofimenko (1991), which is based on an analysis of the distribution of skin shafts (rollers), ridges, folds and grooves on the surface of the nasolabial plate by the deductive method. The shape and

Canon 18 x 10 MP
cm

25-50

Excel, Paint Microsoft Word 2010.

Trofimenko (1991)

Anatomica Veterinaria.

- location of the skin phenocomplexes were studied. The colour of the nasolabial plate was studied as an additional phenone.

The terms used are in accordance with the international veterinary nomenclature - Nomina Anatomica Veterinaria.

„Statistica-2000“

Data was processed by the methods of variation statistics using the program "Statistica-2000" and presented in tables.

RESULTS AND DISCUSSION

The colour (color) of the nasolabial plate is different and specific to every cattle breed. The colour of the nasolabial plate of Bulgarian Red Cattle was studied and systematized as an additional phenone.

The colour of the nasolabial plate in the studied cows and heifers is pale black, grey, from grey-brown to grey with shades of pink (checkers and triangles).

There is a medium thin circle (halo) of white, coarse, covering hairs around the nasolabial plate. Depigmented areas are rare.

1.

($X \pm S x$)

Table 1. Morphometric parameters of the nasolabial plate of cows of Bulgarian Red Cattle breed ($X \pm S x$)

Age	Surface of nasolabial plate, cm ²	Number of skin shafts	Average width of skin shafts, mm		
18-24 /months	50,6±0,8	333±2,1	3,8±0,10	4,0±0,06	3,4±0,14
3-7 /years	71,7±0,7	341,4±2,1	5±0,10	5,4±0,20	3,9±0,10

P<0,05

50,6 cm² 71,7 cm²
333 341,3.

Table 1 shows that the area of the nasolabial plate varies between 50.6 cm² and 71.7 cm² depending on age. The situation is similar with the amount of skin shafts, a slight variation from 333 to 341.3. The folds in the dorsal part have a rounded or oval shape, and in the central

part and the ventral part their shape depends on the type of dermatoglyph: they can be rounded, oval or strongly elongated. The size of the folds increases with age

The frequency of occurrence of the different morphological features of the dermatological structure of the nasolabial plate of cows and heifers of Bulgarian Red Cattle breed is presented in Table 2.

The studied animals are characterized by a predominance of loose structure of the nasolabial plate with 93.7%.

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-
-

2.

Table 2. The frequency of occurrence of the different morphological features of the dermatological structure of the nasolabial plate of cows and heifers of Bulgarian Red Cattle breed, %

/ Phenocomplex		/ Breed
		Bulgarian Red Cattle
/ Type of structure,%		
/ Loose		93,7
/ Dense		6,3
/ Direction of furrows ,%		
/ Equal degree		21,2
/ From the top to high degree		37,3
/ To the periphery		41,5
/ Curve of furrows,%		
/ Highly curved		87,4
/ Slightly curved		12,6
/ Position of folds%		
/ Asymmetrical		73,57
/ Symmetrical		26,43
/ Shape of shafts,%		
/ Long stripes		91,43
/ Short stripes		97,16
/ Ellipses		55,71
/ Polygons		57,14
/ Bee hives		9,53
/ rollers with tensioners		29,81

26,43 %

- The furrows "towards the periphery of the dermatoglyph" and "from the top to a large extent" also predominate. The position of the folds is more asymmetrical, but there are quite often (26.43%) symmetrical images as well. That can be

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 (91,43% 97,16%).
 :
 9,53%
 29,81% .
 „ - „-26,43 % „ -23,51%
 „ -19,81 %
 „ „ .
 - ,
 „ - „ -
 : „ - -
 „ - „ 17,67 %
 „ - „ 12,58 % .
 „
 (26,43%)
 ()
 „ „(23,51%)
 „ „(19,81%)
 „ „(12,58%)
 „ „(17,67%)
 „ - -
 „ -

explained by the high occurrence of "Tree-twig" dermatological type, whose image is symmetrical. The shafts and folds in the form of long and short strips (91.43% and 97.16%) often participate in the construction of the dermatoglyph of Bulgarian Red Cattle. Some variants rarely occur, such as beehives 9.53% and rollers with tensioners 29.81%,

In Bulgarian Red cattle the dermatotypes "Tree-twig" (26.43%), "Class" (23.51%) and "Crown" (19.81%) are observed. Dermatotype "Parallel" is not found. The other two dermatotypes are less represented, respectively "Combi" in their varieties: "Tree-twig-crown" and "Tree-twig-grain" (17.67%) and "Grain" (12.58%).

Dermatotype "Tree-branch" (26.43%) is characterized by a deep, distinct, central groove (trunk) from which to the left and right at different distances come separate or double lines.

Dermatotype "Class" (23.51%) shows the location of the papillary shafts in a form similar to the location of the grains in the class of a cereal plant.

"Crown" dermatotype (19.81%) is known for the flow of lines at different angles coming from a point at the lower end of the nasolabial plate. The shafts are arranged radially.

Dermatotype "Grain" (12.58%) is represented by round skin shafts scattered over the entire surface of the nasolabial plate, having the appearance of warts. Both small and large shafts are observed.

Dermatotype "Combi" (17.67%) combines elements of the above mentioned in different combinations. In the combination "Tree-twig-crown" long and wide stripes are strongly curved in their lower part, and in the upper part they branch and form a crown. In the combination "Tree-twig-grain" in the lower

- part are combined strongly branched
- furrows protruding from the central trunk, passing in the upper part in rounded shafts of granular papillae.
- Data on milk yield of the studied cows by dermatotypes are presented in Table 3.

3.

($\bar{X} \pm S_x$)

Table 3. Dependence of the dermatoglyph type of Bulgarian Red Cattle on milk productivity ($\bar{X} \pm S_x$)

Dermatoglyphic type	Milk yield,kg	Fats,%	Protein,%
- /Tree-twigg	5916±31,97	3,8±0,16	3,4±0,16
/ Class	5828±23,60	3,6±0,16	3,4±0,08
/ Crown	5198±5,44	3,6±0,05	3.3±0,08
/ Grain	4919±23,28	3,5±0,16	3,5±0,16
/ Combi	4779±18,95	3,4±0,08	3,5±0,08

P<0,05

-
%,
" -5916 kg 3,8 %
, 3,6 % " " 5828 kg
"
, 4779 kg 3,4 %
3,5 %, " " "
" " , 3,3%.
Arzhenkova (2001)
Siroтина (2011) Siroтина (2012) Baranov and

The highest values of milk yield and fat content in % were shown by the representatives of the dermatotype "Tree-twigg" (5916 kg of milk and 3.8% fat), and dermatotype "Class" (5828 kg of milk and 3.6% fat).

The lowest milk yield and fat content were found of the representatives of "Kombi" in its various varieties, respectively 4779 kg of milk and 3.4% fat. The highest values of protein were found in the representatives of the dermatotypes "Grain" and "Combi", respectively 3.5%, while the lowest values were found in representatives of the dermatotype "Crown", respectively 3.3%.

The results obtained in the present study are close to the results obtained by Arzhenkova (2001) with cows of Red Estonian Cattle and Baranov and Siroтина (2011) and Siroтина (2012) with cows of Red Gorbatov Cattle.

CONCLUSIONS

- The analysis of the photo of the
- dermatoglyph of the nasolabial plate of

- Bulgarian Red Cattle allows to establish the breed specificity, and can become one of the methods for identification in the herd and certification of the animals, as well as to find application in the court veterinary and zootechnical practice and applied as an additional evaluation method in the selection work.

ACKNOWLEDGEMENTS

I would like to thank to my colleagues from Executive Agency for Selection in Sofia and in the town of Aksakovo. I would like also to express my gratitude to Ivan Ivanov, a farmer who took incredible care in the preservation of that valuable national breed.

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