

## GOAT BREEDING IN THE REPUBLIC OF NORTH MACEDONIA – SITUATION AND PERSPECTIVE

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**Abstract:** The Paper shows the state of goat production in the Republic of North Macedonia with an emphasis on the last 20 years (2000-2020). The data on the movement of the number of goats, the quantity of goat milk and meat which is produced, the breed types of the goats in the country, breeding technology and other indicators of goat production have been processed. It is important to point out that in order to improve the quality of goat production, it is still necessary to work in the direction of modernization and wide use of new breeding technologies, all with the aim of increasing production properties, improving the well-being of goats and quality monitoring of their health condition, as well as improving the economic condition of the farmers.

**Key words:** goats; milk; production; development

### КОЗАРСТВОТО ВО РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА – СОСОЈБА И ПЕРСПЕКТИВА

**Апстракт:** Во трудот е прикажана состојбата во козарското производство во Република Северна Македонија со акцент на последните 20 години (2000-2020). Обработени се податоци за движењето на бројната состојба на козите, произведената количина на козјо млеко и месо, расовиот состав на козите во државата, технологијата на одгледување и други показатели на козарското производство. Важно е да се истакне дека за квалитетно подобрување на козарското производство потребно е уште да се работи во насока на осовременување и широка примена на нови технологии на одгледување, а се со цел зголемување на производните својства, подобрување на благосостојбата на козите и квалитетно следење на здравствената состојба, како и подобрување на економската состојба на фармерите.

**Клучни зборови:** кози; млеко; производство; развој

### INTRODUCTION

Goats and their role in stockbreeding in the world are very important, which can be seen in the fact that they are bred in almost every country in the world. (except in Arctic and Antarctic) (Uremovich et al., 2002).

Goats belong to the group of domestic animals which were first tamed and used for the production of meat, milk, leather, fiber and fur, as evidenced by numerous archaeological sites (Galal, 2005). Since goats are quite modest in terms of nutrition and keeping conditions, and at the same time are defined as quite mobile and adaptable to different climatic conditions, goat farming is one of the important branches of stockbreeding, especially in mountain-

ous regions with modest vegetation and specific climatic conditions. Successive complementing in the good environmental image of goat production is also seen in agritourism in mountainous regions such as the regions of the Iberian Peninsula, the Balkan Peninsula, the Apennine Peninsula, the Alps, etc. (Dubeufi et al., 2004).

### *Resources for the development of goat farming*

In the Republic of North Macedonia, stockbreeding is represented to the greatest extent in the hill areas in the perimeter of the northern, western and eastern borders with a zone girdle width of 10–80 km. These regions border the regions for the production of husbandry crops, which increases the

interaction in terms of the use of by-products from husbandry in livestock nutrition.

It is a tradition in the Republic of North Macedonia to graze goats. Our pastures enable the development of not only goat breeding but also sheep and cattle breeding.

Of the total agricultural area, which is 1,264,578 ha, 743,991 ha are pastures, and the rest part (519,848 ha) is cultivated area.

Of the total cultivated area, 418,823 ha are arable land and orchards, 16,784 ha are kitchen gardens, 24,468 ha are orchards and 59,773 ha are meadows.. The rest are ponds, wetlands and fish ponds.

About 40% of the total arable land and 80% of the pastures are state-owned, managed by the Ministry of Agriculture and Forestry and the Public Enterprise for Pasture Management. The remaining available land resources are owned by a large number of family agricultural holdings, which makes to limit productivity and limited economic results.

According to the Unique Register of Agricultural Holdings of the Ministry of Agriculture, Forestry and Water Management from 2020, the number of family agricultural holdings is 172663. On the other hand, according to the data of the Agency for Financial Support of Agriculture and Rural Development from 2018, the number of beneficiaries of the measures of direct payments have been 86,650 to family agricultural holdings (Ministry of Agriculture, 2018), i.e. about 50.18%.

According to the available resources, using data from the SSO (State Statistics Office), about 2.92 ha of arable land and 4.18 ha of pasture belong to the agricultural economy. This data indicates the breaks and fragmentation of the agricultural lands, which on the other hand does not create enough space and opportunity for organizing profitable and sustainable agricultural and stockbreeding production.

In addition to pastures, bur clover, clover, vetchling, cattle peas, etc., are used as additional voluminous nutritious for goats, while from cereals crops, barley and corn is used a lot, while wheat and triticale are less used. Both are produced on arable agricultural lands. Most of these foods are produced on the lands in the Republic of North Macedonia and they satisfy the needs, with the exception of corn, wheat and triticale, which due to insufficient domestic production, are imported from abroad in a certain percentage.

### *Normative acts which the development of goat farming depends on*

More important acts that govern this stockbreeding branch and that can significantly affect its advancement are:

- National strategy for agriculture and rural development 2014-2020;
- National strategy for agriculture and rural development 2021-2027;
- Law on Agriculture and Rural Development (Official Gazette of the RM No. 49/10);
- The Law on Stockbreeding (Official Gazette of the RM No. 7/2008);
- The common basic program for livestock breeding (CBPLB 2011–2020);
- The joint basic program for goat breeding (JBPG), which is an integral part of CBPLB 2011-2020;
- The program for the protection of biological diversity of stockbreeding in the RM (Official Gazette of the RM no. 144/10);
- Rulebook for the protection (conservation) preserving of the biological diversity of animal genetic resources in domestic animals;
- Rulebook on the method of performing and monitoring biological diversity in stockbreeding;
- Rulebook on the method of cultivation and circulation of the indigenous breeds and/or lines (breeds), the format and content of the request for recognition of new indigenous breeds and/or lines (breeds) and the format, content and method of keeping their register;
- Rulebook on the volume of genetic reserves, as well as the method and procedure of securing and maintaining the reserves;
- Rulebook on the closer conditions for the performance of a separate public service, protection of biological diversity in stockbreeding, the method of performance and monitoring of biological diversity in stockbreeding and the preservation of genetic variability and genetic reserves of livestock;
- Programs for financial support of the country in the Republic of North Macedonia;
- Programs for financial support of rural development in the Republic of North Macedonia

### *Numerical status of goats in the world*

According to FAOSTAT data, today 1,128,106,236 goats are bred in the world, represented by more than 500 breeds, of which about 63% are for milk production, 27% for meat production,

and only about 5% for goat's hair (mohair) production.

Most of the goats in the world are bred in Asia (51.43%) and Africa (43.35%), while in Europe of the total goat population is bred about 1.44%.

From the data shown in **Table 1**, it is noticeable that the total number of goats in the world is increasing, especially in the territory of Africa and Asia, but in Europe, from the beginning of 2004, the number of goats has a negative trend, respectively, it is decreasing.

During the period 2000-2020 in Europe, from the total number of goats, the most goats are bred in Greece 22.14%, followed by Spain 16.45%, the former Soviet republics 12.18%, Romania 10.12% and etc.

development, and those are:

- lack of manpower;
- uncoordinated purchase and low purchase price of goat meat;

- relatively poorly developed goat milk market;
- price of European markets);
- primitive and backward production technology;
- unfavorable breed type and low productivity in the existing goat population;
- weak interest in investing and working in the branch;
- low degree of accumulation and profitability.

The continuous solution and overcoming of the above-mentioned problems will contribute to the stabilization of the numerical status, and thus of the goat production as a whole (milk, kiddies, etc.)

When analyzing the data on the number of goats in some of the countries of the region for the period 2005-2020, it can be concluded that a larger number of goats are bred in Republic of North Macedonia than in Montenegro and Croatia, but we are still significantly behind compared to Greece, Romania, Bulgaria, etc. (**Table 2**).

Table 2

*Movement of the number of goats in Macedonia and some European countries (2005-2020)*

	Greece	Romania	Bulgaria	Serbia	Macedonia	Croatia	Montenegro
2005	5509233	661000	718120	/	62190	134483	/
2006	5422240	687000	608426	138604	63579	102877	/
2007	5401865	727000	549076	149000	126452	91902	/
2008	5345737	865000	495484	154296	133017	83877	/
2009	5180391	898000	429834	143050	94016	76119	/
2010	5274759	917300	360822	128733	75708	75215	/
2011	5123833	1240786	356334	129720	72777	70030	/
2012	5009904	1236143	341362	231837	63585	71978	23660
2013	4895244	1265676	293639	225073	75028	68948	29675
2014	4782003	1312967	289308	218603	81345	60697	32997
2015	4128036	1417176	292644	202828	88064	62000	29678
2016	3975504	1440151	276919	200150	101669	75530	31458
2017	3998205	1483100	237543	182558	107466	76771	29595
2018	3625000	1539300	271740	195932	117447	80000	29040
2019	3580000	1594800	228490	191280	87581	82000	28700
2020	3568000	1630400	253400	202325	95008	86000	28913

Source FAOSTAT, 2021

For statistical purposes, the territory of the Republic of North Macedonia is divided into eight regions. The number of goats bred in each of the regions is shown in **Table 3**. According to the data in **Table 3**, the largest number of the total number of

goats are bred in the Eastern and Southeastern regions of the country. There is an exception only in 2007 and 2009, when the largest number of goats were bred in the Southwest region.

Table 3

Numerical status of goats in the regions of the Republic of North Macedonia (2007–2020)

Year	Vardar region	East region	Southwest region	Southeast region	Pelagonia region	Polog region	Northeast region	Skopje region
2007	14009	12565	43745	17372	7651	5850	18231	7029
2008	17799	15102	21582	33240	7569	9007	24760	3958
2009	6974	11710	27812	19807	7322	3067	9471	7584
2010	8046	23514	4824	14114	5567	2743	11510	5390
2011	10050	22875	6198	11594	5358	3663	7585	5454
2012	6835	18533	6842	10558	3710	4715	6936	5456
2013	10891	16725	6140	19112	2006	6560	6081	7513
2014	8754	18748	8861	21651	4588	6236	8799	3707
2015	9462	20316	9544	23421	4957	6893	9488	3983
2016	10218	22914	11801	26500	5208	8373	11200	5455
2017	4014	30334	15654	20445	3866	8571	12444	9138
2018	5488	29698	19934	19326	7319	12495	9552	13635
2019	3665	25970	16700	13890	4238	6502	8636	7980
2020	4728	23698	11098	34189	4390	3685	7935	5285

Source AFV, 2021 Breed type

The breed type of goats in the Republic of North Macedonia is domestic Balkan goat, with a certain representation of goats from the Alpina and Saanen breeds, as well as hybrids between all these breeds. Of the total number of goats, determined by the Agency of Food and Veterinary in 2019, 47.51% belong to the domestic Balkan breed, 22.02% are defined as goats obtained by unplanned crossing of the domestic Balkan goat mostly with goats from the Alpine and Saanen breeds. 10.7% belong to goats of the Alpina breed, 10.54% are hybrids of the Alpine breed. 4.6% are goats of the Saanen breed, while 4.23% are defined as hybrids of the Saanen breed. Out of the total number of goats, only 0.38% are the goats of the Murciana breed.

Greater changes in the percentage of representation of breeds during the past years have not been recorded.

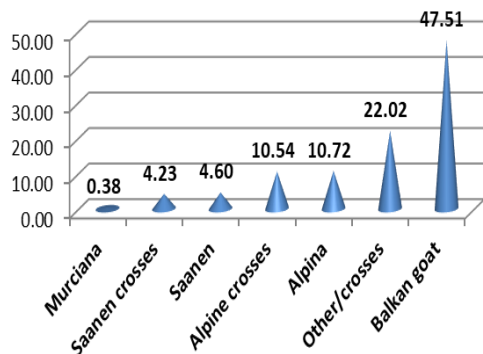


Fig. 2. Goat breeds in the country, 2019

#### Number of herds, conditions and method of breeding

According to Krstić (1993) (quote in Bogavac, 1998), the economic results of the farm are improved when on the same the number of goats are increased. The determination of both the maximum and the minimum number of heads of all categories on the farm is closely correlated with the size of the facilities, the feeding possibilities of the heads, as well as the hired workforce.

In the Republic of North Macedonia, according to the data of the SSO, the number of herds ranges from 20 to 200 heads, and in rare cases up to 300 heads of all categories. According to the researches of Porchu et al. (2020), in the period 2011–2019 there was an increase of 7% in the farms where 11–20 heads are bred as well as in the farms where 21–50 heads are bred (9%) and in the farms where 50–100 are bred was (5%). The analyzed data indicate a consolidation and growth rate of the number of farms that have solid production facilities, especially farms with herd number of 21–50 and 51–100 heads.

In 2020, a total of 23,734 agricultural holdings breeding livestock were reported to the Agency for Financial Support in Agriculture and Rural Development. Of them, 8.5% or 2,024 farms breed goats. At the same time, according to the data of AFV, goats in our country are bred on individual farms (98.8%), and a very small part (1.2%) in business entities.

In our country, the goat breeding system can be defined as extensive, stable-pasture, with an emphasized seasonal character fully adapted to the climatic conditions in the country, as well as to the seasonal reproductive activity of the goats. Of course, regular health care is also an inseparable part of the breeding system.

### Milk production

The basic product got from goats is goat's milk, which is usually processed into white brined goat's cheese, sour milk, yogurt, cottage cheese and whey. The easy digestibility of goat's milk makes it suitable for children, the elderly and convalescents. People who are allergic to lactose can use goat's milk and completely replace cow's milk with it. (Pacinovski (2015) (quote in Haenlein, 2004)).

Most (more than 95%) of the breeding goats in the country are milked. At the same time, part of the goat farms hand over the milk to a dairy, while part of it is mostly processed into white brine cheese mostly for own needs, and a very small part is sold directly from the farm to users for individual needs.

The production of goat milk in the Republic of North Macedonia (total number of dairy goats, average milk produced per head and total milk produced) for the period 2009–2020 is shown in Table 4.

Table 4

#### Produced goat milk (2009-2020)

Year	Number of dairy goats	Milk by dairy goat (liters)	Total produced milk (liters)
2009	68.270	284	19.386.000
2010	56.638	266	15.074.000
2011	62.711	248	15.565.000
2012	49.828	298	14.848.000
2013	51.805	278	14.395.000
2014	53.781	253	13.587.000
2015	63.948	243	15.568.000
2016	70.082	276	19.336.000
2017	76.548	251	19.250.000
2018	86.865	263	22.846.000
2019	61.396	275	16.865.000
2020	70.132	222	15.567.000

Source SSO, 2021

According to the data given in Table 3, where the number of goats in the country and by region is

shown, and from the analyzed data in Table 4 can be concluded that as the total number of goats decreased the number of dairy goats decreases/increases and also the total amount of milk which is milked out.

The average milk per head in the period 2009-2020 indicates the fact that at the level of the country there is a decrease in values in 2020. Of course, the average amount of milk which is milked out primarily depends on the breed type, the age of the goats and lactation in line, from the diet, the health condition of the head, external influences, etc. How much and which of the listed reasons are an influencing factor for this situation is the subject of some future analysis, but the fact is that according to the SSO, the production of goat milk in 2021 recorded an increase of 6.2% compared to 2020.

Also if it is taken into account that the average amount of milk produced by domestic Balkan goats according to CBPBL (Common basic program for breeding livestock) 2011–2020, has been in amounts to 120–250 liters for a lactation of 250 days, and in goats of the Alpina breed bred in a traditional way, the same amount on average 252 liters (+/- 10 liters) (Eftimova, 2013), and at the same time the largest percentage of goats bred in our country belong to the domestic Balkan goat (48%) and goats from the Alpina breed and its hybrids (approx. 13%), the obtained data for the milked out milk / head show no exceptions.

Table 5 and Table 6 present data on the total milk produced in 000 liters in individual regions of our country for the period (2016–2020) and on the average milk/head in the same regions and for the same time period.

Table 5

#### Produced goat milk by regions in 000 liters (2016–2020)

	2016	2017	2018	2019	2020
R. N. Macedonia	19336	19250	22846	16865	15567
Vardar region	2323	1810	1270	919	828
East region	4583	5667	5472	5005	4997
Southwest region	1143	2269	5562	3681	1374
Southeast region	3799	3445	2978	2579	4989
Pelagonia region	841	528	698	796	908
Polog region	2133	1608	2307	1396	854
Northeast region	2624	1947	1574	1123	826
Skopje region	1890	1977	2985	1365	792

Source SOS, 2021

Table 6

*Average milk by head (liters)*

	2016	2017	2018	2019	2020
R. N. Macedonia	276	251	263	275	222
Vardar region	314	347	266	309	220
East region	254	250	274	271	294
Southwest region	155	230	346	353	167
Southeast region	224	233	192	251	188
Pelagonia region	309	201	157	247	226
Polog region	374	290	307	354	326
Northeast region	346	231	229	187	196
Skopje region	436	269	255	226	209

Source SOS, 2021

From the analyzed data in [Table 5](#), it can be concluded that the most goat milk was produced in the East and Southeast regions, where the most goats are bred.

When it comes to the production of goat milk, the fact that affects poorly with its intensification and increase is that the market for goat milk is still poorly developed. The purchase price of a liter of raw goat's milk is almost half of the price of sheep's milk (i.e. almost equal to the price of cow's milk), so because of that, many sheep farmers mix goat's milk with sheep's milk.

The average purchase price of a liter of raw goat milk for the period 2013–2019 is presented in [Table 7](#).

Since goat milk products have relatively high sales prices, more and more farmers are equipping facilities for the milk processing at the farm level in order to produce special types of goat or mixed cheese.

Table 7

*Average purchase prices of raw goat milk, euro/per litre*

Year	2013	2014	2015	2016	2017	2018	2019
Goat milk (raw)	0.29	0.30	0.31	0.31	0.29	0.29	0.31

Source: Agricultural and market informative system, MAFWE, 2013–2019.

*Production of meat*

Apart from goat's milk, other products obtained from goat production are goat and kiddy meat.

Goat meat belongs to the category of less fatty meats, it is rich in macro and micro elements as well as water-soluble vitamins and is easily digestible (Mioč and Pavić, 2002) and therefore, to a large extent, it satisfies the criteria for a healthy and proper diet. However, the production and consumption of goat meat globally is low, especially when compared to beef. A problem in the production and marketing of goat meat is the absence of typical meat breeds (except the Boar Goat), the weaker response to fattening of kiddies, the seasonal (mostly spring) production of goat meat and its distribution in the markets, as well as consumer habits and the existence of certain prejudices during the consumption of the same (Kegalj et al., 2011).

Goats are characterized by high fertility (two, and often three, kiddies are got annually), which results to the possibility of increased production of goat meat compared to lamb.

The data on the number of kiddies that the farmers kept for their own reproduction and part for sale as breeding material for the period 2016–2020 are shown in [Table 8](#).

Table 8

*Produced kiddies for breeding and own reproduction*

	2016	2017	2018	2019	2020
R. N. Macedonia	19832	16793	18593	17326	17546
Vardar region	977	629	465	369	309
East region	3087	4941	4252	4876	5455
Southwest region	3614	3948	4213	4491	1833
Southeast region	6343	2313	2752	2042	5044
Pelagonia region	1693	933	2233	634	1013
Polog region	1304	1148	1557	2099	1607
Northeast region	1033	1683	1120	1304	1252
Skopje region	1781	1198	2001	1511	1033

Source SOS, 2021

The data on the total number of slaughtered goats from the categories: goats over 12 months, goats up to 12 months and kiddies up to 5 months of age in 2020 are given in [Table 9](#).

*Financial support for goat farming*

The financial support for goat farming in the country mainly takes place through two programs: the Program for Financial Support in Agriculture and the Program for Financial Support of Rural Development.

Financial support is used in order to neutralize the risks that are more present in this economic movement. According to this trend, after the independence in the Republic of North Macedonia, it has continuous increase of subsidies in stockbreeding, and therefore also in goat production.

The measures used for subsidizing goat farming are presented in [Table 10](#).

Most of the farmers who breed goats in the country use the first two measures. Theoretically, the farms that can use all these measures should have goats of the domestic Balkan breed, and at the same time they are certified as organic farms.

The reason for such small amounts of slaughtered goats of all categories is that a large part of the kiddies (and goats) are slaughtered illegally, i.e.

outside slaughterhouses. The price of a kilogram of live goat meat is identical to the price of a kilogram of lamb meat and is on average 140 denars/kg.

Table 9

*Slaughtered heads goats by categories and obtained meat in 2020 in RNM*

Category of livestock	Number of slaughtered heads	Quantity of obtained milk in kilograms
Goats over 12 months	504	7.437
Goats up to 12 months	62	746
Kiddies (up to 5 months)	1.168	9.649
TOTAL		17.832

Table 10

*Financial support in goat farming*

Measure	Program for financial support	Program for rural development
Direct payments for marked head of goats of all categories	17 euro/sheep	/
Additional direct payments for kept female kiddy	17 + 11 = 28 euro/f. Kiddy (11 euro fist year)	/
Additional payments for heads goats of domestic Balkan goat	/	9 euro/sheep
Direct payments for produced and sold goat milk	0.07 euro/liter goat milk	/
Help to preserve rural areas and their traditional characteristics	/	Annual salary for goat workers
Organic goat production	/	+30% of measured marked head

Source Извор: MAFW, 2021

*Measures for the promotion of goat farming in the Republic of North Macedonia*

The development and promotion of goat production in our country directly depends on the correct direction by taking concrete measures that will refer to the breed type and the production potential of the goats. The direction should go in the way, first of all, of intensifying the production of goat milk, and then of meat, with changes in the way of breeding, improving the quality of the nutrition of the goats, as well as with the activation of mechanisms that will lead to a change in intensity of using goat products.

The improvement of the productive properties of goats should take place by increasing the number of highly productive goats and by improving the genetic potential of domestic indigenous breeds through the implementation of selection activities (control of productive properties and selection of elite goats).

For this purpose, the number of recognized organizations of goat breeders should be increased, so that a larger number of goats could be covered under selection. At the moment, there is only one recognized organization in our country, and that is for the domestic Balkan goat, formed by the Association of breeders of indigenous breed of goats, Balkan goat from the village of Dedeli, Valandovo.

At the same time, activities should be carried out in the direction of changing the extensive system and intensifying production by applying the stable-pasture system breeding.

The problem of depopulation in the entire territory of the country, which is especially emphasized in the rural areas where the majority of goats are bred, can be partially solved by stimulating the young population to keep and breed goats accompanied by appropriate stimulation. At the same time, the experiences of European countries should be used and farmers should be stimulated in the way of develop-

ing eco-tourism and selling local products produced on the farm itself.

Also, in addition to the intense influence of consumer habits for consumption of the products of goat milk and goat meat, it is necessary to work on the processing of goat milk into quality products (cheeses and yellow cheeses) that should be protected as local and specialized products of protected origin.

Of course, as a measure for the improvement of goat production would be the continued financial stimulation by the state, as well as the improvement of the advisory system in the direction of education of goat farmers.

## CONCLUSIONS

Goat production in the Republic of North Macedonia is distinguished by several significant features that contribute to its development. First of all, it is the renewed tradition in the breeding of goats, the favorable climatic conditions, the developed national legislation and the stimulation of farmers, the appropriate health protection of goats and the initial change in consumer habits for the consumption of the products of goat milk and goat meat.

The number of goats varies, but still shows an upward trend. The production of the average quantity of raw milk per goat is moderate, but it is lower than the same in the countries defined as leaders in goat farming.

The purchase price for a liter of raw goat's milk is almost twice lower than the same in other EU countries.

The breed type of the goats that are bred in the country is mostly based on the domestic Balkan goat, and the breeding method is defined as extensive. In certain regions of the country, farmers are more interested in breeding goats.

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