

Review paper

THE STATE AND DEVELOPMENT PROSPECTS OF GOAT PRODUCTION IN THE WORLD

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Abstract

Goats are the most popular animals in the world and goat meat and milk consumption are most widely distributed in the world. Goats are popular with small holders because of their efficient conversion of feed into edible and high-quality meat, milk and hide. Goats are also used as holistic tools for land vegetation management and fire fuel load control. With proper grazing management, goats can eliminate noxious weeds, restore native grasses and prevent fires through fuel load reduction. In the world the number of goats is increasing. However, when it comes to growing goats, the conditions prevailing today are fairly complex. Problems and prospects vary by region, which consequently have different cultural and economic implications. Both global and regional approaches to livestock farming are important from the economic aspect of developed and developing nations. Rapidly increasing goat populations in developing countries point to the goat assisting in solving some of the needs created by the rising human population. Goat farming in Europe also has a more positive outlook after nearly a century of a negative reputation. Dairy-goat farming is significant to the economies of the Mediterranean countries. Dairy goats produce about 15.2 million metric tons (MT) of milk, accounting for about 2% of the world total amount of milk produced by livestock species. The developing countries produce approximately 83% of the total amount. In Europe, goat breeding is strongly oriented towards milk production, with only 3% of the world goat population producing about 15% of the world's goat milk, which is mostly used for cheese production. Goat meat is widely consumed in the developing countries. According to FAOSTAT (2008), total meat inventory is about 280 million MT. Goat meat represents only 2% of this total. The total amount of goat meat produced in 2008 was 4.9 million MT. The developing countries produced approximately 97% of this amount, reflecting the great importance of goat meat to feed millions of people in these countries. The top ten countries producing goat meat are all from Asia and Africa. China is a world leader in producing goat meat, accounting for 38% of the world total goat meat produced. Goat meat production has been increasing from 2.65 million MT in 1990 to 4.93 million MT in 2008.

Key words: *goats, milk, meat, number of goats, production*

Introduction

Globally, the number of goats is constantly increasing. However, despite the fact that this branch of livestock production had the highest growth rate in last 20 years, global situation in regard to goat production in the world shows contradictory situation. On one hand, there are well organized private sectors in several countries which have clearly defined breeding and selection goals in goat production, and have constant progress in production of milk, meat and thread. On the other hand, most of the goat population is mainly used for production of milk, meat, leather or threads in developing countries but without any greater tendencies towards quantitative and qualitative improvement of production. So, milk, and primarily meat, meets the nutritional requirements of rural population in developing countries, especially in those regions with rapid growth of human population (Boiazoglu et al., 2005; Dubeuf et al., 2004; Devendra, 2007). This means that increase of number of goats is no indicator of positive development of productivity, but simply reflects the fact that many people living in rural regions of developing countries are trying to survive by keeping small ruminants, such as goats (Dubeuf and Boiazoglu, 2009; Žujović et al., 2011). Dairy-goat farming is significant to the economies of the Mediterranean countries. Previously, in developed countries, a limited number of high quality goats was raised as a complementary activity. Recently, the market for high-quality cheeses made from goat's milk has been developing and there has been growing interest in intensive cultivation of goats with high milk yield. An example of this is France, with about 1.2 million dairy goats and production of about 40.000 tones of cheese per year, while the production of meat and skin of goats and kids is of secondary importance in the total income of goat production.

Goats live either in small or large herds or in different areas and environments ranging from plains, desert areas, mountain and alpine areas. Table 1 shows the numerical strength of the goats in different parts of the world, as well as their representation in the percentage of the total number (FAOSTAT, 2010). The number of goats has increased by 18.91% in the analyzed period, reaching 867.9 million heads in 2009. Most of the livestock is in Asia (59.5%), followed by Africa (34%), the Americas (4.3%), Europe (1.8%) and Oceania (0.4%), which proves that the highest share is in developing countries where goat milk is a basic food especially for rural population (Table 1).

Table 1. *Number of goats in the world (FAOSTAT, 2010)*

Year	MU	Asia	Africa	America	Europe	Oceania	Total world
1999	Million heads	447.3	227.8	33.7	19.0	2.1	729.9
	%	61.3	31.2	4.6	2.6	0.3	100.0
2009	Million heads	516.7	294.8	37.1	15.9	3.4	867.9
	%	59.5	34.0	4.3	1.8	0.4	100.0

Source:FAOSTAT, 2010

Based on the data presented in Table 1, it is evident that the number of goats in the world is 867.9 million (FAOSTAT, 2010). However, there are huge variations in the distribution and number of goats among different parts of the world. The largest number of goats is grown in

Asia (China, India, Pakistan and Bangladesh have 59.5% of the total goat world population), followed by Africa, 34% of which represents 93.5% of the total number of goats in the world (Table 2).

Table 2. *Top 10 countries based on goat livestock (FAOSTAT, 2010.)*

Country	Number of goats (million heads)	% of the total number of goats in the world
India	154.0	16.7
China	150.7	16.4
Bangladesh	65.0	7.1
Pakistan	59.9	6.5
Nigeria	56.5	6.1
Sudan	43.4	4.7
Iran	25.7	2.8
Ethiopia	22.0	2.4
Indonesia	16.8	1.8
Mali	16.5	1.8
Total world	920.6	100.0

The number of goats in the world has been growing steadily since 1990 from about 1% to 4% annually. In the same period, the number of cattle has increased by 5%, while the number of sheep decreased by 10%. Goat is now considered "poor man's cow". Goats consume a smaller amount of food, take up little space, and according to their size, i.e. body mass, produce enough milk for the needs of an average family, and in relation to the keeping of cows, gain on an increasing popularity.

Milk production

Goat breeds according to milk production can be divided into three groups:

1. Breed of goats belonging to a highly productive improved breeds;
2. The second group of the breeds with an average production, with the potential for high production but whose actual production is decreased due to the conditions of nutrition, care and housing; and finally
3. The third breeds belong to the group with low production that are not regularly milked.

Highly productive goat breeds are originating from the mountain range of the Alps and the Mediterranean area. Typical improved breed of goats are Saanen, Alpine and Toggenburg. Spanish Granada and Malaga which have sufficient milk production are also classified as a dairy breed, along with Nubian (Table 3). The examples of breeds with an average production is the Damascus from the Middle East, as well as the Indian breeds: Jamnapari, Beetal and Barbari. Most of the African, Asian and Latin American goat breeds fall into the third group of goats, where our local goat breeds and their crosses can also be introduced (Memiši, 2000; Memiši and Žujović, 2012).

Table 3. Milk production of certain breeds of goats in the world

Goat breeds	Milk production, kg	% milk fat	Authors
Saanen	720 – 1000	3.4	Fehse and Kunzi, (1998)
Toggenburg	700 – 900	3.3	Fehse and Kunzi, (1998)
Alpine	650 – 900	3.4	Gall (1982)
Appenzell	670	3.1	Fehse and Kunzi, (1998)
Chamois Coloured	758		Fehse and Kunzi, (1998)
German White Improved	1126	3.6	Gall (1982)
Poitou	700	3.0	Gall (1982)
Murcia Granada	500	4.0 – 4.5	Falagán and Mateos (1996)
Maltese	500 – 600		Gall (1982)
Israeli Saanen	650		Gall (1982)
Damascus	400 – 600	3.5	Constantinou (1985)
Jamnapari	540	3.5 – 4.5	Gall (1982)
La Mancha	800	4.0	Gall (1982)
Domestic breeds and genotypes of goats			
Domestic Balkan	180	3.7	Memiši (1998 and 2000)
Domestic Serbian White	400	4.0	Žujović (1988)
Domestic crossbreds	250 - 350	3.5 – 4.0	Memiši and Bauman (2002, 2003)

The use of goat milk as an excellent food source is undeniable. It has beneficial effects for health maintenance, physiological functions, nutrition of children and elderly people, and according to some authors, can be consumed without negative effects by people suffering cow milk allergy. Goat (*Capra hircus*) milk production is of significant importance to the economy and survival of large populations of many countries in the world: in developing countries (i.e. Asia, Africa, the Middle East and Mediterranean countries and South America) as well as in developed countries (i.e. Europe, North America and Oceania) (Billon, 2003; Albenzo et al., 2006).

Dairy goats produce about 15.2 million metric tons (MT) of milk, accounting for about 2% of the world total amount of milk produced by livestock species (FAOSTAT, 2008). The developing countries produce approximately 83% of the total amount. In Europe, goat breeding is strongly oriented towards milk production, with only 3% of the world goat population producing about 15% of the world's goat milk, which is mostly used for cheese production. Table 4 shows the amount of goat milk produced by the top ten countries in the world, along with the total number of dairy does and the average of milk produced per doe (FAOSTAT, 2008).

The largest amount of goat milk is produced in India, followed by Bangladesh and Sudan. China, India, Pakistan, Indonesia and Bangladesh together contribute 78% of the total small ruminant population in Asia (Talpur et al., 2009). In Pakistan, the Damani and Kamori breeds are popular, while in other countries popular breeds are Barbari, Beetal, Jamnapari, Malabar, Damascus, Barky and Black Bengal (Talpur et al., 2009).

Table 4. *The amount of goat milk produced in the top ten countries (FAOSTAT, 2008)*

Country	Goat milk production (million MT)	Number of dairy goats (million)	Milk produced per dairy doe (kg)
India	4.0	30.2	132.5
Bangladesh	2.2	27.1	80.0
Sudan	1.5	-	-
Pakistan	0.7	4.9	141.9
Spain	0.6	1.4	422.3
France	0.6	0.8	703.8
Greece	0.5	4.1	123.9
Iran	0.4	13.7	29.9
Somalia	0.4	6.6	59.7
China	0.3	1.4	194.8

Goat farming is of vital importance for the national economy in many countries in the Mediterranean and Middle East region, and is particularly well organized in France, Italy, Spain and Greece (Park et al., 2007). Among the European countries, Greece is the first in goat population (6,000,000 animals) and produces about 450,000 t of goat milk per year (Kondyli et al., 2012). France has nearly 1 million goats and occupies the first place in the European Community in terms of milk production. Turkey has the largest goat population in Europe (5,600,000 t in 2009) and is the fourth in total goat milk production (192,000 t in the year 2009) in the European and Mediterranean region, after France, Spain and Greece (FAOSTAT, 2009). In France, interest in dairy goats has led to the establishment of organized programs for selection, processing and commercialization of goat milk, which is produced mainly from Saanen and Alpine breeds. France leads the list in terms of the annual milk production per dairy doe, while Iran reports the lowest milk production per dairy doe. China has the largest total number of goats in the world with 195.6 million, but they are mainly kept for meat production (Olivijer et al., 2005), followed by India with 120.0 million, and Pakistan 56.7 million.

Table 5. *Increase in the production of goat milk and cheese in the period from 1985 to 2005, Source: FAOSTAT (2006)*

	2005		1985	
	Cheese	Milk	Cheese	Milk
Europe	180	2.5	132	1.7
Asia	99	6.7	113.7	4.1
America	17.8	0.37	33.96	0.48
North and Central A.	13.8	0.19	30.06	0.32
South A.	4.0	0.18	3.9	0.16
Africa	122	2.8	35	1.8
Total in world	437.8	12.4	343.32	8.4

By the amount of milk produced per goat (194.8 kg), China is on the third place just behind France and Spain. China officially reports 1.4 million dairy goats producing 0.3 million MT of milk (FAOSTAT, 2008). Since 1990, interest in dairy goats has been steadily increasing, as

manifested by the increase in milk production from about 10 million MT in 1990 to about 15.2 million MT in 2008. The dairy goat industry has great potential for further growth.

Meat production

In many countries, especially in Asia and Africa, goat and caprine meat have great importance in the diet of the population. Because of its high biological value, caprine meat is increasingly required in highly developed countries (Todaro et al., 2004). Production of goat meat in the world, although it is four times smaller than the meat of sheep, is of great importance for many countries, especially in Asia, Africa and South America (Dubeuf et al., 2004). In EU countries the production of goat meat is of much less importance and scope, especially in the countries where there are grown dairy goat breeds in which the meat is a by-product. It is estimated that the goat meat in Europe makes about one tenth of the total quantity of sheep meat. Greece, Spain, Italy and France are the largest producers of these types of meat products because they produce two thirds of the total quantity of goat meat in Europe (Webb et al., 2005).

Table 6. *The amount of goat meat produced in the top ten countries, number of animals slaughtered and the average amount of meat produced per animal (FAOSTAT, 2008)*

Country	Total meat (million MT)	Number of animals slaughtered (million)	Average meat produced per animal (kg)
China	1.8	133.3	13.7
India	0.5	47.8	10.0
Nigeria	0.3	21.3	12.7
Pakistan	0.3	15.4	17.0
Bangladesh	0.2	30.0	7.0
Sudan	0.2	14.5	13.0
Iran	0.1	7.6	14.0
Indonesia	0.1	6.6	10.0
Ethiopia	0.1	7.6	8.5
Niger	0.1	4.4	12.0

Due to the long-standing prohibition of goats keeping which has been in force since 1954 (unique law in the world that has been adopted in the former Yugoslavia), on the territory of the Republic of Serbia there has not been paid special attention to the production of goat meat, nor any statistical data on the number of production of goats have been produced. Although on the territory of Serbia, the basic product is a goat milk, meat production should not be ignored either. It should properly utilize high biological potential of goats for good fertility (Memiši et al., 2001). Goat is known as the most prolific ruminant, which many breeders use to increase a caprine meat production by forcing goat fertility and creating a race that can on average produce 2-3 young goats annually. This ability in goats may very well take advantage of the sequential kidding, and this is where the caprine meat production is more profitable than milk production, and where, there may be the reason for a lack of interest for the production of milk, or the conditions for organized sale of large quantities of milk or for a milk processing (Memiši and Bauman, 2002a and 2007; Memiši et al., 2004).

Goat meat has about the same nutritional value and digestibility as sheep milk (to put it more exact: more protein and less fat compared to sheep meat). It is still less appreciated because of specific smell and flavor, especially if the animal is older. On the basis of chemical composition, caprine and goat meat, in terms of nutritional and biological value is not inferior to other types of meat in other types of livestock for slaughter.

Table 7. Top exporters of goat meat

Country	Goat meat production (million tonnes)	%
Australia	16.431	50
China	3.999	12.1
France	2.628	8
New Zealand	1.198	3.6
Industrialized countries	21.194	64
World	33.087	

Source: FAOSTAT (2005)

Goat meat is widely consumed in the developing countries. According to FAOSTAT (2008), total meat inventory is about 280 million MT. Goat meat represents only 2% of this total. The total amount of goat meat produced in 2008 was 4.9 million MT. The developing countries produced approximately 97% of this amount, reflecting the great importance of goat meat to feed millions of people in these countries. The top ten countries producing goat meat are all from Asia and Africa (Table 6). China leads the world in producing goat meat accounting for 38% of the world total goat meat produced. Goat meat production has increased from 2.65 million MT in 1990 to 4.93 million MT in 2008.

Table 8. Top importers of goat meat

Country	(MT)	%
U.S.	9.551	18.2
China	5.709	10.9
Italy	1.451	2.8
Canada	1.374	2.6
France	1.151	2.2
Industrialized countries	16.097	30.7
World	52,477	

Source: FAOSTAT (2005)

Australia leads goat meat export in the world with 16.431 MT and 50% of the total world market. China, France and New Zealand claim 12.1, 8.0 and 3.6% of the world market respectively (Table 7).

Total goat meat imported in the world is 52,477 MT. Top importers of goat meat are the United States with 18% of the market, followed by China with 10.9% and Italy, Canada and France, each about 2% of the market (Table 8).

Conclusion

Geographical conditions that have been deteriorating due to global warming will probably further increase the importance of goat industry in the future. Although the goats have been the most defamed domesticated animals in many countries they have played an important role in human nutrition, wellbeing and survival. In Europe, the decline in goat number is compensated by an increased milk and meat performance with a positive impact on the continent contribution to the world goat milk.

While in the developing countries goat milk and meat will continue to be a basic food for rural population, in the developed ones the goat milk processing will continue to be a priority because of the increased demand for dairy products.

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