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RESUME - «La production laitiere caprine». L'élevage des chèvres tient une place importante dans le bassin méditerranéen. La production du lait qui est de 6,3 kg. par tête a augmenté de 1,6 kg. depuis un siècle. Bien que la population de chèvres ait diminué de moitié depuis une cinquantaine d'années, il est possible de considérer que la chèvre gardera une place dans la vie des populations rurales. Des programmes d'amélioration génétique sont appliqués aux races de chèvres locales dans différents pays où les éleveurs bénéficient de chèvres sélectionnées. La production laitière est essentiellement valorisée sous forme de fromage, 63% en Italie, 70% en Grèce, 95% en Turquie. Le système d'élevage extensif peut être considéré comme un système agro-silvo-pastoral.
Mots-clés: Caprins, système d'élevage, amélioration génétique, fromage.

ABSTRACT - The goats have a specific place in the animal agricultural economy of the Mediterranean region. The annual per capita goat milk production of 6.3 kg. in the region will drop to the present world value of 1.6 kg. approximately after a century. It will take more than half a century for the region's goat population of 40.6 million to be halved. It seems that the goats will continue to contribute greatly to the livelihood of the rural people keeping them for many years to come. There are government programs to improve the genotype of the native goat breeds. The general practice is the distribution of purebred or crossbred male breeding animals to the goat farmers. In Greece, Italy and Turkey the percentages of goat milk made into cheese are about 70,63 and 95 percent respectively. The development of the present extensive goat production system within the framework of a silvo-agro-pastoral system appears to be the optimal approach.
***Key words:** Goats, breeding system, genetic breeding, cheese.*

Introduction

There are important reasons to justify the efforts being spent and to be spent to increase the production of milk and meat from the goats in especially developing Mediterranean countries.

First of all, the human population is increasing steadily and as a consequence the need for more animal protein is growing. To increase the production of animal products, the present animal stock and natural vegetation should be utilized as efficiently as possible. In the mediterranean countries the amount of precipitation and the higher atmospheric temperatures do not permit the development of pastures capable of meeting the roughage requirements of the European dairy cattle breeds. The development of dairy cattle production projects requires the expansion of the irrigated areas allocated for roughage production. This, in turn demands more investment for such projects. Therefore dairy cattle could be employed to meet the demand for milk and milk products of the large urban centers. In those parts of the countries where the natural vegetation and the geophysical properties of the terrain is not suitable for other livestock species but goat, there seems to be no better solution than to improve the milk and meat yield of the goats to raise the living standards of the inhabitants.

The role of goats in food production for humans is very well treated by many researchers (among many others, DEVENDRA 1987, FLAMANT 1983, GALAL 1987a, GALL 1975, MAHJOUB et al. 1987, SHKOLNIK et al. 1987, STEINBACH 1987). Based on the knowledge accumulated about the characteristics of goats one can confidently say that the goats have a specific place in the animal agricultural economy of the Mediterranean region. These characteristics can be summarized as follows: The goats of dry and hot climates can withstand heat stress and can endure prolonged water deprivation. They can utilize poor quality feeds such as shrubs and can cover long distances to find food. Their peculiar feeding habits makes it easier to choose diets to meet their feed requirements. They are the only livestock species that can utilize the Mediterranean shrub vegetation efficiently. They have an astonishing adaptability to adverse climatic and geophysical conditions. The goat is the most prolific domesticated ruminant. There are many «improver» breeds with regard to milk, meat and prolificacy. As a result, in the Mediterranean region the goats are raised in various systems of production ranging from the very extensive systems of North Africa to the intensive and sometimes large-scale goat operations of 100 to 1,000 goats of France.

In this report I would like to examine the trends in goat

milk production in the Mediterranean zone and give some information on the characteristics of the breeds contributing to the milk production. The other topics to be dealt with are genetic improvement programs carried out by the governments, milk collection process, goat milk products with an emphasis on cheese and the prospects for the evolution of the extensive system for milk and cheese production.

Trends in goat milk production

In order to study the trends in goat milk production in the world, in the Mediterranean region as a whole and by countries the Table I was prepared. The world milk production reached about 520 milyon tons in 1986 with an average annual increase of 1.94 percent since 1970. This figure is slightly behind the average annual growth in human population of 2.07 percent over the same period.

The world goat milk production in 1986 was about 7.7 million ton with an annual increase of 1.65 percent and constitutes 1.5 percent of the world total milk production.

In the Mediterranean countries the total milk production in 1986 was 74.1 million tons and the 3.2 percent of this or 2.4 million tons came from goats. Between 1970 and 1986 the average annual increase in the total milk production was 1.8 percent and that in goat milk production was 0.79 percent.

In the region the contribution of the goat milk to the total milk supply is twice as much of that in the world. The annual per capita goat milk production is 6.3 kg. in the region compared to that 1.6 kg. in the world. The per capita goat milk in the world was almost constant over the period studied, but that in the region decreased at a rate of 0.7 percent a year and if this trend continues it will drop to the world level after a century. Furthermore it will take over half a century for the percentage contribution of the goat milk to the total milk to come down to the 1986 figure for the world (i.e. 1.48 percent).

While the goat population in the world has shown an annual increase of 1.37 percent between 1970 and 1986 reaching 492.2 Milyon; it declined to 40.6 Milyon from 46.1 Milyon in the region during the same period with an annual decrease of 0.75 percent; if the same trend continues it will take more than half a century for the region's goat population to be halved. Considerable declines in the goat populations have occurred in Morocco and Turkey, while marked increases have taken place in Egypt, Greece, Libya, Syria and Tunisia.

It can be concluded from the above analysis that the goats will continue to supply milk and other products to the human population in the Mediterranean countries for many years to come. More than this they will continue to contribute greatly to the livelihood of the rural people keeping them. With the development of the government programs for breed improvement, teaching better management, input supply, control of infectious diseases, milk collection and processing and marketing, the incomes of the goat keepers may be increased.

The breeds and genetic improvement programs

The study of milk production from goats would be incomplete without reviewing the breeds constituting the population.

In the extensive production system mainly native breeds are raised. The animas are concentrated in and around the forest in some of the Mediterranean countries (e.g. in Turkey). In Turkey they have been considered as a potential hazard to the forest for over a century and various regulations have been put into effect by the government to control the grazing in the forest and in the ranges located within the forests. Currently a regulation is also in effect.

The practical solution repeatedly proposed by the animal scientists is to improve the milk producing ability of the native goats and obtain a desired amount of milk and other yields from much les number of goats (EKER 1961, YARKIN and EKER 1961, SÖNMEZ and SENGONCA 1964, EKER and TUNCEL 1972, ELLIÇIN et al. 1976, ÖZCAN et al. 1976, EKER et al. 1978,ÖZCAN et al. 1986). This is the leading idea to the crossbreeding experiments with goats to attain suitable improver genotypes. In Turkey, experiments on the dairy goats started in 1954 with the establishment of a herd of native dairy goat «Kilis» at the Department of Animal Science, Faculty of Agriculture in Ankara.

Starting in 1961 the Saanen breed was used as the improver breed and crossed with the Kilis breed and the crossing was terminated after obtaining first backcrosses (3/4 Saanen, 1/4 Kilis). Afterwards the backcrosses were bred among themselves. The resulting dairy goat was named Ak keçi «White goat», and has become the most popular improver genotype in Turkey and was used in the establishment of dairy goat herds in two state farms in the Mediterranean coastal area. This genotype has also constituted one of the sire breeds used in the development of improver genotypes at the Faculty of Agriculture in Adana in the same region (ÖZCAN et al. 1976, ÖZCAN 1977). Other foreign breeds which are used in the crossbreeding work at this Faculty are Damascus and German Improved Fawn (ÖZCAN et al. 1986).

Studies on the adaptability of the Saanen breed were started at the Faculty of Agriculture in Izmir in 1959 (SÖNMEZ and SENGONCA 1964). In the crossbreeding experiments carried out at this Faculty Saanen x Hair goat and Malta x Hair goat first crosses and backcrosses were obtained and their performances compared.

The popular goat breeds contributing to the milk supply in Turkey and in some other Mediterranean countries are briefly described in Table 2.

An effort has also been made to gather information on the government programs for genetic improvement. Notes on this subject are also included in Table 2. General practice in the countries, about which information was available, is the distribution of purebred or crossbred male breeding animals to the goat farmers.

Milk collection process

One of the major constraints in the development of small ruminant production in the extensive production system is the marketing of milk and milk products (GALL 1975, QURESHI 1978 an STEINBACH 1987).

GALL (1975) has described nicely the handling and marketing of milk in the extensive production system. His description in general applies to Turkey as well. In this system the amounts of milk produced are not very much and are further reduced by some home consumption in the form of various milk products. Quite often the producers bring their milk products such as cheese, butter and yogurt to the markets in the small cities and towns. The other practice for the marketing of milk is through the merchants collecting and processing the milk. Such small-scale cottage-type operations are common in particularly Eastern Turkey. The operators often set up their units at the villages and have strong relationships with the producers. They usually contract and pay in advance for the season's production. In this system hygienic conditions of milk processing is not satisfactory and as consequence the quality of the products is subject to wide variation. The solutions are also suggested by GALL (1975). One practical alternative is to improve the established system in which both the producers and the dealers are supported with credit and given technical assistance for the improvement of production and processing.

In the past an experimental movile cheese-making unit has been tried out in Lebanon (WESTERGAARD, 1972). In recent years a similar approach has been put into practice in Turkey by the Türkiye Kalkinma Vakfi. Presently milk collection and procesing are carried out in many villages of two provinces of Eastern Anatolia and of one province of East-Central Anatolia. The most of milk handled is sheep milk followed by cow and goat milk. The main features of milk collection are as follows: [1].

Each village is a milk collection unit: The producers are supplied with clean plastic 28-30 liters containers to carry milk to the collection unit: The unit is stationed by a water source under a tent and the full milk churns are replaced by clean ones when the milk is collected. Milk in the churns is cooled to 15º C in cooling pools filled with water obtained from the water source and having a temperature of 11-12º C. Hydrogen peroxide is added to the milk brought from far distances. The density and PH of the milk is measued at the colletion point. Currently there are 50 collection units and it is planned to set up four three-ton and two five-ton cooling tanks operating with diesel-generators in one of the provinces in the East.

It is hoped that similar services be extended to goat milk producers in other regions of the country and in other countries of the Mediterranean region having comparable problems associated with the collection of goat and ewe milk.

1. Alpar, O. Türkiye Kalkinma wakfi, Ankara; personal communication.

Goat milk products

Many dairy products can be made from the goat milk. Among these the following have been listed (ADAM 1972, LOEWENSTEIN et al., 1980): Cheese, yogurt, frozen yogurt, butter, beverage milk, ice cream, condensed, evaporated or dried milks and kefir.

By leaving the goat cheese to the end of this section for a broader treatment, I'll first deal with the goat milk products consumed in Turkey and some experiences acquired about them.

Yogurt, butter and ice cream are the products other than cheese made from goat milk in Turkey which are worth mentioning. Dairy researchers have experienced that yogurt made from whole goat milk is not very satisfactory. [1,2] however goat milk yogurt is consumed locally in the regions where goat keeping predominates. General practice of the merchants collecting and proccesing milk is mixing the goat milk with sheep milk in the proportion of 5-10% before processing it into cheese, yogurt and butter. [3]

Butter from goat milk is also locally produced. It is said that the Mutki district of Bitlis Province in the Eastern Anatolia is the main goat milk butter producing locality in Turkey [3]. The goat milk butter is whiter than the cow milk butter. In the provinces of Gaziantep and Sanliurfa goat milk butter is melted together with the sheep milk butter and supplied to the market under the market name «Urfa yagi» (butter) According to the comments of the local people the dishes and desserts prepared with goat milk butter are very delicious (ADAM 1972).

In the city of Kahraman Maras of the Mediterranean Region ice cream is made exclusively from goat milk and Kahraman Marais-ice cream is quite popular in many large cities of Turkey. However outside of Kahraman Maras it is generally made from cow milk. [2]

There is also some research on making kefir in Turkey. If goat milk is processed into Kefir a good quality product can be obtained.[1] KAPTAN and GURSEL (1983) cites from KEOGH (1976) that the best quality kefir can be made from goat milk.

All over the world the primary dairy product obtained from goat milk is cheese. LOEWENSTEIN et al. (1930) reported that in 1979 a large portion of the world's production of goat milk was made into cheese. They also report that there are description of over 400 varieties and a list of over 800 names of cheeses; and that a great number of these are, or can be made from goat milk or from combinations of goat milk with milk from the cow, ewe or buffalo.

1. Konar, A. Çukurova Universitesi, Adana; personal communication.

2. Koçhisarli, I. Ankara Universitesi, Ankara; personal communication.

3. Bahçivan, M. Bahçivan Gida Sanay ve Ticaret Anonim Sirketi, Istanbul; personal communication.

Table 1
TRENDS IN GOAT MILK PRODUCTION

COUNTRY	MILK PRODUCTION			GOAT MILK PRODUCTION			MILK PRODUCTION			GOAT MILK PRODUCTION			GOAT MILK			GOAT POPULATION		
	...Thousand metric tons...						...Kg./yr per			capita...			in % of milk prod...			1000 Head		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
WORLD	397,175	520,590	1.94	6,084	7,692	1.65	107.5	105.9	—0.09	1.6	1.6	0.00	1.53	1.48	—0.20	403,895	492,192	1.37
MEDITERRANEAN COUNTRIES	65,970	74,147	1.88	2,091	2,356	0.79	192.8	199.8	0.23	7.1	6.3	—0.70	3.67	3.18	—0.83	46,137	40,583	—0,75
Albania	224	417	5.39	36	31	—0.87	104.7	133.9	1.74	16.8	10.0	—2.53	16.07	7.43	—3.36	868	700	—1.21
Algeria	512	900	4.74	123	164	2.08	37.2	40.1	0.49	8.9	7.3	—1.12	24.02	18.22	—1.51	2,546	3,090	1.34
Cyprus	68	143	6.89	29	40	2.37	110.6	211.5	5.70	47.2	59.2	1.59	42.65	27.97	—2.15	340	360	0.37
Egypt	1,607	2,347	2.88	6	9	3.13	48.6	48.9	0.04	0.2	0.2	0.00	0.37	0.38	0.17	1,166	2,700	8.22
France	28,514	35,241	1.47	304	454	3.08	561.6	636.4	0.83	6.0	8.2	2.29	1.07	1.29	1.29	923	969	0.31
Greece	1,353	1.642	1.33	348	400	0.93	153.9	164.7	0.44	39.6	40.1	0.08	25.72	24.36	—0.33	4,063	5,600	2.36
Israel	495	906	5.19	29	22	—1.51	166.4	211.0	1.68	9.8	5.1	—3.00	5.86	2.43	—3.66	137	127	—0.46
Italy	10,080	11.664	0.98	136	130	—2.76	187.3	203.8	0.55	2.5	2.3	—0.50	1.35	1.11	—1.11	1,032	1,189	0.95
Lebanon	95	150	3.62	21	42	6.25	38.5	55.0	2.68	8.5	15.4	5.07	22.11	28.00	1.66	357	460	1.80
Libya	50	130	10.00	13	17	1.92	25.2	34.8	2.38	6.5	4.5	—1.92	26.00	13.08	—3.11	1,222	1,705	2.47
Malta	28	30	0.45	5	1	—5.00	85.9	77.7	—0.60	15.3	2.6	—5.19	17.86	3.33	—5.08	17	5	—4.41
Morocco	493	910	5.29	25	35	2.50	32.2	40.5	1.61	1.6	1.6	0.00	5.07	3.85	—1.50	8.467	4,700	—2.78
Portugal	721	978	2.23	25	41	4.00	83.6	95.2	0.87	2.9	4.0	2.37	3.47	4.19	1.30	668	750	0.77
Syria	472	1,177	9.34	57	76	2.0	75.4	108.0	2.70	9.1	7.0	—1.44	12.08	6.46	—2.91	759	1,075	2.60
Spain	5,000	7,294	2.87	306	360	1.10	148.0	188.1	1.69	9.1	9.3	0.14	6.12	4.94	—1.21	2,656	2,828	0.40
Tunisia	191	324	4.35	25	10	—3.75	37.3	44.8	1.26	4.9	1.4	—4.46	13.09	3.09	—4.77	627	1,100	4.71
Turkey	4,308	5.154	1.23	603	524	—0.82	122.0	102.4	—1.00	17.1	10.4	—2.45	14.00	10.17	—1.71	20,129	13,100	—2.18
Yugoslavia	2,759	4,740	4.49	—	—	—	135.4	203.7	3.15	—	—	—	—	—	—	160	125	—1.37

(1) 1969-71 (2) 1986 (3)% anual change (4) estimated.
Source: F. A. O., 1980 and 1986 Production Yearbooks.

Table 2

THE BREEDS BY COUNTRIES AND GENETIC IMPROVEMENT PROGRAMS

COUNTRIE	The composition of the goat population (Heads)	Milk yield average (Kg.)	Reproductive rate (Kids/goats)	Age at first breeding (months)	Government programs for genetic improvement
CYTRUS					Damascus bucks bred at the government farms distributed to the goat breeders.
Northern Cyprus[1]					
Native goats	18.900(2)	500-600			
Purebred Damascus	3.150(2)				
Damascus native crosses	40.950(2)	(goods animals)			
Soutern Cyprus[2]					
Indigenous goats	86.400(2)	—	1.75-2.25	8-10(1)	— Genetically superior stock from elite government flocks distributed to farmers.
Purebred Damascus	46.800(2)	500-600			— Assistance in building up multiplication flocks, and in helping in the distribution of improved animals to farmers.
Damascus local crosses	226.800(2)				
EGYPT[3]					
Baladi	majority	97-127 (in 5 months)	1.96		— Distribution of Damascus and F buks to selected producers in[1] the northwestern coastal desert.
Barki	269.000	64 (in 5 months)	1.20		— Distribution of anglo-Nubian or Anglo-Nubrian crossbred bucks to small holders in upper Egypt.
Nubi (Zaraibi Theban)	rarest among the improved breeds	86 (in 19 wks.)	1.45-1.55	13-14	
Wahati	minor breed	30-40	2.2		
GREECE [4,5]	85% nondescript	219,9 (intensive system 91,8 extensive system)			
The island of Cephalonia					
Local Greek breed	the results on the 92% of the Island goat population	92.0	1.2	15-19	

(1) When fed adequately.
(2) Estimated from percentage values.

Table 2 (Continued)[1]

COUNTRIE	The composition of the goat population (Heads)	Milk yield average (Kg.)	Reproductive rate (Kids/goats)	Age at first breeding (months)	Government programs for genetic improvement
TUNISIA [6]					
Local breed	935.000(2)	150	1.47-1.51	18	— Distribution of male breeding animals to Tunisian goat farmers.
Nubian	110.000(2)	250	—	18	
Maltese	49.500(2)	400	—	18	
Foreign breeds	5.500(2)	Up to	—	18	
Alpine		600	1.36		
Saanen			1.29		
Boer			2.00		
TURKEY [7,8,9,10]					
Hair goat	10.955.000	50-60	1.04	18-20	Distribution of Ak Keçi bucks to the goat breeders in the provinces along the Aegean and Mediterranean sea. Additionally in the province of Manisa Toggenburg bucks, in the province of Adana Ak Keçi Hair goat and Damascus bucks distributed, German Improved Fawn hair goat bucks planned to be distributed in 1989.
Angora goat	2.219.400	20-25	1.05	30	
Dairy goats	100.000				
Kilis	—	280-327	1.27-1.42	18-20	
Maltese	—	226	1.84	18-20	
Ak Keçi (White Goat)	—	380-718	1.75	18-20	
YUGOSLAVIA [11]					
Serbian republic with Vojvodina and Kosova provinces	Total population 130.000	355 liters (1619 goats in 4 cooperative farms).			

Sources: (1) Soygen 1988, (2) Economides 1987, (3) Galal 1987b, (4) Anafantakeas and kalatzopoulos 1987.
(5) Yannakopoulos and Tserveni 1986, (6) Mahjoub et al. 1987, (7) Tuncel and Yener 1983.
(8) Tuncel and Bayindir 1983, (9) Sengonca 1974, (10) Yarkin and Eker 1961, (11) Antic et al. 1987.

Table 3

TRENDS IN TOTAL CHEESE PRODUCTION

COUNTRY	TOTAL CHEESE PRODUCTION					
	...Metric tons...			...Kg./yr. per capita...		
	(1)	(2)	(3)	(1)	(2)	(3)
WORLD	7,667,886	13,399,414	4.67	2.08	2.73	1.95
MEDITERANEAN COUNTRIES	1,975,892	3,115,919	3.61	6.69	8.40	1.60
Albania	6,233	13,200	6.99	2.92	4.2	2.83
Algeria	403	968	3.76	0.03	0.04	2.08
Cyprus	8,837	13,150	3.05	14.37	19.45	2.21
Egypt	204,127	302,500	3.01	6.18	6.30	0.12
France	779,667	1,283,000	4,03	15.36	23.17	3.18
Greece	141,641	194,000	2.31	16.11	19.46	1.30
Israel	31,547	66,475	6.92	10.61	15.48	2.87
Italy	469,533	666,044	2.62	8.72	11.64	2.09
Lebanon	7,166	11,154	3.48	2.90	4.09	2.56
Libya	—	—	—	—	—	—
Malta	239	79	—4.18	0.73	0.20	—4.54
Morocco	3,951	6,396	3.87	0.26	0.28	0.48
Portugal	22,715	40,960	5.02	2.63	3.99	3.23
Syria	26,486	57,283	7.27	4.23	5.26	1.52
Spain	79,526	173,000	7.35	2.35	4.46	5.61
Tunisia	979	4,160	20.31	0.19	0.57	12.50
Turkey	93,509	139,250	3.06	2.65	2.77	0.28
Yugoslavia	99,333	144,300	2.83	4.88	6.20	1.69

(1) 1969-71 (2) 1986 (3) % annual chage.
Source: F. A. O., 1980 and 1986 Production Yearbooks.

It is difficult to find statistics on the production of cheese from goat milk. Only statistics I was able to find was about the production in Greece such that of the total cheese production in 1980 about 26% or 43837 tons were produced from goat milk (ANUFANTAKES and KALATZOPOULAS 1987). It is also reported that in this country, 70% of ewe and goat milk is used for cheese (NIKITOVIC and LAZARAVIC 1987). In Italy 63% of goat milk is used for cheesemaking and the rest is used for kid feeding or direct human consumption (GAIFAMI 1986).

In Turkey also, a great part of goat milk is made into cheese. The written communication with the provincial Agricultural Directors has shown that in some of the Aegean and Mediterranean Provinces over 95% of milk is used for cheesemaking. White cheese made from goat milk by the village women is not generally of desirable quality having a hard texture with eyes. A doctorale thesis has been prepared at the Faculty of Agriculture of Ankara University to determine the appropriate process in making white cheese from goat milk (KOÇHISARLI 1982). In this study the different combinations of pasteurization, fat percentage, renneting temperature and coagulation period affecting the manufacture of cheese have been tested.

The sample of cheese receiving the highest score with regard to organoleptic properties by the end of the first month or ripening had the following manufacturing characteristics: Pasteurization at 75º C for 20 seconds; milk fat percentage, 1.5; renneting temperature 25º C; coagulation period, 90 minutes.

At the end of the second month of ripening, the sample of cheese having the highest organoleptic score had the following manufacturing characteristics: Pasteurization at 75º C for 20 seconds; milk fat percentage, 2,5; renneting temperature, 20º C; coagulation period, 120 minutes.

Cheese yields determined after taking from the press and cutting, have ranged between 11.27 and 14.16%. The author cites from PAIX (1975) that at the end of the ripening period the cheese yield obtained from goat milk is 10%.

In order to examine the trends in total cheese production in the world and in the Mediterranean countries, the Table 3 has been prepared. In 1986 the total cheese production in the world and in the Mediterranean countries are 13,399,414 tons and 3,115,919 tons (23,3% of world production) respectively.

Rough estimations regarding the proportion of total cheese production coming from goat milk can be obtained for the world and for the Mediterranean countries by assuming that 70% of the goat milk is processed into cheese and that cheese yield is 10%. Based on these assumptions the relevant estimations are 538,440 tons for the world (4,02% of total) and 164,920 tons (5.29% of total) for the Mediterranean countries (figures are for the year of 1986). It should be remembered that the estimations may not give the actual goat cheese yield, because the goat milk used for making cheese may have been mixed with milk from sheep, cow or buffalo.

The average annual per capita total cheese production in the Mediterranean area is 8.40 kg. compared with the world figure of 2.73 kg. The three countries ranking high in per capita production are France, Greece and Cyprus with values of 23.17, 19.46 and 19.45 kg. respectively; those three ranking low are Morocco, Malta and Algeria with values of 0.28, 0.20 and 0.04 kg. respectively.

The prospects for the evolution of the extensive system for milk and cheese production

It can be said that presently the extensive goat production system in the Mediterranean region is not operating at its optimum. Because at present the system is undeveloped and there are limitations to its development such as lack of knowledge of goat owners about the potential productivity of their animals, lack of economic and/or social incentives and lack of services to the producer (STEINBACH 1987). To speak of optimum operation these limitations need to be lifted. By doing so it would be possible to raise the standard of living of goat keepers; to stop their emigration to urban centers and to increase the supply of animal products to the urban population.

Particularly the developing countries of the region have to use their natural and economic resources optimally. This means that they should have polices and programs to eliminate the constraints mentioned above. This necessity by it self is a driving force for the development of the extensive goat production system.

On the other and the concern in some countries e. g. Turkey, the Balkans, Greece, Italy and Israel about damaging effects of goats on trees and woodlands have the tendency to reduce the dimensions of the system.

In these premises the development of silvo-agro-pastoral systems appears to be an optimal approach (STEINBACH 1987).

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