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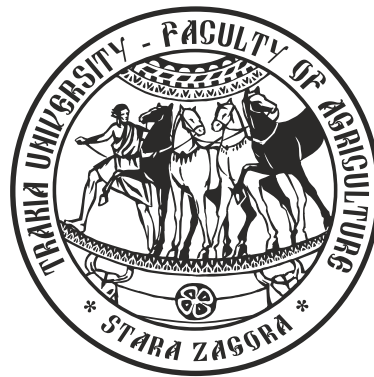
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## Study on the continuity of farmer`s breeding activity with Patch Faced Maritza sheep breed

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(Manuscript received 4 June 2018; accepted for publication 2 October 2018)

**Abstract.** *The aim of this study was to analyze tendencies in the population of Patch Faced Maritza sheep breed and estimation of sustainability of the breeding program for this breed by analyzing continuity of farmer`s breeding activity. Patch Faced Maritza sheep breed is a local Bulgarian sheep breed typical for lowland regions of South Bulgaria and could be successfully used as local genetic resource in productive strategies for milk and meat production. Data about breeders and population structure of the breed during 27 years (1991-2017) were provided by the breeding association of Maritza sheep breed. The changes in the population structure during the 2005-2017 were tracking. The number of breeders included in the breeding program was increased from 10 to 88 herds. This positive trend in the population and increased farmer`s interest to participate in the breeding program were due to government programs for supporting sheep farming and preserve many indigenous sheep breeds that are part of agricultural heritage. The increased number of herds included in the breeding program led up to enlarge active population in three main reproductive categories: ewes, rams and breeding lambs. Comparatively small number of ewes, rams and breeding lambs which in 2005 were respectively 375, 13 and 180 run to 7678, 493 and 1868 in 2017. This enlarge of active population was achieved by three ways: joining farmers which kept Patch Faced Maritza sheep but not participating in official breeding program of the breed, increasing the breeding lambs for replacement rate and limited upgrade crossing. On the based breeding activity contracts with farmers it was estimated continuity of breeding activity in two categories of breeders: finished breeding activity with the breed and continuing with active breeding activity with the breed. The causes for discontinuing of active farmers breeding work were analysed. A total number of farmers which finished breeding activity was 54 for 27 years. Averaged continuity of farmer`s breeding activity was 4.26 years. The analysis of this information find out five reasons for discontinuing farmers breeding activity: disinterest, death, old age, switching to another business, and changing the breed. From the listed reasons the most important are switching to another business 23 farmers and disinterest for active breeding work 17 farmers. The most important fact results nowadays is the fact that Patch Faced Maritza sheep is occurred already in 11 regions in Bulgaria, although 74.11% of the population is situated in two regions Plovdiv and Pazardzhik.*

**Keywords:** Patch Faced Maritza sheep, breeding activity, continuity, trend, sheep farming

### Introduction

According to the second report on the state of the world's animal genetic resources (second SoW-AnGR) 1382 sheep breeds exist in the world (FAO, 2015) and 83.57% are classified as local and locally adapted. The second SoW-AnGR also signalled that until to 2014, 160 sheep breeds are disappeared. There are many different reasons why some of the breeds disappear. Globally this leads to a loss of biodiversity on the planet, because the breeds of farm animals are part of agro-biodiversity.

To 2016 in Bulgaria are breeding 34 sheep breeds: 10 exotic, 18 local and 6 locally adapted. Most of the local sheep breeds in the country have developed breeding programs for their conservation as genetic resources, as they have different risk status. The breeding program for each breed is the main factor for its survival and development and grounds for official recognition of the breeding organization. The sheep breeding activity includes complex of specific activities that provide reproduction of breeding males and females animals. These activities comprise identification and registration of animals from active part of population, keeping register and pedigree book, recording of traits subjects of selection and breeding value estimation. In most cases animals are private ownership of many farmers who are members in breeding associations established for the breed concerned. Farmers' participation in the breeding program is voluntary, and they assume different obligations entered into breeding contracts. These obligations comprise participation of the farmers in the processes of

identification and registration of animals for breeding purposes, keeping a day-book, recording of traits subjects of selection. Correctly and accurately performed, these activities ensure successful implementation of the breeding program. Breeding work is of a long-term nature and this requires persistence of the sheep breeder's participation. The herd reproduction requires not only replacement of culled ewes and rams, but and improvement of the herds by productive and functional traits. In essence, this is selection of animals, which requires prolonged activity of sheep breeders and specialists.

Patch Faced Maritza sheep breed is a local Bulgarian sheep breed typical for lowland regions of South Bulgaria (Dimov, 1998). In the past this sheep breed has undergone a massive crossbreeding with other breeds. As a result, its population size was greatly reduced (Dimov and Marinova, 1993). Within the framework of the initiative for the preparation of the first national report on genetic resources in the Republic of Bulgaria, Patch Faced Maritza sheep breed have been included in the list of 20 breeds threatened from extinction in Bulgaria (Tzvetkova et al., 2003, Krastanov, 2003). In recent years the population of Patch Faced Maritza sheep breed (in Bulgarian also called 'Vakla Marishka ovtsa') has been spread to some semi-mountains regions such as Sofia, Vratza, Sliven, Blagoevgrad and Kardzhali (Dimov, 2017).

The aim of this study was to analyze tendencies in the population Patch Faced Maritza sheep breed and estimation of sustainability of breeding program for this breed by analyze continuity of farmer`s breeding activity.

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## Material and methods

### Short breed performances

Patch Faced Maritza is a local sheep breed in Bulgaria with dual purpose – milk and meat. In series of studies, productive and functional traits of Patch Faced Maritza sheep breed were examined. Depending of farming year milk yield of the breed varied from 113.6 to 154.80 litres and between different herds milk yield varied from 100 to 200 litres per ewe (Dimov, 1998). Patch Faced Maritza sheep breed has good prolificacy – 1.48-1.55. Non-genetic factor as flock, farming year, age has significant effect on the milk yield and prolificacy of this sheep breed (Dimov and Djorbineva, 1997; Dimov, 2000). The body weight at birth is 4.85kg, at 30-day-old lambs – 15.18kg, at 60-day-old lambs - 23.26kg (Vuchkov and Dimov 2005). The weight of cool carcass of 60-day-old single born mail lambs was 12.18kg and according to the SEUROP systems they corresponded to the category „C“ (Vuchkov and Dimov, 2006). Patch Faced Maritza sheep is a large sheep breed with comparatively high body weight of ewe and rams respectively – 74.47kg and 121.14kg (Dimov et al., 2016). From an economic point of view Patch Faced Maritza sheep has very good mother ability. For a 60-day suckling period, litter weight was 30.66kg and litter size was 1.34 weaned lambs (Vuchkov, 2009).

Dimov and Kuzmanova (2007) studied production systems and established zootechnical and economic characteristics of the breed. Good milk yield, growing abilities and prolificacy of Patch Faced Maritza sheep breed make it competitive among other sheep breeds.

### Source of data

Information about sheep breeders which are members in Breeding association of Maritza sheep, from 1991 to 2017 (27 years) was used. The data used for this analysis were provided by the association headquartered in Plovdiv. The tendencies about numbers of ewes, rams and lambs for breeding purposes of Patch Faced Maritza sheep breed were traced from the zootechnical register and pedigree book. On the base of available contracts for breeding activity with farmers it was estimated continuity of breeder's activity of two categories sheep breeders:

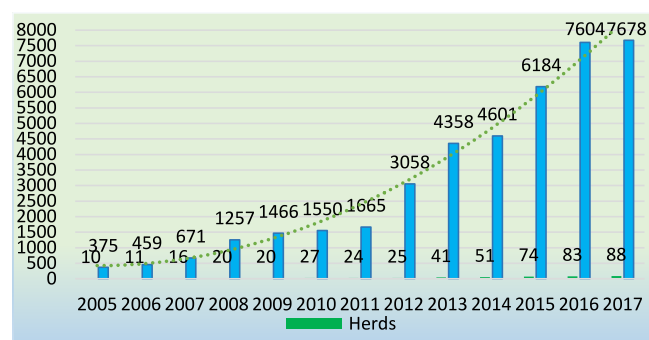
- finished breeder's activity with the breed;
- continuing breeder's activity with the breed.

The causes of finishing breeder's activity with the breed were analysed. All data were processed by SPSS Statistics 13.0.

## Results and discussions

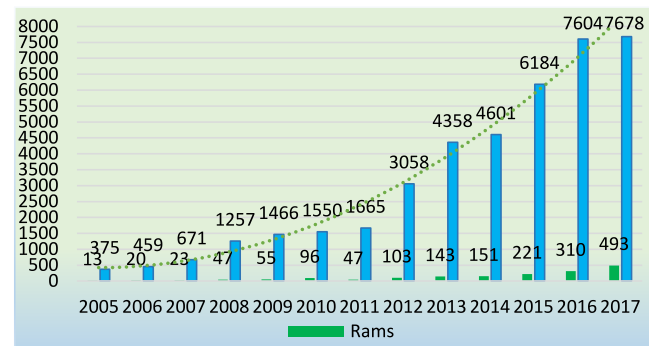
The main breeding goals in the breeding program of Patch Faced Maritza sheep breed is to preserve it as genetic resource, in order to achieve a sustainable tendency to increase the population size and improvement of the breed. It is provided in the breeding program of Patch Faced Maritza sheep breed increasing of the population size in initial breed's area of distribution as well as in other regions of the country through extended reproduction of male and female lambs for breeding purposes and creation of new herds (Dimov, 2011). Limited upgrade crossing also was applied. The strategy adopted by the Breeding Association of Maritza sheep to increase the population size resulted in an increase of sheep included by the breeding program. First of all, there is a growing number of farmers interested in breeding Patch Faced Maritza

sheep breed. This is related to an increase in the number of ewes, rising from 1257 in 2008 to 7678 as of December 1, 2017 (Figure 1).



**Figure 1.** Trend in the number of ewes and herds of the Patch Faced Maritza sheep for the period 2005 - 2017

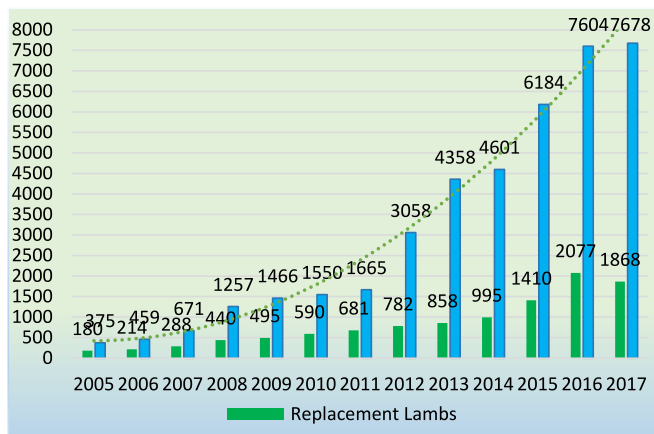
Several programs of state fund “Agriculture” to support local sheep breeds of sheep threatened with extinction helped to this increase. In this respect, the policy of Ministry of Agriculture and Food (MAF) to support different sheep breeders of local sheep breeds is more than successful. The increased number of ewes in the population and the natural mating of sheep in herds led to the need for a larger number of breeding rams (Figure 2). In 2016, the number of male animals in the population is 310 and in 2017 increase to 493 (including male lambs left for breeding). The natural mating of ewes and the use of a large number of male animals is a prerequisite for maintaining a greater genetic diversity in the population and reducing the risks of inbreeding depression and genetic drift typical of small populations. The increased population size makes possible to extend the scope of the in-situ method of conservation (FAO, 2015). To increase the competitiveness of the breed, it is necessary to incorporate in the breeding program and elements of genetic improvement of the breed on some productive traits (milk production, prolificacy, growth abilities, etc.).



**Figure 2.** Trend in the number of ewes and rams of the Patch Faced Maritza sheep for the period 2005 - 2017

The increased number of herds and ewes has led to an absolute increase in “repairs” in herds (Figure 3). While in 2010 the number of lambs left for breeding purposes was 590, in 2017, the number of lambs left for breeding purposes was 1868, which represents 23.24% reparation of herds and guarantees the renewal of the population. The increased population size of Patch Faced Maritza sheep is related to the inclusion in the breeding program of new sheep breeders mainly from southern Bulgaria. The success of the breeding program and the sustainable development of the breed depend on the continuity of breeding activities with herds negotiated

sheep breeders mainly from southern Bulgaria. The success of the breeding program and the sustainable development of the breed depend on the continuity of breeding activities with herds negotiated with sheep breeders of the breed. Participation of sheep breeders in the breeding program requires a higher level of livestock culture including knowledge, skills, ambition and opportunities for further work with the herd, which requires additional efforts. Sustainable management of genetic resources requires optimal long-term management. The choice to breed one or another sheep breed is a right of free choice of the farmers they make on the basis of their personal judgment, taking into account various factors such as economic benefit, personal preferences, available environmental conditions, etc.



**Figure 3.** Trend in the number of ewes and replacement lambs of the Patch Faced Maritza sheep for the period 2005 – 2017

The complex economic situation in the country with regard to livestock farming and especially the difficult conditions in sheep farming and number of other factors are causes for some sheep breeders to stop the breeding activity with the breed. These are inevitable processes for each breeding organization and have an impact on the continuity of breeding activities with sheep breeders. The discontinuing of breeding activity with one herd represents a loss of human labor, both to the farmer and to the specialists in breeding organization. Not always following the liquidation of a herd, the sheep fall into an environment where breeding can continue. It is therefore essential to analyze the causes of discontinued breeding activity (BA) for individual farmers (Table 1).



**Figure 4.** Breed's area (marked with green, yellow and pink color) of distribution of the Patch Faced Maritza sheep in Bulgaria for 2017

**Table 1.** Continuity of breeding activity of sheep breeders discontinued their sheep breeding work for the period 1991-2017

No	Causes of ceasing of breeding activity	Breeders n	Continuity of breeding activity, years			
			$\bar{x}$	$S\bar{x}$	min	max
1	Lack of interest	17	3.24	0.44	2	8
2	Farmer's death	1	-	-	6	6
3	Old age	6	7.67	2.29	2	14
4	Switching to another business	23	4.30	0.74	2	17
5	Change of the breed	7	3.43	0.77	1	6
Total number of breeders discontinued breeding activities with the herds		54	4.26	0.45	1	17

Legend: n – number;  $\bar{x}$  – mean;  $S\bar{x}$  – error of mean, min – minimum value; max – maximum value

**Table 2.** Continuity of breeding activity with breeders' of the Patch Faced Maritza sheep continuity of breeding activity for the period 1991-2017

No	Territorial distribution of herds as of 01.12.2017	Breeders n	Ewes %	Continuity of breeding activity, years			
				$\bar{x}$	$S\bar{x}$	min	max
1	Plovdiv and Pazardzhik	55	74.11	5.31	0.60	1	22
2	Other districts*	28	25.89	4.36	0.58	2	12
Total number of herds		83	100	4.99	0.44	1	22

Legend: n – number;  $\bar{x}$  – mean;  $S\bar{x}$  – error of mean, min – minimum value; max – maximum value

\*Sofia, Vratsa, Sliven, Blagoevgrad, Yambol, Stara Zagora, Burgas, Haskovo and Kardzhali.

The analysis of information in the Breeding Association of Maritza sheep shows in general 5 reasons for discontinued of breeding activity: lack of interest, farmer's death, old age, switching to another business and change of the breed. Farmer's death and old age are understandable reasons, so the opportunity for the breeding organization to maintain breeding activities with the herd is relatively small. The other three causes are important, and they also deserve to be analyzed, which would help to improve breeders' approaches to farmers in order to achieve a longer continuity of breeding work with the herds. Due to lack of interest, 17 sheep breeders stopped the breeding work with the breed Patch Faced Maritza for the period 1991-2017. The average duration of breeding work with these farmers was 3.24 years. Often, the detailed records that should be kept for everything happening in the herd are not a pleasant obligation for the sheep breeders, especially for those who do not have the habits to records for dates of birth, dates of mating, dates of lambing, the number of lambs born, the causes and dates liquidation of their sheep. This is an essential part of the breeding activity responsibility, which is borne by the farmers themselves. This leads to the conclusion that BA as a type of activity requires a higher level of livestock culture and responsibility. Livestock culture includes not only knowledge but also discipline that must be consciously respected by farmers. Breeding activities require farmer training for good breeding practices (GBP). For the proper implementation of good breeding practices by farmers, a short specialized training course for farmers involved in breeding programs could be introduced as a requirement. For now, such GBP and in particular measures related to support for the breeding of sheep and goats, has not been introduced. This greatly impedes the activities of the breeding association in order to achieve an effective and higher level breeding activity. Some farmers discontinued their breeding work because of switching to another business. Often, this due to inability to organize effective sheep farming activity that brings enough income. This is a very serious and objective reason for dropping sheep breeders from active breeding, which should be explained to farmers before they start working with them. The termination of breeding work in a herd is associated with a loss of input from the breeding organization, which is expressed in money and invested human labor, which requires a long-term character breeding contracts. In seven (12.96%) of 54 farmers discontinued breeding activity with Patch Faced Maritza sheep breed, the reason is a change of breed. The choice of breed by farmers is their personal choice, which is not always sustainable in time and the free market economy. Private ownership of animals and market conditions are often the reasons for a farmer to change the breed. In recent years, Patch Faced Maritza sheep breed has gained popularity and many farmers from other regions began to breed it. At present the breed can be found in 11 districts of the country (Figure 4), however, 74.11% of the population is in the districts of Plovdiv and Pazardzhik (Table 2).

It is clear from Table 2 that there are farmers who have been active in breeding activities for more than 10 years in some areas that do not belong to the typical areas of Patch Faced Maritza sheep breed. This fact shows that the continuity of the breeding activity is not so dependent on the breed's area of distribution but rather on the farmer himself and his breeding satisfaction with the breed and the ambition for greater success.

## Conclusion

In recent years, the population of the Patch Faced Maritza sheep has seen a stable trend to increase the population size. This

increase is at the expense of propagation of the breed in other areas of Southern Bulgaria by including farmers from different regions of southern Bulgaria in the breeding program of Patch Faced sheep breed. However, 74.11% of the population is located in Plovdiv and Pazardzhik districts (South Central Bulgaria) that is its initial area of occurrence. Incorporating new farmers into the breeding program is not always a guarantee of long-term activity. The average continuity of the breeding activity of farmers included in the breeding program of Patch Faced Maritza sheep breed is 4.26 years. From the formulated and investigated five reasons for discontinuing of breeding activity with the breed, the largest number is the number of farmers who have discontinued their breeding activity due to the transition to another business and because of their lack of interest in active breeding activity. Based of made analyses we recommend that the participation of farmers in the breeding program for Patch Faced Maritza sheep breed should be supported by awareness raising and training programs for good breeding practices.

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### Thesis:

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