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Original Paper

Characteristics and possible utilisation of Busha population in different Balkan countries

Vesna Gantner[1], Muhamed Brka[2], Maja Gregić[1]*, Gjoko Bunevski[3], Alka Turalija[1], Denis Kučević[4]
[1]*Josip Juraj Strossmayer University of Osijek, Faculty of Agriculture in Osijek, Croatia,*
[2]*University of Sarajevo, Faculty of Agriculture and Food Sciences, Bosnia and Hercegovina*
[3]*Faculty of Agricultural Sciences and Food, Skopje, Republic of Macedonia*
[4]*Faculty of Agriculture, University of Novi Sad, Serbia*

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Busha cattle are indigenous breed in many Balkan countries. Because of the economic, cultural and scientific reasons it is very important to protect biological diversity of autochthonous breeds like Busha. In the past several decades, as a result of uncontrolled crossing of this cattle with some more productive breeds, the number of purebred Busha animals is permanently being reduced which imposes an urgent need for setting up *in situ* and *ex situ* conservation program for this breed. Since Busha is bred in many Balkan countries, the aim of this study was to define main productive, reproductive and exterior traits of Busha cattle in the following countries: Bosnia and Hercegovina, Croatia, Macedonia and Serbia. Also, number of animals and possibility of future production system was analysed. Analysed data indicate that highest milk production potential and lowest age at first mating has Serbian Busha (till 2,000 kg in lactation, at 18 months). Regarding the exterior traits, smallest frame was observed in Bosnian and Macedonian Busha. The population decrease in the past several decades was determined in all analysed countries. The conservation programs in Croatia and Serbia resulted in certain increase of Busha population, but aiming successful preservation of the breed, economically effective production systems should be put in practice. The branding of Busha's products could result in necessary added value. Taking into account similarity between all Busha breeds as well as population sizes, branding should be organized on regional level.

Keywords: Busha breed, Balkan region, characteristics, preservation

1 Introduction

Busha cattle are indigenous breed in many Balkan countries. Because of the economic, cultural and scientific reasons it is very important to protect biological diversity of autochthonous breeds like Busha (Bunevski et al., 2017). Busha, has been bred for centuries in Balkan Peninsula and belongs to a group of primitive short horned cattle (*Bos brachyceros* Europaeus). Busha was dominant and most important breed in almost all Balkan countries until 50s and 60s of the XX century but today in lowland areas with intensive farming it is replaced with more productive and specialized cattle breeds. Busha is officially classified as triple purpose breed (for meat, milk and work) but considering its low productive capabilities it is more similar to some primitive working breeds. Today, these cattle are no longer used for work but because of absence of systematic cattle improvement program these animals have retained their poor beef and dairy production capability. It could be said that the Busha's genome is very elastic since this breed in unfavourable conditions easily achieves better milk production and bigger body weight (Bunevski et al., 2017). In the past several decades, as a result of uncontrolled crossing of this cattle with some more productive breeds, the number of purebred Busha animals is permanently being reduced which imposes an urgent need for setting up *in situ* and *ex situ* conservation program for this breed. Since Busha is bred in many Balkan countries, the aim of this study was to define main productive, reproductive and exterior traits of Busha cattle in the following countries: Bosnia and Hercegovina, Croatia, Macedonia and Serbia. Also, number of animals and possibility of future production system was analysed.

***Corresponding Author:** Maja Gregić, Josip Juraj Strossmayer University of Osijek, Faculty of Agriculture in Osijek, Croatia, e-mail: vgantner@pfos.hr

Bosnian Busha

Busha is, relative to modern European breeds of cattle, a small animal. The productivity of Bosnian Busha cow is generally modest and it is considered to be a beef – diary – draft type cattle. By the colour of its coat is mostly considered to be one coloured as streaked, black, tan, cream white, dark grey or red. The streaked variants are rare. Over the head, neck, and body they have typical 1–2 cm wide, parallel dark or black stripes. The black colour is even less frequent. It is actually brownish – black with lighter stripes across the back and over the muzzle. Horns and hoofs are dark grey as it the udder which sometimes may be brownish – red. The characteristics of Bosnian Busha are presented in Table 1.

Croatian Busha

Busha is, regarding the frame, the smallest Croatian original breeds. The main exterior measures, productivity and reproduction characteristics is shown in Table 2. This breed is mainly bred in the area of Lika and Dalmatia. The program of conservation started in 2003, and since 2007 Busha is included in the national breeding program (CAA, 2017). In year 2017 the effective population size (Ne) in was 241.5 (65 bulls and 852 females), which characterized this breed as potentially endangered (II).

Macedonian Busha

In the mountain rural regions of Macedonia, the dominant type of cattle are the crosses of the Busha breed. In Macedonia Busha was officially classified as triple purpose breed (for meat, milk and work) but considering its low productive capabilities it is more similar to some primitive working breeds. According to colour Busha breed is classified in following strains: Black, Brown, Red, Gray and Tiger that also differ in their productive, reproductive and morphological traits (Bunevski et al., 2017). The average daily milk production in grey strain was 3.8 kg, and in brown strain was 4.1 kg, with 3.89 i.e. 4.01% of fats, 3.7% i.e. 3.62% proteins and dry unfatted matters 9.49% i.e. 9.62% in milk from brown i.e. brown strain of Busha cows. According to the measurement of some morphological traits of adult Busha cows, in grew strain the wither height was 107 cm, in black strain 105, and in brown strain also 105 cm, with the similar values for the traits back height and rump height in cows. The length of head was 38 cm i.e. 37 in grew i.e. black and brown strain, and length of horns 16 i.e. 15 cm in grey and black i.e. brown strain of cows. The average body mass of new born calves was 15 kg i.e. 14 kg in grew and brown i.e. black strain. The average body weight at first mating was 125 kg in male and 150 kg of female Busha cattle, and the average age at first calving was 28 months.

Table 1 Bosnian Busha – Characteristics

Main exterior measure		Productivity		Reproduction	
Wither high (cm)	90–112	Lactation (days)	240	Sexual maturity (month)	16
Hip height (cm)	117	Milk yield (l)	800–1,200	Age of first mating (month)	22–25
Body length (cm)	116–132	Fat content (%)	4–6	Fertility (calves/year)	1
Body weight (kg)		Protein content (%)		Breeding time (years)	10–13
Bulls	300	Meat (kg)		Lifetime (years)	20
Cows	150–250	Dressing percentage (%)	52–55		
Calves (at birth)	15				
Chest girth (cm)	146				

Source: Adilović and Andrijanić, 2005

Table 2 Croatian Busha – Characteristics

Main exterior measure		Productivity		Reproduction	
Wither high (cm)	100–115	Lactation (days)	240	Sexual maturity (month)	15–16
Body weight (kg)		Milk yield (l)	750	Age of first mating (month)	24
bulls	300	Fat content (%)	4–6	Fertility (calves/year)	1
cows	250			Breeding time (years)	10–12
calves (at birth)	15			Lifetime (years)	20

Source: CCA, 2017

Table 3 Cattle breed distribution according the official data in the Republic of Macedonia (AVF, 2015)

Breed	2008		2010		2012		2014	
	No.	%	No.	%	No.	%	No.	%
Busha cattle	29535	12.1	27242	7.8	20363	10.1	12064	5.6
Crosses (Busha × other breeds)	89707	36.8	104961	43.6	113720	38.9	98958	46.3
All cattle	243667	100.0	269443	100.0	261073	100.0	213747	100.0

Table 4 Serbian Busha – Characteristics (Institute for Animal Husbandry (2018)

Main exterior measure		Productivity		Reproduction	
Wither high (cm)	90–120	Lactation (days)	240	Sexual maturity (month)	15–16
Body weight (kg)		Milk yield (l)	1,000–2,000	Age of first mating (month)	18–24
Bulls	300	Fat content (%)	4–6	Fertility (calves/year)	1
Cows	150–250			Breeding time (years)	10–15
Calves (at birth)	15–20			Lifetime (years)	20

During the last few years, there are certain negative trends in population size of Busha cattle (Table 3). These trends are mainly due to the decreasing of rural population in hill-mountain regions and small interest of young people to rear indigenous breeds like Busha cattle. Also, in the past several decades, as a result of uncontrolled crossing of this cattle with some more productive breeds, the number of purebred Busha animals is permanently being reduced which imposes an urgent need for setting up *in situ* and *ex situ* conservation program for this breed (Bunevski et al., 2017).

Serbian Busha

Busha is low-productive three purpose breed that is evolutionarily adapted to unfavorable conditions of breeding and is characterized by exceptionally modest requirements in terms of feeding, care and breeding. This is late maturing, relatively small breed (Table 4). Regarding to colour, in Serbia, Busha is classified in following strains: Gray, Red, and Tiger.

The conservation program of Busha breed as a genetic resource started in year 1993 with an estimated population size of 1,000 to 100,000 animals. Currently, the size of the entire Busha population is about 1,500 animals, of which 847 are breeding animals. The effective population size (Ne) from 1999 almost continuously increased and in 2017 amounted 78.11 (Institute for Animal Husbandry (2018).

Fatty acid profile in milk of Busha

The analysis of fatty acid profile in milk of Busha, Cika and Simmental cattle (Škrtić et al., 2008) showed that Busha's milk contained significantly lower content of SFA, higher content of MUFA and PUFA, lower SFA/MUFA and SFA/PUFA, but higher content of n-6 PUFA and higher n-6/n-3 PUFA ratio in regard to Cika's and Simmental's milk (Figure 1). The significant differences in fatty acid profile between Busha's and other analysed breeds (Cika and Simmental) milk could be basis for branding of Busha dairy products.

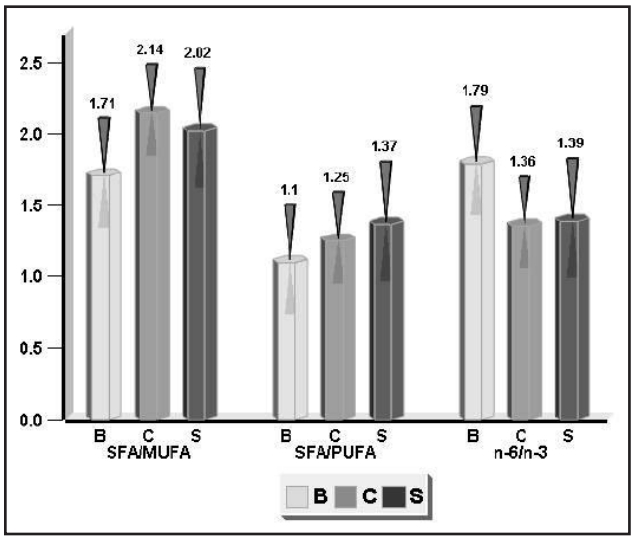

Figure 1 SFA/MUFA, SFA/PUFA (*10–1) and n-6/n-3 PUFA ratios according to breeds B – Busha; C – Cika; S – Simmental (means – histograms with values and standard errors as triangles)
Source: Škrtić et al., 2008

4 Conclusions

Analysed data indicate that highest milk production potential and lowest age at first mating has Serbian Busha (till 2000 kg in lactation, at 18 months). Regarding the exterior traits, smallest frame was observed in Bosnian

and Macedonian Busha. The population decrease in the past several decades was determined in all analysed countries. The conservation programs in Croatia and Serbia resulted in certain increase of Busha population, but aiming successful preservation of the breed, economically effective production systems should be put in practice. The branding of Busha's products could result in necessary added value. Taking into account similarity between all Busha breeds as well as population sizes, branding should be organized on regional level.

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