January 2018 • e-ISSN: 1857-8187 • p-ISSN: 1857-8179

https://doi.org/10.5281/zenodo.1167876 **Research Article**

The State of Local Cattle of Busha Type in Albania and Kosovo. Their Identification and Morphometric Description

Healthcare

Keywords: Local cattle, identification, morphometric measurement, local differentiation.

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Abstract

Local cattle population of Busha type are still found in remote areas of Albania and Kosovo. They have survived until now because of geographic isolation and harsh conditions that are not suitable for exotic breeds. The number of these populations is rapidly declining putting them in danger of extinction. Conservation of this genetic diversity is challenging for both countries. Identification of local cattle populations of Busha type farmed in different regions of Albania and Kosovo , their phenotypic and genetic characterization, has been and currently is one of interesting study subject with the aim of compiling a sustainable breeding strategy that will help to run a national or cross border conservation program. The study was conducted in 5 regions distributed in the north-west and north –east of Albania whereas in Kosovo the east and south-west regions both countries: The number of local cattle's sampled of Busha type for phenotypic characterization was 94 of which 86 were females and 8 were males. The linear body measurement of adult animals only were done according to FAO guidelines 2012. The means of morph metric variables were calculated for animals not divided by sex. Local cattle of Busha type is characterized of different coat colors from intensive red, reddish, dark and light brown. Velipoja local cattle has the lowest mean of wither height, heart girth and body length than other populations (103.07, 137.57 and 113.5 cm). It can be noticed that the populations located in the border between Albania and Kosovo (Kukes and Prizren regions) as well as the population of Gjilan have similar mean values of wither height, heart girth and buby length. Higher mean value of wither height is found at Gjakova local cattle (133.0 cm). Despite these small differences in body size the milk production is rather different between Albanian and Kosovo populations. Discriminate analyses model was used to evaluate the level of local differentiation of cattle populations. Three groups are formed: Back Rjoll herd of Albania showing constant differentiation from other groups, the group composed by three herds located in Kukes (Albania), Prizren and Gjilan (Kosovo); the group where we find only Gjakova herd. The results of discrimanate analyses shows that the process of evolution of morphometric trais and selection have been associated with the presence of isolation in distance. The results need further verifications.

Introduction

Biodiversity including livestock biodiversity is an indication of the genetic and economical wealth of a country (O. Yilmaz et al 2012). Livestock production represent the main activity of farmers in rural remote areas in Albania and Kosovo . The introduction of exotic breeds or their crosses with local breeds have not shown to fit with the grazing extensive system of cattle farming of these countries. Therefore local cattle of Busha type (Ilirian cattle)have been bred for centuries in both countries and have survived until now because of geographic isolation and harsh conditions that are not suitable for exotic breeds. The total local cattle population of Busha type in Albania and Kosovo accounts respectively around 2200 and 13300 heads (K.Kume et al., Bytyqi et al. 2013). The farmers like this type of cow because of their strong ability to use natural feed resources without any feed supplements or veterinary care and show to be very fertile. The Buša, with their withers' height at around 100 cm, show high fertility and modest production in harsh environments (Kompan et al., 2008).

These animals are fully fed on pasture from late April up to November and during the winter time they are kept in poor housing and fed with hay, straw and some corn. The main products are milk and meat of high quality mainly for family self consumption and a small part of it for local market. There are some historical data and according to craniological and genetic characteristics they belongs to short horn Brachyceros type. Two types of local cattle breeds are still found in both countries : Ilirian Dwarf Cattle and Busha cattle(Kume et al., 2013; Bytuqi et al., 2013).The number of these populations is rapidly declining putting them in danger of extinction. The main factors of this process are restriction of the livestock industry to a few specialized more profitable breeds because of increasing demands for livestock products and the intensity of migration of people from rural areas to urban regions (Kume and Papa. 2013). This practice has reduced the use of local breeds and put their survival in danger (Oldenbroek J.K. 1999). Losses of indigenous cattle breeds are happening at a high rate worldwide, and FAO has recommended immediate action should be taken to conserve local cattle breeds and possible valuable genetic variation (Food Agriculture Organisation , 2007b). The strategy of rural development of mountain region of Albania and Kosovo will be based mainly on traditional system. The local breeds of animals are the most suitable for this system and a strong supporting factor for the production of local food and the development of agro tourism in these areas. Small herds of local cattle on small scale family farms will help to protect the natural environment and landscapes that are very attractive for tourism development. Small-scale production units and farmers interested in keeping the locally adapted cattle to produce local foods is important in both conservation of the breed and rural development to increase the economic diversification and finally to enhance the quality of life for local people.

In the FAO-EFABIS database, actual data about Busha Cattle are rare. Busha cattle, shows a very high polymorphism. Genetic distance investigations showed, that unselected Busha breeds exhibit a very high degree of diversity within an identified cluster of Brachycerous cattle (Medugarac et al., 2009). Conservation of this genetic diversity is challenging for both countries , because these animals are in small rapidly declining subpopulations. The large neutral diversity of virtually unselected traditional Busha strains should be conserved with a high global priority to ensure sustainable cattle breeding in the future(Medugorac et al., 2011). The phenotypic characterization of local genetic resources depends on the variation of morphological traits, and the selection on them may constitute an effective tool to breed preservation and improvement (Nsoso et al., 2004; Sowande, Oyewale and Iyasere, 2010). Identification of local cattle populations of Busha type farmed in different regions of Albania and Kosovo , their phenotypic and genetic characterization , has been and currently is one of interesting study subject with the aim of compiling a sustainable breeding strategy that will help to run a national or cross border conservation program.

Material and Methods

Description of the study area

The study was conducted in 5 regions distributed in both countries: Back Rjoll village in Velipoja commune of Scutari region, Bardhok and Morine villages of Kukes region in Albania; Gjilan, Gjakova and Prizren (Sharry highland) regions in Kosovo.

Velipoja is subdivision of the Scutary municipality of northwestern Albania situated on the estuary of the Buna river, where it flows into the Adriatic seawhile constituting the natural border with Montenegro. Back Rjoll village is situated in the south of Velipoja on the seaside of Adriatic sea. Until recently there was an isolated area due to lack of roads and transportation was done only by sea.

Bardhoc and Morin are settlements in north-eastern Albania, part of the Kukës municipality, on the border with Kosovo and west to Prizren city . They are both mountainous villages with the altitude 500 m above sea level.

Gjilan is a city and municipality located in the Gjilan District in eastern Kosovo on 508 m above sea level.

Gjakova geographically, it is located in the south-western part of Kosovo, about halfway between the cities of Peć and Prizren and 100 km inland from the Adriatic Sea. The sampling villages of this district are about 600 m above sea level.

Prizren is a historic city located on the banks of the Bistrica river, and on the slopes of the Šar Mountains in the southern part of Kosovo. The local population of Busha type were identified in Gozhub village that lies on the slopes of Pashtric mountain with its highest peak located on mutual border of Kosovo and Albania.

The agricultural production system.

The agricultural production system in sampling areas varies with agro-ecology of the zones. Back rrjoll (Velipoja) low-land village is on sea level is characterized by typical mixed crop-livestock system where the owners keep different spices of farmed animals(cattle, swine, sheep and goats)and cultivate vegetables, grapes and some grains specially corn for both animals and human feeding. The rearing system of animals is extensive combining the natural pasturing during all round the year and a few quantity of corn grain supplement administered in critical weather period of the year. The livestock productions are destined for self consumption and local market. Being part of Velipoja seaside commune that is a touristic zone has increased the interest of farmers on kipping local animals and diversification of livestock products.

The agricultural production system in the mid and high -altitude areas on the other hand is based on diversified livelihood strategies that include livestock production from local cattle, sheep and goats as well as wild medicinal plants and fruits gathering. The animals are kept in fully extensive system pasturing all day round during from late spring to autumn and inside during the severe winter period. The livestock products are mainly used for self consumption and small quantities for local market. Mating system is natural. The bulls are reared in farms and circulated between neighbor farms of the same or different village.

Data collection

The study was conducted from May to September 2016 and April –June 2017. The number of local cattle's sampled of Busha type for phenotypic characterization was 94 of which 86 were females and 8 were males. Regions wise 14, 10, 24, 33, 13 cattle's were sampled from Velipoja (Back Rjoll), Kukes, Gjilan, Gjakove and Prizren. Linear body measurement including body length, heart girth, pelvic width, ear length, horn length, frontal width, were taken using measuring tape while wither height was measured using a 1.5 m ruler. The measures were done in adult animals only. The linear body measurements were done according to FAO guidelines 2012. A questioner was compiled to gather data to describe the system of rearing and the main products taken from local cattle in remount areas of Albania and Kosovo. The questioner was compiled according to FAO guidelines for Phenotypic Characterization of Animal Genetic Resources (2012).

Data analyses

The means of morph metric variables were calculated for animals not divided by sex. Quantitative traits for body measurements were used to calculate correlation coefficient of Pirsons (r). Discriminate analyses model was used to evaluate the level of local differentiation of cattle populations.

Sampling areas

The sampling areas represent the noth-west and north –east of Albania whereas in Kosovo the east and south-west regions. (Figure 1).

Results and discussion

Phenotypic characterization

Local cattle of Busha type is characterized of different coat colors and level of production. According to Samimi V. 1950, cattle of Brachycerous type is shown different not only for body size but also for economic values. Velipoja and Kukes populations were characterized by reddish, dark brown or brown opened to grey coat colors.

Small body size, strong skeleton, narrow rump and well developed udder, very developed orbit eyes. Short horns, thin and bedded to forward and back bent horns in the form of semi ring with black color on the top. Nicely shaped udder. Excellent maternal traits, easy calving, long productivity life and very resistance to dieses.

The Kosovo populations are bigger in body size than Albanian populations. The coat colour is intensive red, sometimes dark red and sometimes yellowish with a nuance of dark red. The other phenotypic characteristics were similar. The description of phenotypic traits is given in table 1.

Characterization of quantitative traits

Global Plan of Action for Animal Genetic Resources (GPA) (FAO, 2007b) calls for improved "characterization, inventory and monitoring" of "risks" to AnGR as a basis for improved understanding of these risks and improved decision-making in support of conservation and sustainable use.

The average values and standard deviations of body measurements for both sexes in different regions of Albania and Kosovo are presented in Table 2.

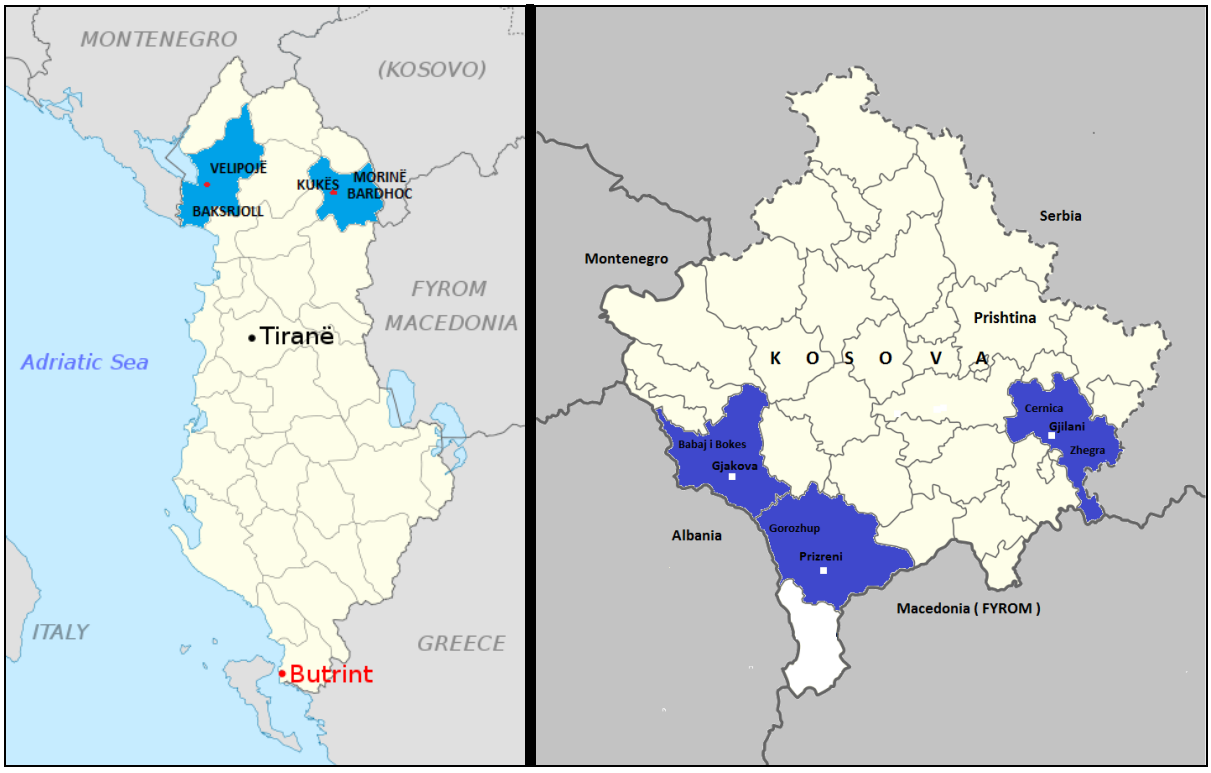

Figure 1. Map of sampling areas.

Table 1. Qualitative traits

Population	Coat Colour	Head	Horns
Velipoja Back Rrjoll - Albania	Reddish	Very developed orbit of eyes	Short, thin and tip and back bent horns
Kukes Morine - Albania	Reddish, brown or brown opened to grey.	Very developed orbit of eyes	Short, thin and tip and back bent horns
Gjakova highland - Kosovo	intensive red,sometimes dark red	Small, narrow, mug is dark colored with some white or black hair around	lyre shaped horns
Prizren Pashtric highland	intensive red, sometimes yellowish, dark red, tiger	Small, narrow, mug is dark colored with some white hair around	lyre shaped horns
Gjilan	Intensive red, dark red	Small, narrow, mug is dark colored with some white hair around	lyre shaped horns

Velipoja local cattle has the lowest mean of wither height, heart girth and body length than other populations (103.07, 137.57 and 113.5 cm). It can be noticed that the populations located in the border between Albania and Kosovo (Kukes and Prizren regions) as well as the population of Gjilan have similar mean values of wither height, heart girth and budy length. Higher mean value of wither height is found at Gjakova local cattle (133.0 cm). Despite these small differences in body size the milk production is rather different between Albanian and Kosovo populations. Our monitoring coincide with previous studies conducted in Albania and Kosovo (Kume et al 2013; Bytyqi et al. 2013) and show that respected average milk yield in Albanian populations is 300-400 kg per cow and in some cases up to 600-700 kg. Lactation length is 150-200 days. The average milk production of Kosovo populations is 1500-1800 kg per lactation. Lactation length is 240-280 days. The other mean values of measured quantitative traits are similar for all five populations of local cattle of both countries.

Table 2. Average values of morphometric traits.

Population	**Velipoja**	**Gjilan**	**Gjakova**	**Kukës**	**Prizren**	**Total**
Counts	14	10	24	33	13	94
MEANS±SD						
Wither height	103.07±3.31	116.5±1.50	133.0± 2.57	114.09±1.84	111.61±2.22	117.34±10.17
Heart girth	137.57±4.16	161.3±5.16	162.79±2.34	159.15±4.016	161.69±2.56	157.45±9.20
Body length	113.5±8.83	123.1±5.73	117.83±2.08	113.18±2.34	118.61±2.40	116.22±5.36
Frontal width	19.51±1.60	19.4±1.35	19.79±0.78	19.75±0.61	19.53±0.66	19.66±0.95
Horn length	16.64±5.67	17.4±1.71	19.66±1.27	22.48±2.83	17.31±1.18	19.64±3.69
Ear length	15.86±1.09	16.4±0.84	17.5±1.06	17.94±0.93	16.46±0.88	17.15±1.24
Pelvic width	37.43±3.18	41.5±1.69	40.12±0.74	40.12±0.93	39.92±1.19	39.84±1.84

Correlations coefficients of Pirson that serve to evaluate stochastic relationship between quantitative traits are presented in table Nr. 3.

Average correlation was found between body length and heart girth (0.55) and pelvic width and body length (0.65). All other correlations coefficients were low. The lowest and significant correlation coefficient was recorded between horn length and frontal width (0.05) and ear length and body length (0.10).

Table 3. Correlations coefficients of Pirson

	Wither height	**Heart girth**	**Body length**	**Frontal width**	**Horn length**	**Ear length**
Wither height	1.0					
Heart girth	0.32	1.0				
Body length	0.11	0.55	1.0			
Frontal width	0.24	0.39	0.36	1.0		
Horn length	0.05	-0.21	0.14	0.05	1.0	
Ear length	0.14	-0.14	0.09	0.10	0.41	1.0
Pelvic width	0.29	0.34	0.65	0.47	0.37	0.1

The first standardized discriminating function was:
1.01948* **Wither height** + 0.159128* **Heart girth** + 0.134429* **Body length** - 0.190545* **Frontal width** + 0.14937* **Horn length** - 0.0445793* **Ear length** - 0.323574* **Pelvic width**
Based on the morphometric measures the distribution o local cattle population animals of five regions was evaluated. The results of discriminate analyses are presented in figure 2.

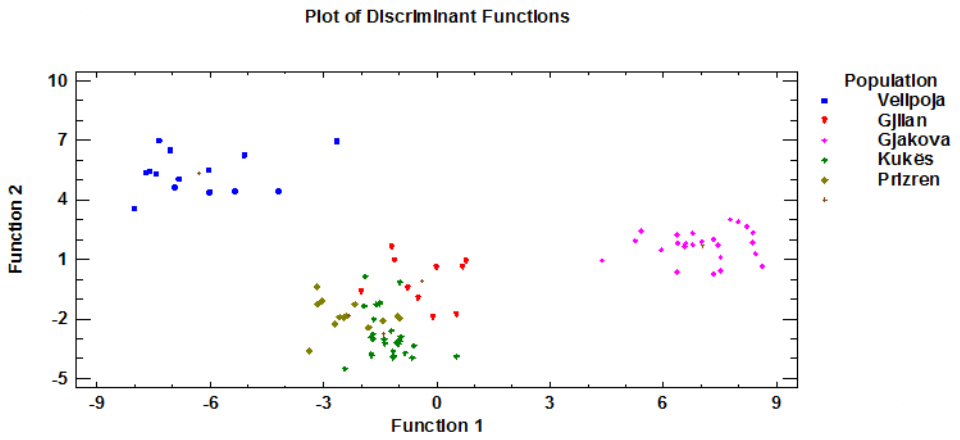

Figure 2. The distribution of local cattle populations.

The distribution of measured individuals of five local cattle populations of two neighbor countries in the plain of two first discriminate functions shows that three groups are formed: Back Rjoll herd of Albania showing constant differentiation from other groups in accordance with previous studies (N.Rexhaj et al.. 2016); the group composed by three herds located in Kukes (Albania), Prizren and Gjilan (Kosovo); the other group where we find only Gjakova herd. Referring to the geographical position to which these population belong, we note that there are similarities between the distances of cattle populations estimated using morphometric indicators and geographical distances . Velipoja heard is far away from other herds and it seems that no animal exchanging have happened between. Kukes and Prizren heard are placed in borders between two countries and their similarities on body measures show thay can be consider as one population kept in similar rearing conditions and perhaps exchanging animals between them. Gjilan heard is placed on the southeast of Kosovo but withstanding its geographical location it elongs to the same group of Kukes ad Prizren. Based on these results the hypotheses which may arise is: the process of evolution of morphometric traits and selection of local cattle population of north Albania and northwest and southeast of Kosovo have been associated with the presence of isolation in distance. The observed results needs further verifications including more animals and should be complimented by molecular characterization.

Conclusion

The results of these study must be considered as preliminary because the animals number of each population is limited. The observed data shows that local cattle of Busha type still farmed in remote areas of Albania and Kosovo has been developed in different size, coat color and productive performances. The animals are reared in typical extensive system. The results of discrimant analyses shows that the process of evolution of morphometric trais and selection have been associated with the presence of isolation in distance. The results need further verifications.

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