

CREATING A GENE BANK FOR BUSHA CATTLE IN THE R. OF MACEDONIA

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Abstract: Busha cattle are autohtonous breed on the Balkan Peninsula. This breed is a part of the National Biodiversity Program for conservation of the indigenous breeds of animals in the R. of Macedonia. Because of the economic, cultural and scientific reasons it is very important to protect biological diversity of autochthonous breeds like busha cattle. The aim of the research was to establish a gene bank for different strains of adult busha cattle in the R. of Macedonia. For that purpose, 998 samples of blood, 1100 coat hair samples and 958 doses of semen were collected from Busha adult cattle. Also, a phenotypic characterization was done on the adult Busha cattle, for the basic productive and morphological traits in adult Busha cattle. During the last few years, there are certain negative trends in population size of busha cattle, according to the decreasing of rural population in hill-mountain regions and small interest of young people to rear indigenous breeds like Busha cattle.

Key words: cattle, Busha, autohtonous breed, gene bank, biodiversity, phenotypic traits

Introduction

Busha breed of cattle with its crosses are dominant cattle breeds in the mountain rural regions of the R. of Macedonia. This breed of Busha cattle, also known as Illyrian cattle, is autochthonous breed of the Balkan Peninsula. It has been bred for centuries in this area and belongs to a group of primitive short horned cattle (*Bos brachyceros Europaeus*).

Busha cattle is an indigenous, actually trans-boundary breed, which is in high danger of extinction. It used to be 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 they are already replaced with more productive and specialized cattle breeds. In Macedonia this breed was officially classified as triple purpose breed (for meat, milk and work) but considering it's 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 unfavorable conditions easily achieves better milk production and bigger body weight. Having in mind that this breed is well adapted to the very harsh feeding and housing conditions that exist in the rural areas of the Macedonian mountains and is resistant to diseases, it is still the most significant beef

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and sometimes milk resource for these areas where the more productive cattle breeds cannot thrive successfully.

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. Because of the economic, cultural and scientific reasons it is very important to protect biological diversity of autochthonous breeds like Busha.

Busha strains in the R. of Macedonia

There are two main classifications of Busha strains in the R. of Macedonia:

a) Classification of strains according to locality:

- Povardarie strain,
- Polog strain,
- Orgazden strain,
- Prespa (Ohrid) strain,
- Mariovo strain, etc.

b) Classification of strains according to colour:

- Black strain,
- Brown strain,
- Red strain,
- Gray strain, and
- Tiger strain.

In our country the following varieties on the basis of their coat color can be found: black Busha which is reared in Debar, Tetovo and Gostivar region (Polog strain), red Busha (Metohija strain), grey Busha (Povarie strain and Prespa or Ohrid strain), brown strain (Orgazden strain) and sometimes the so called “tiger” strain.

Actual situation of cattle breeding in the R. of Macedonia

According to the official statistical data there are totally 238.000 cattle in the R. of Macedonia (FAO, 2014), from which 12.064 heads of Busha cattle or 5,6% (Agency of Veterinary and Food-AFV, 2014), but according to reality, there are approximately 1000-2000 heads of Busha cattle in our state.

State policy and legislative for conservation of Busha cattle

In 2008 a new Law of animal production is in function in the R. of Macedonia, where several articles are regulating the biodiversity and species of autochthonous breeds of cattle in Macedonia. From cattle, the only autochthonous breed is Busha cattle.

In 2010 a Livestock Common Breeding Programme was established from the Ministry of Agriculture of RM, for the period from 2010 to 2020, where the main stress from cattle breeds was given to Busha cattle. According this program, a Separate Breeding Programmes for each species and breed have to be done, for the duration of 5 years.

In 2011 was done the Programme for Livestock Biodiversity by the Ministry of Agriculture of RM, for the period 2011-2017, with the main activities:

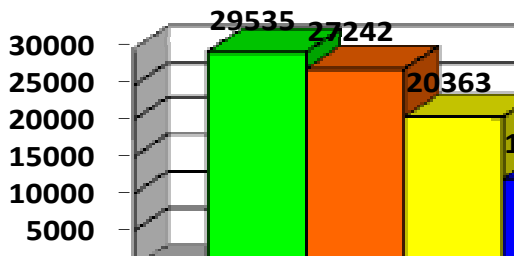
- Inventarization,
- characterization, monitoring of the trends and risks
- Phenotype analyses,
- Production traits,
- Reproduction traits,
- DNA characterization, and
- Creating a gene bank of semen, blood and hair.

The overall objective of the National Breeding Program for Busha cattle is to implement the national conservation plan and sustainable use of Busha cattle.

Table 1. Cattle breed distribution according the official data in the R. of Macedonia (AVF, 2014)

Tabela 1. Distribucija rasa goveda u skladu sa zvaničnim podacima u Republici Makedoniji (AVF, 2014)

Breed <i>Rasa</i>	2008		2010		2012		2013	
	No. of heads <i>Broj grla</i>	In % <i>U %</i>	No. of heads <i>Broj grla</i>	In % <i>U %</i>	No. of heads <i>Broj grla</i>	In % <i>U %</i>	No. of heads <i>Broj grla</i>	In % <i>U %</i>
Busha cattle <i>Buša</i>	29535	12,12	27242	7,80	20363	10,11	12064	5,64
Crosses of Busha and other breeds <i>Melezi buše i drugih rasa</i>	89707	36,82	104961	43,56	113720	38,95	98958	46,30
Total No. of cattle <i>Ukupan broj goveda</i>	243667	100,0	269443	100,0	261073	100,0	213747	100,0



Graph. 1. Total No. of Busha cattle in RM (AFV, 2014)

Grafik 1. Ukupan broj goveda rase Buša u Republici Makedoniji (AFV, 2014)

Material and methods

After the previous phenotypic characterization and inventarization of Busha cattle according to the breed standards described in the National Breeding Program for Busha cattle, the second phase was to collect samples of blood, semen and hair from the adult Busha male and female cattle for gene bank, in property of the Ministry of Agriculture,

Forestry and Water Economy in our state. From the phenotypic traits, on several herds of busha cattle were investigated the main productive, morphological and reproductive traits. All of them are reared semi-nomadic, i.e. during winter period from the end of October till the middle of April in the mountain village areas, and on the warm part of the year they are migrated on the mountain pastures according to the water sources and pasture yield. The controlled Busha cattle are mainly aimed for beef production, but some of them are milking by hand only for the purposes for farmers, not for selling. From the dairy production traits, the main emphasis was given to the milk yield per day and milk content (percentage of fats, proteins, solids non-fat matters and dry matters in milk), from the beef production traits to the average daily gain and body mass on 6 and 12 months of age and meat percentage from the carcass. The main morphological traits were measured with Lithin's rod and measure tape, only on adult Busha cattle. Also, several main reproductive traits were measured, with the emphasis on the age on first mating and delivering, duration of open days and calving period, as well as on birth weight and body weight.

Photo documentation from tissue sampling from Busha cattle



Picture 1. and 2. Fixation and blood taking from Busha cattle
Slika 1. i 2. Fiksacija i uzimanje uzoraka krvi od goveda rase Buša



Picture 3. and 4. Packaging and identification of blood and hair samples of Busha cattle
Slika 3. i 4. Pakovanje i identifikacija uzoraka krvi i dlake goveda rase Buša



Picture 5., 6. and 7. Fixation, electro-ejaculation, semen collection, testing and packaging of semen in straws from Busha bulls

Slika 5., 6. i 7. Fiksacija, elektro-ejakulacija, uzimanje sperme, ispitivanje i pakovanje sperme u pajete od goveda rase Buša

On the second phase after collecting the data for phenotypic characterization of busha cattle, began collection of the biological material for gene bank in blood, hair and semen samples. Blood samples were taken by the veterinarian team from the jugular venue of each cattle in special vacuum epruvetes with conservants and stored frozen in fridge on -40 °C. Hair samples were taken from wither or tail part of body with special tools for collecting to be whole hair together with the root. After that hair samples were packed in plastic bags and eticketed with the animal identification data. Semen was taken on the field conditions by veterinarian team with electro-ejaculation of Busha bulls, with previous fixation and stimulation of bulls. After taking of semen samples from busha bulls, in a special container the semen was transported to the veterinary lab for inspection of their quality, and after that packed in 0,45 mL straws and stored in containers on -196 °C in containers with a liquid nitrogen.

Results and discussion

From the tissue samples collection, main accent was put on blood, hair and semen sampling aimed for gene bank for Busha cattle.

Table 2. Number of collecting samples of blood, hair and semen from Busha cattle

Tabela 2. Broj prikupljenih uzoraka krvi, dlake i semena od goveda rase Buša

Parameter <i>Parametar</i>	No. of blood samples <i>Broj uzoraka krvi</i>	No. of hair samples <i>Broj uzoraka dlake</i>	No. of semen doses <i>Broj doza semena</i>
Number	998	1100	958

All the collected tissue samples as blood, hair and semen samples are stored properly and periodically maintained and investigated of their quality, and are subject for further analyses on molecular and DNA analyses. Collection of data for all phenotypic traits and tissue conservation for gene bank was done from a expert team from 3 institutions - the Faculty of Agricultural sciences and food in Skopje, Institute of Animal Production in Skopje and Faculty of Veterinary medicine in Skopje. All the collected tissue samples from gene bank from the autohtonous cattle breed Busha are property of the Ministry of Agriculture, Forestry and Water Economy of the R. of Macedonia.

Conclusions

The aim of the research was to create a gene bank of tissue samples from the autohtonous cattle breed Busha in the R. of Macedonia, as well as to estimate the main productive, reproductive and exterior traits from their phenotypic characterization procedure. For that purpose, 998 samples of blood, 1100 coat hair samples and 958 doses of semen were collected from Busha adult cattle. All the collected tissue samples from gene bank from the autohtonous cattle breed Busha are property of the Ministry of Agriculture, Forestry and Water Economy of the R. of Macedonia. All the collected tissue samples as blood, hair and semen samples are stored properly and periodically maintained and investigated of their quality, and are subject for further analyses on molecular and DNA analyses.

Literature

- Agency of Food and Veterinary (Afv) of RM (2014). Cattle breed structure in Macedonia (<http://www.fva.gov.mk/index.php?lang=mk>).
- Bunevski, G.J. (1994). Improving of domestic cattle busha (seminar paper). 1-61, Skopje.
- Bunevski, Gj., Trajkovski, T., Trifunovic, G., Adamov, M. (2004.). Selection program of cattle in the R. of Macedonia. 16th Symposium on innovation in animal science and production, Biotechnology in animal Science, Belgrade.
- FAO (2014). Annual statistical review. Roma (<http://www.fao.org/home/en/>).
- Ilkovski, R., Trajkovski, T., Bunevski, Gj. (1994.). State and perspective of cattle production in the R. of Macedonia. Meeting Faculty - Farms, Skopje.
- Kume KIRSTAQ, Papa, L., Brka, M., Dokso, A., Zečević, E., Rustempašić, Alma, Ivanković, A., Ramljak Jelena, Ligda Christina, Georgoudis, A., Bytyqi, H., Mehmeti, H., Bunevski, Gj., Marković Božidarka, Marković, M., Stojanović, S., Bogdanović, V., Perišić, P. (2013). Busha - old cattle in the Balkan, ERFP project - Evaluation of current status of busha cattle and develop a regional breeding program for their conservation and sustainable economic use, 1-71.
- Trajkovski, T., Bunevski, Gj. (2006). Cattle breeding. Book, 1-371, Skopje.

KREIRANJE BANKE GENA ZA GOVEDA RASE BUŠA U REPUBLICI MAKEDONIJI

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Izvod: Goveda rase Buša su autohtona rasa goveda na Balkanskom poluostrvu. Ova rasa je deo Nacionalnog Programa biodiverziteta za očuvanje domaćih rasa životinja u Republici Makedoniji. Zbog ekonomskih, kulturoloških i naučnih razloga veoma je značajno zaštititi biološki diverzitet autohtonih rasa kao što su Buša goveda. Cilj istraživanja je bio da se osnuje banka gena za različite sojeve odraslih Buša goveda u Republici Makedoniji. Iz tog razloga, prikupljeno je 998 uzoraka krvi, 1100 uzoraka sa dlačnog pokrivača i 958 doza semena od odraslih goveda rase Buša. Takođe, izvršena je fenotipska karakterizacija odraslih goveda rase Buša, na osnovne proizvodne i morfološke osobine. Tokom poslednjih par godina, postoji jasan negativan trend u veličini populacije goveda rase Buša, u skladu sa opadanjem ruralne populacije u brdsko-planinskim područjima i malog interesovanja mladih ljudi da zadrže domaće rase kao što su goveda rase Buša.

Ključne reči: goveda, Buša, autohtona rasa, Banka gena, biodiverzitet, fenotipske osobine

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