

DEFINING THE BREED STANDARDS AND BREEDING GOALS FOR DOMESTIC MOUNTAIN HORSE

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Abstract

Domestic mountain horse is a transboundary breed present in many Balkan countries. According to the Law of Animal Production of R. of Macedonia from 2008, for every breed of domestic animal in our state it is necessary to create a separate breeding program. In 2013 in law of animal production the autochthonous breeds of equidae are added two new varieties - domestic mountain horse and domestic donkey. Facing the obtained results from estimating the main morphological, reproductive and functional traits in 220 domestic mountain horses in central mountain part of Macedonia during 2015 and 2016, the current standards and breeding goals were defined for the next national breeding program of this breed. According to the fact that the domestic mountain horse is a metapopulation and transboundary breed of horse in almost all Balkan countries, it is a good recommendation to create a regional breeding program with flexible standards and breeding goals for this breed of horses for all Balkan countries together.

Keywords: horse, selection, domestic mountain breed, breeding goals.

Introduction

The Balkan Mountain Horse is the oldest and most versatile horse breed and the only indigenous breed of domestic horse on the Balkan countries, but now sadly close to extinction. It is also known as "Balkan Pony" or "Bosnian Pony", as a result that in ex-Yugoslavia was the main selection of this breed in Bosnia, but spread the genetics in all former Yugoslav countries. The breed has not been substantially affected by importations of foreign horses. It is in some mountain areas the principal, or even the only, means of transportation. The Bosnian pony, or Bosnian Mountain Pony, a small horse, and a breed that belongs to the greater native population of Balkan ponies, was founded in the former Yugoslavia,

especially Bosnia and Herzegovina (Mesaric et al., 2015, Trajkovski and Bunevski, 2007).

Brief history of domestic mountain horse on Balkan areas

The Balkan mountain area is rather difficult to travel, with great differences in altitude and vegetation. The existence of fertile valleys and rough mountains with meager soils are partly responsible for the variation in size found in these ponies (small horses). They are a breed that belongs to the greater native population of Balkan ponies, and as such arguably the one most thoroughly bred. With Turkish invasions and occupation in former times, the horses gained a certain amount of oriental blood, especially in Bosnia and Herzegovina, which makes these horses the most attractive and highly-bred. Traditionally, these ponies were used as mountain pack horses, to a lesser degree as riding ponies. In 1908, an official stud for the mountain ponies was established, which was dissolved only six years later. Then the Bosnian pony received recognition again in 1929, with the establishment of a new stud. The best mares in the country were acquired, which showed no oriental blood, plus a few stallions. It took until 1932 to obtain the stallions that became the foundation sires of the breed as we know it today. The Domestic mountain horse, as ancient Balkan equine breed, is believed to have evolved from cross between the Mongolian Wild Horse and Tarpan. During centuries this ancient domestic horse was crossed with horses from Hunes (IV. Century AC), Slovenian horses from Carpathes (6th century), by horses from Roman Impery (10th century), Avarian horses (13th century), and the largest influence during the Ottoman Empire, the Turks added infusions of Tarpan blood over the years improves the breed (15-19th century). Since the beginning of the 20th century, the Bosnian type of Domestic Balkan mountain horse has been selectively produced at the Gorazde stud in Bosnia and Hercegovina. All the breeding stallions were controlled by the state, and the mares were kept under private ownership at the Borike Stud, which was one of the most important breeding centers in Bosnia and Balkan. From 50s till 90s in last century, this breed was spread in several parts in ex-Yugoslavia, from north to south (Slovenia, Croatia, Monte Negro, Serbia and Macedonia). The most important stallion lines of Bosnian mountain horse were Barut and Mishko, which was spreaded in Macedonia several times in different regions (Skopje region, Tikves, Bitola region, Strumica etc.).



Picture 1 and 2: Domestic mountain horse in Macedonia

Breeding strategies

In different parts of the world, there are several different breeding strategies of animal production, which vary from the different points of view (Baban, 2011, Mitrovic, 2011):

- Balance between profitable, market oriented and sustainable production,
- Results of crossing of breeds (\pm effects),
- How to continue? Breeding for biodiversity aims, for functional traits, or using the heterosis effects or ...?

Biodiversity program in horse breeding in the R. of Macedonia

The National Biodiversity program in Macedonia started from 2014, where in horse breeding a special emphasis was given on 1. Domestic Mountain horse, and 2. Domestic donkey. The program is realised by the following activities: phenotypic characterization of the adult male and female horses, inventarization, as well as conservation of genetic material. Unfortunately, still the main problem for book recording is non-realised identification of all horses in our state, as the only species of domestic animals which is not registered and identified.

Size of horse population the R. of Macedonia

From the total population of horses in 2016 in the R. of Macedonia (19.000 heads of horses), still the dominant breed is domestic mountain horse with its crosses, mainly with some European half-blood breeds of horsers, as well as with Arabian horse (very little amount).

In Macedonia after the II World War is a tradition of rearing half-blood and pureblood horse breeds mainly from middle Europe, aimed for sport and recreation. From 50th till 90th in last century a lot of attention was given to rural development of horse breeding in Macedonia and all other ex-Yugoslavian republics and horse development in rural areas too, with particular emphasis on the following breeds of horses: Lippican horse, Haflinger, Bosnian Mountain horse with the stallion lines from Misko and Barut, originated from Bosnia and Hercegovina.

Table 1. Number of horses in the R. of Macedonia (Annual Statistical Review from MARD, 2017)

| Year | No. of horses | Year | No. of horses |
|------|---------------|------|---------------|
| 1956 | 81.000 | 2001 | 45.638 |
| 1964 | 89.000 | 2003 | 42.883 |
| 1969 | 94.000 | 2005 | 40.391 |
| 1976 | 93.000 | 2008 | 34.400 |
| 1984 | 81.000 | 2009 | 29.418 |
| 1989 | 68.000 | 2010 | 26.658 |
| 1996 | 66.000 | 2011 | 25.415 |
| 1997 | 63.000 | 2012 | 21.676 |
| 1998 | 60.000 | 2014 | 19.368 |
| 2000 | 56.486 | 2016 | 19.263 |

No. of horses

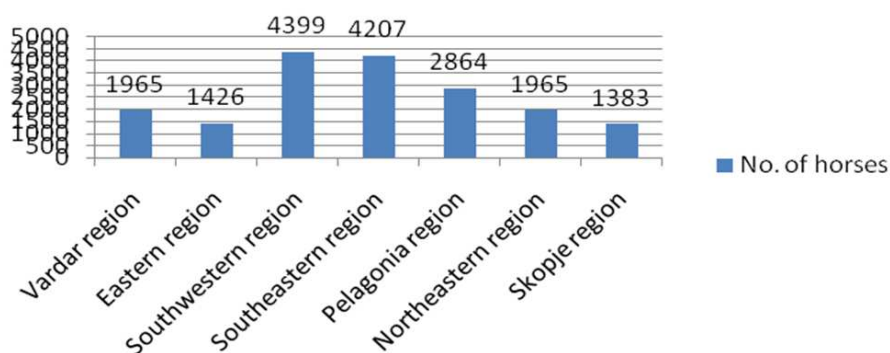


Figure 1. Regional distribution of horses in the R. of Macedonia (MRAD, Annual Stat. Review, 2015)

Today in the R. of Macedonia there are two groups of horse breeds reared for different purposes: 1) horse breeds aimed for sport and recreation, in the Federation of sport horses of Macedonia (Thoroubred horse, Hanoverian, Holstein, Arab, Trakhener, East-Bulgarian, American Pinto, pony breeds etc., and 2) domestic breeds like Domestic Mountain horse, Haflinger and domestic donkey as their relative, aimed for transport and work.

Defining the breeding goals

Theoretically, the breeding goal represents the directed genetic improvement of the certain characteristics realized in successive generations of animals which

accomplish the desired production through the future, but expects economic, social and ecological production conditions (Groen, 2000). The clear definition of breeding goals means what we have to expect in the future. So, definition of breeding goals is the first step of every breeding program for each breed of horse. But for each productive type and breed of horse, there are different separated breeding objectives, depending by different zootechnical, economical and market conditions. From the point of view from the farmers, every breeding goal ought to satisfy 2 main conditions: 1) maximal profit in current productive conditions, and 2) with realization risk in the working limits (Groen, 2000, Drumi, 2011, Mitrovic, 2011). According to the breeding goals, the following breeding and selection program ought to be adapted for each breed of horse, with the emphasis on defining traits, aggregate genotype, variances, covariances, fixed and random effects, heritabilities and other parameters. Finally, all breeding goals are directly or indirectly connected with the profit function on the farm, so they have an economical value.

Material and methods

The phenotypic characterization was done of adult domestic mountain horses in several mountain villages, showed in the following table.

Table 2. Total number of domestic horses with phenotypic characterization in Macedonia in 2016 and 2017

| | Location | Species/breed | Total number of animals |
|---------------|-----------------|-------------------------|--------------------------------|
| 1. | V. Visoka Maala | Domestic Mountain horse | 20 |
| 2. | V. Drzilovo | Domestic Mountain horse | 23 |
| 3. | V. Dobri Dol | Domestic Mountain horse | 31 |
| 4. | V. Malcishte | Domestic Mountain horse | 86 |
| 5. | V. Jabolci | Domestic Mountain horse | 60 |
| Total number: | | | 220 |

Our two autohtonous equidae species (domestic mountain horse and domestic donkey) is still out of the national subsidy program, mainly because of lack of identification of horses in the state. According to the obtained results from the realized phenotypic characterization of adult domestic mountain horses in central part of Macedonia, the following standards and breeding goals are proposed.

Defining the standards and breeding goals for domestic mountain horse in the R. of Macedonia

The main breeding objective for domestic mountain horse is to conserve the breed not to extinct from our region, as well as to have economical and sustainable production in hill-mountain areas. That working ability could be realized by controlling the horses and completing the book recording for them, by proper

identification and registration according EU regulative, selecting by male and female line and improving their morphological, productive and reproductive as well as their functional traits.

Results and discussion

According to the obtained results of controlling of totally 220 heads of domestic mountain horses in several villages in Central Mountain part of Macedonia in 2015 and 2016, the main proposed standards for the Macedonian type of domestic mountain horse is shown in table 3.

Table 3. Standards for the Macedonian type of domestic mountain horse

| Parameters | Standards (average value) |
|--------------------------------|--|
| Height of withers (cm) | 125 (120-138) |
| Height of back and loin (cm) | 127 (120-140) |
| Body length (cm) | 128 (120-145) |
| Chest circumference (cm) | 145 (130-160) |
| Chest wight (cm) | 30 (25-40) |
| Cannon circumference (cm) | 16 (14-18) |
| Chest depth (cm) | 56,5 (50-64) |
| Body mass (kg) | 250 (females) to 300 (males) |
| Coat Color | Brown, black and grey |
| Ramp | Obliquely and round |
| Chest | Deep and not so width |
| Head | Heavy and dry, with straight face profile |
| Neck | Short and muscular, flat withers |
| Shoulders | Long and inclined |
| Back | Mainly straight |
| Quarters | Sloping |
| Legs | Short and muscular, with broad joints and strong tendons |
| Gaited | Well movement, sure-footed |
| Constitution | Strong constitution and good health |
| Fertility | Very good |
| Adaptation and acclimatization | Excellent, well adapt in farch environment |
| Longevity | Relatively long |

Comparing with the main reproductive traits for domestic mountain horses in the other Balkan countries, it is similar with the neighbouring countries (Mesaric et al., 2015, Trailovic et al, 2011), but for morphological traits the Macedonian type of

domestic mountain horse have smaller values mainly due to the natural environmental conditions. According to the standards of breed, the main breeding goals for the domestic mountain horse in the R. of Macedonia are presented in table 4.

Table 4. Main breeding objectives for the domestic mountain horse in the R. of Macedonia

| Parameters | Breeding goals |
|--|--|
| Main breeding goal | Conservation of the genotype and increasing the purebred animals under control |
| Height of withers (stallion/mare) (cm) | 135/130 |
| Height of back and loin (cm) | 130-135 |
| Body length (cm) | 130-135 |
| Chest circumference (cm) | 145-160 |
| Chest wight (cm) | 30-40 |
| Cannon circumference (cm) | 16-18 |
| Chest depth (cm) | 60-65 |
| Coat Color | Brown, black and grey, rarely chestnut, bay, dun |
| Rump | Obliquely and round |
| Neck | With middle length, strong and muscular |
| Fundament (legs) | Strong, dry with correct position, muscular with strong ligaments and hoofs |
| Chest (barrel) | Strong constitution and good health |
| Head | Small and dry, with plate face profile |
| Body weight of mares | 250-300 kg |
| Body weight of stallions | 300-400 kg |
| Constitution | Strong constitution and excellent health, with excellent indurance |
| Fertility | Excellent |
| Adaptation and acclimatization | Excellent, with good natured temperament and docile personality |
| Longlasting | Relatively long |
| Other important functional traits: | bigger capacity for growing, better working ability, larger body frame, as well as other traits connected with their resistency, good milk and meat quality, sustainability, longlasting and efficiency. |

About the morphological traits, the main emphasis is given to selecting of bigger animals (with more than 125 cm of wither height), with large and long

bodies, which can have a good ability of consumption of big amount of forage crops. Legs ought to be thin, with derisable pasture, and with strong and healthy hoofs. At functional traits, specially desirable animals are those with a good resistance on diseases, with good longlasting, good fertility, early maturing, easy delivering, and with well growing (daily gain). Young mares ought to have a faster development and to have approximately 200 kg of body weight at 24 months of age at the first mounting (insemination), i.e. 33 to 35 months of age on their first delivering.

The additional activities, for improving the sustainable production and rearing of domestic mountain horse could be:

- Crioconservation of breed in-sity and ex-sity,
- Improving the quality traits in horses,
- Taking a part of the programs for rural development, agritourism, recreative purposes and mounaining,
- Taking a part of the programs for hyppotherapy and medical tourism,
- Improving the daily and meat performances of horses for producing some traditional products, etc.

Breeding methods of domestic mountain horse

The main recommended method of breeding the domestic mountain horse in breeding in pure breed (pure rase). It can be: a) very close, b) close) and c) moderate. The first two submethods are very risky and could be damage, if it is out of expert control, good selection of parents and without good rearing conditions. Particular importance is giving to imbreeding coefficient and depression in the controlled population (Baban, 2011, Trajkovski and Bunevski, 2007).

Future Breeding program for Domestic Mountain Horse in the R. of Macedonia

Every breeding program has the following steps of its realization: 1) defining the breeding goals, 2) defining the breeding program, defining the selection criteria, 4) creating of breeding scheme, 5) creating a breeding structure, 6) creating the mating plan, 7) progeny controlling, and 8) economical analyses of the breeding program.

According to the Low of Animal Production (2008), in 2010 was prepared the Common Breeding Program for Livestock Selection (CBPLS) by the Ministry of Agriculture. In the Breeding program for domestic mountain horse, totally there are a lot traits are taken in account, divided in several groups of traits: a) Productive and reproductive traits, b) Exterior traits, c) Linear traits, d) Other functional traits (Ivankovic et al., 2014, Trailovic, 2011).

Conlusions

According to the controlled traits and obtained results of morphological and reproduction traits in 220 domestic mountain horses in central mountain part of Macedonia, the proposal standards and breeding goals were define for preparing the future breeding program for the autohtonous breed - domestic mountain horse

in the R. of Macedonia. According to the fact that the domestic mountain breed is a metapopulation and transboundary breed of horse in almost all Balkan countries, it is a good recommendation to create a regional breeding program with flexible standards and breeding goals for this breed of horses, from Slovenia (with established International Breeding organization for Bosnian Mountain Horse), Croatia, Bosnia and Hercegovina (with previous main selection experience for this breed), Serbia, Monte Negro, Kosovo, Albania, Greece, Bulgaria, Turkey and Macedonia as well.

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