

A decade of implementing the preservation program in Slovenian indigenous breed Posavje horse – an overview

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Abstract

One of the Slovenian indigenous horse breeds is Posavje horse, which has also been traditionally reared in Croatia. The purpose of this paper was to assess the progress of the Posavje horse population achieved in the recent years, from a perspective of the breed's preservation in Slovenia. The estimated population size in Slovenia for year 2016 was 1750 animals (660 breeding mares and 95 breeding stallions). Over the 11-year period, Slovenian Posavje horse population has increased and its size has been stable since 2014. Genetic trends for some conformation traits (gait correctness, 4 indexes, overall score) are shown, using standardised estimated breeding values (BV12). The data used for the evaluation of genetic changes included 1032 data records from Posavje horses born between 2000 and 2012. In general, the trends of genetic changes were not clear. Most cases of mildly positive trends referred to the breeding mares. Analysis of genetic changes showed the population is generally stable and it does not change. Horse selection in Slovenia is based on phenotype values instead of estimated breeding values, and the number of animals included in the data record is very small. Therefore, the results are expected. In the future, effort to increase the numerosness of the population and to implement breeding value based selection should be made.

Introduction

Posavje horse is defined as one of the Slovenian indigenous horse breeds. It is named after the area of origin, Posavje region, which still represents the traditional location of the majority of Slovenian population. Today, the breed is widespread all over the country. The breed originates from a population of a smaller type indigenous horses, reared in the Slovenian-Croatian Sava river basin. That population was crossed with horses of different, mostly coldblooded breeds (e.g. Belgian coldblooded type, Nonius,...), without any pre-planning or breeding goals set, forming the Posavje horse as it is known today. The herdbook for Posavje horse is kept in Slovenia and Croatia since 1993, as these two countries represent the breed's main rearing area (RUS 2010; BOJKOVSKI et al. 2014).

Posavje horse breed was formed in moderate environment of tough survival conditions, which has made these animals very resistant and adaptable. Nowadays, Posavje horse is also known for its expressive sexual dimorphism, early breeding maturity and good fertility, as for its calm

and pleasant temperament. From a perspective of the economic crisis and still ongoing consequences, its good feed conversion, fast growth rate and excellent carcass traits have become quite favourable (VEJNOVIČ 2008; RUS 2010; BOJKOVSKI et al. 2014).

Slovenian Posavje horse is a small framed horse. It has a thin head, straight nose profile and a muscular neck with a tick, wavy mane. Its body is wide, very deep but short, with a muscular back and short, down-casted, split croup. Its legs are furry and rather thin but strong, with well - formed joints, allowing correct and efficient gaits. Most common fur colour is brown or black. Posavje horse is known as light to medium heavy, nimble and persistent horse. Farmers use it for farm labour or for cargo transport. It is used as a carriage horse, and sometimes for recreational, terrain riding (RUS 2010; BOJKOVSKI et al. 2014). The main breeding direction of Slovenian population of the Posavje horse is the production of slaughter animals and horse sale to the meat industry (BOJKOVSKI et al. 2014).

A status of breeding organisation has belonged to the Slovenian association of breeders of the Posavje horse since 2006. It includes more than 200 members and is responsible for the breeding tasks, such as maintaining the member and animal registry, executing educational and promotional activities (exhibitions and auctions), breeding and slaughter animals' marketing, collaboration in herdbook admissions, selection and licencing of breeding stallions, stallion management, use and exchange, and organising the work ability test. It takes care for identification and registration of Posavje horses in Slovenia and generally cooperates with the Biotechnical Faculty and the Veterinary Faculty, University of Ljubljana (RUS 2010).

Total estimated population size of Posavje horse animals in Slovenia for 2016 was 1750 horses, where 660 breeding mares (38% of total population) and 95 breeding stallions (5% of total population) have been registered to the herdbook. On average, Posavje horse breeding stallions are aged 5 – 15 years, with 1 – 140 registered progenies per stallion (Registry of equine... 2016; MESARIČ 2016).

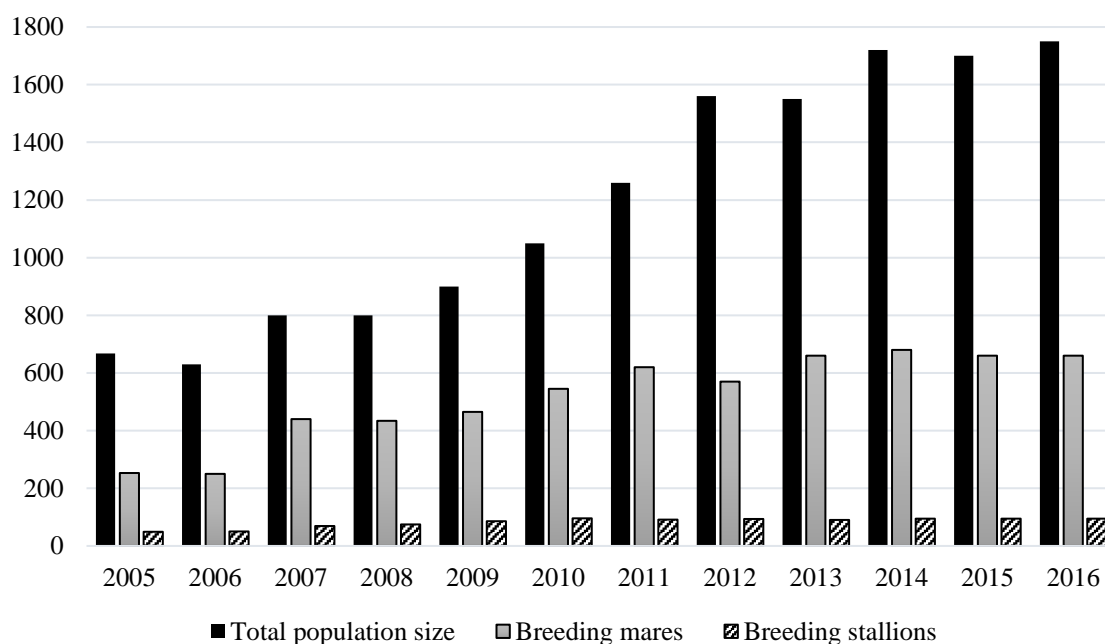


Figure 1: Change in Posavje horse population size between years 2005 and 2016

Over the studied 11 - year period the estimated number of animals in Slovenian population has been rising (fig. 1). The sudden increase seen in 2010 and later on, is mostly due to a larger extent of breeding animal registration and not actual increase in their numerousness. Interestingly, at the beginning of the economic crisis in 2008, no significant reduction of animal number can be seen, although the reduction commonly occurred in other Slovenian horse breeds. The economic circumstances negatively affected the breeding animals' market, yet the number of Posavje breeding mares has slightly increased and has remained unchanged. The number of breeding stallions has also not changed significantly. This is, presumably, due to the meat production breeding direction. The current state of Slovenian Posavje horse population size is stable.

The present level of threat for Posavje horse in Slovenia was assessed by four criteria: regarding the criteria of "reproduction ability" (the number of purebred breeding mares and stallions in herdbook) the population is considered to be endangered. It is considered to be vulnerable following the criteria of "population trend" and "purebred mating percentage". The size of the effective population is small, which is understandable for the total population size is also small (although slowly increasing) and its numerousness in recent years has not fundamentally changed. The number of breeding stallions, which has the main role in assuring genetic variability (inbreeding prevention), is sufficient relatively to the total population size. In compliance with the criteria "inbreeding coefficient" and "geographical spread", the Slovenian Posavje horse population is considered to be critically endangered. Since the population is small, the main threat is represented by great potentiality of inbreeding. The proposition to make genealogical separation of the breeding stallion lines has emerged, and it is believed to relieve a choice of mating partners and mating plan structure. A positive assessment regarding the geographical spread of the Posavje horse is the reflection of the breed's presence in Croatia (Pravilnik o ohranjanju... 2004).

Materials and methods

Trends of genetic changes for body traits in Slovenian Posavje horse population have been estimated. Genetic changes are shown on standardised breeding value scale (BV12). For standardisation, a mean of 100 points is used, whereas 12 points represents one standard deviation. Trends are based on standardised breeding values (BV12) for 1032 horses born in 2000 – 2012. For breeding value estimation data of 885 breeding mares and 147 breeding stallions were used.

In Slovenian horse selection 22 body traits are scored or measured. Scored body traits (12) are breed type, head, neck, front part of body, middle part of body and rear part of body, front and rear legs, gait correctness and efficiency, and overall score. Measured body traits (7) consists of croup height and width, body length, wither height, chest girth, chest depth and chest width, and cannon bone girth. Also 4 indexes are determined, reflecting body proportions. For the analysis of variance, performed by statistical software package SAS/STAT, animal model was used:

$$y_{ijkl} = \mu + G_i + B_j + A_k + a_{ijkl} + e_{ijkl}$$

where y_{ijkl} represented observed trait (body trait, index or overall score (22)); μ estimated overall mean; G_i fixed effect of gender (i = male, female); B_j fixed effect year of birth (j = 2000,

2001,..., 2012); A_k fixed effect of age at scoring ($k = 2.5-3.5$ years, $3.5-5$ years); a_{ijkl} additive genetic effect and e_{ijkl} residual.

Results and discussion

Greater differences between animals within different birth year, noticed in stallions, are the expected consequence of a smaller number of scored animals (fig. 2, 3).

Minor indication of a positive genetic change can be seen for gait correctness (fig. 2) in mares. Indexes between 2 traits (chest width-wither height; chest depth-wither height; croup width - wither height; cannon bone girth-wither height) and the overall score as a sum of all scored traits (fig. 3, 4), also show a positive trend especially for mares. That means the female population of Slovenian Posavje horse reflects phenotype changes, which are in compliance with the breeding goals.

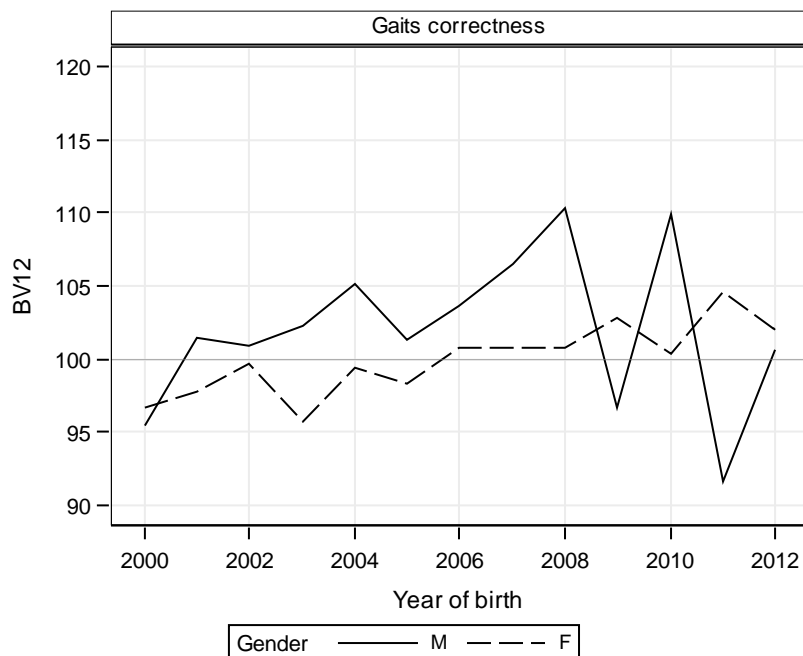
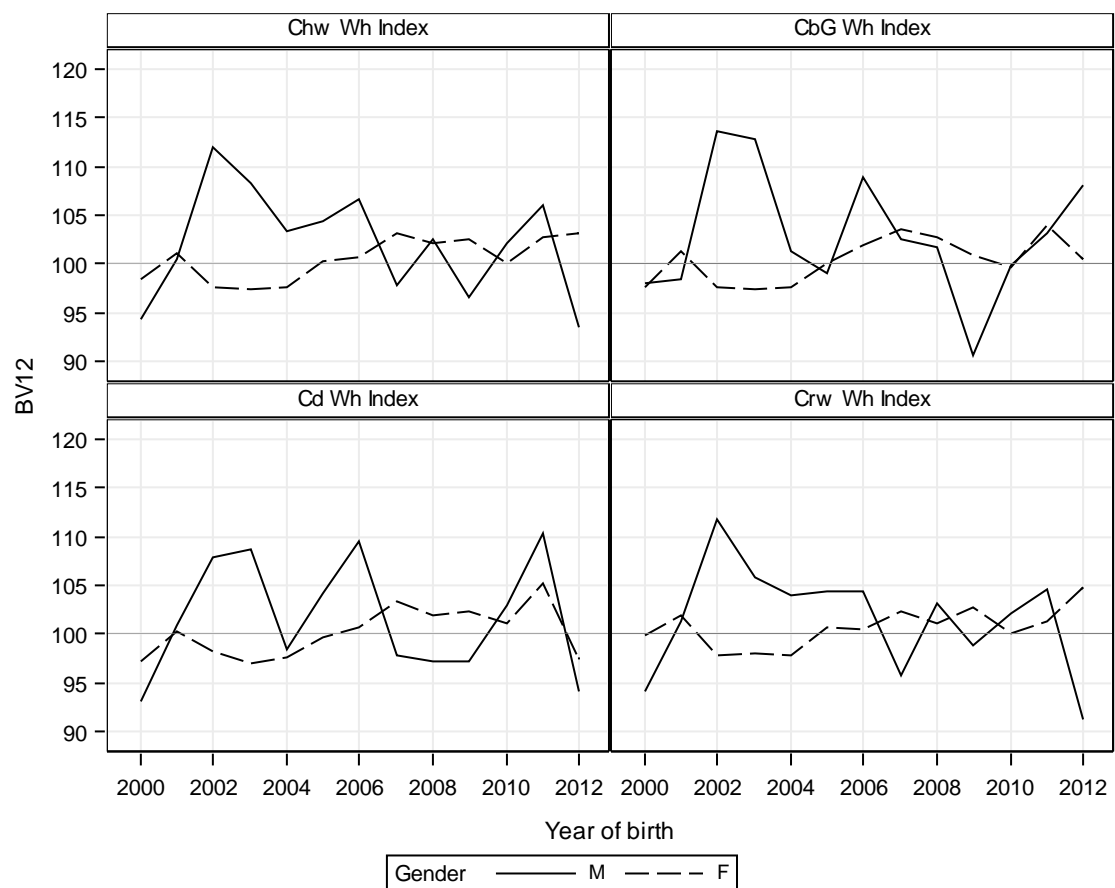


Figure 2: Estimated genetic changes for gait correctness

Body volume measurements (chest width/girth/depth; croup width) showed a very slight, positive trend for the female part of Slovenian Posavje horse population, and no distinguishable trend for the male part of the population. This could be explained by continued decrease in the number of scored stallions within the year of birth. Estimated genetic changes of scaled traits, considering head, rear legs, body and breed type showed minor positive trend for both genders. There were no noticeable population changes regarding body frame measurements (body length, croup height, wither height), front legs and gait efficiency. For the most traits the trends were not remarkable, hence they are not shown in the paper.

Among all the studied traits, estimated genetic changes showed the most positive trend for overall score (fig. 4). This is an evidence that selection of Posavje horses in general, is going in a direction towards the breeding goal.



Chw: chest width; Wh: wither height; CbG: cannon bone girth; Cd: chest depth; Crw: croup width

Figure 3: Estimated genetic changes for indexes

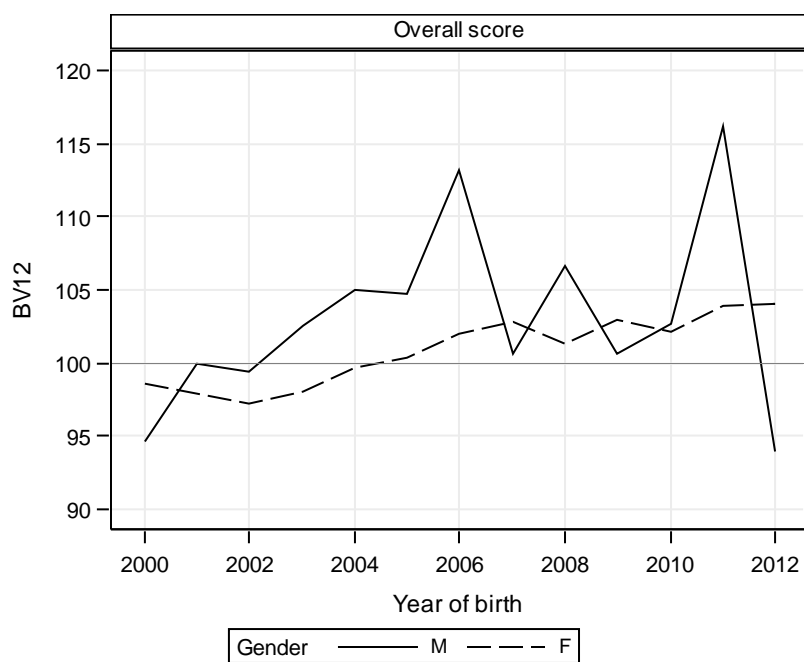


Figure 4: Estimated genetic changes for overall score

Conclusion

The population of purebred Posavje horses in Slovenia has been slowly but constantly increasing since 2006. It seems that its total size has not been affected by the conditions of economic crisis. This is probably due to the production of meat as a main breeding direction. Nevertheless, the number of breeding animals is more or less stagnant. That is a positive fact when compared to the population state of other horse breeds in Slovenia and Europe. On the account of current weak enquiry on the market, breeding animals are hard to sell.

Overall, the estimated genetic changes in Slovenian Posavje horse population are quite small or seemingly non-existent. Since the selection of these horses is based on phenotypic values instead of estimated breeding values, trends of genetic changes such as the ones shown are expected. In Slovenian horse selection, estimated breeding values should become first and the most important criteria of consideration.

The breeding value based selection of the Posavje horse could become more interesting and effective in practice with the possibility of merging the Slovenian and Croatian Posavje horse population data.

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