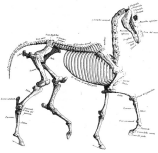


Morphometric description of the Noriker horse breed in Austria



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Introduction:

The Noriker breed is an autochthonous draft horse breed in Austria with a breeding history reaching back to the 15th century.

Because of the baroque breeding period, sophisticated coat colours like black Roan, Leopard and Tobiano are still present.

Due to the agricultural mechanisation starting in the 1950's the population size decreased.

Currently the breeding population comprises of 3600 mares and 170 stallions.

The aim of the study is to show the effects of different elements of the structure of the Noriker horse population on morphology, as selection in this breed is based mostly on conformation traits.



Fig. 2: Geographic map of Austria with the breeding regions Carinthia (105 horses), Styria (40 horses), Salzburg (200 horses), Tyrol (25 horses) and Upper Austria (79 horses)

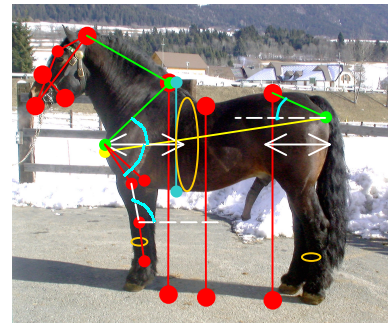


Fig. 1: Linear, angular and circular measurements used in this study

Material and Methods:

33 body measurements from 449 Noriker horses in 5 breeding areas.

The log data of 25 linear measurements illustrated in Figure 1, was used in canonical discriminant analysis (ellipsoids containing 75% of the data).

Differentiation by:

- 5 breeding areas (Figure 2)
- 6 coat colour types: Roan (29 horses), Leopard (42 horses), Tobiano (7 horses), Brown (100 horses), Chestnut (107 horses) and Black (154 horses)
- 4 classes of breeding values.

Results:

The plot of the first two canonical axes by breeding area, Fig. 3, shows the original breeding area, Salzburg, in the center, with Carinthia, Upper Austria and Tyrol moving away in different directions. The Mahalanobis distances between these groups were all significant. The differentiation is due to separate founder populations in Carinthia and Salzburg, and to different breeding goals.

In the plot of the first two canonical axes by coat colour, Fig. 4, Tobianos are most distinct (all Mahalanobis distances significant). This structure can be explained by different family structures in the colour groups.

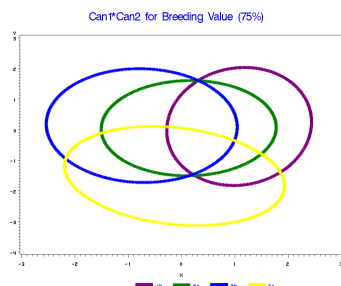


Fig. 5: Plot of the first two canonical axes for for classes of breeding value

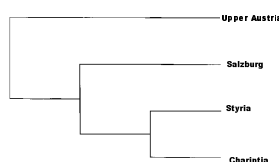


Fig. 6: UPGMA tree for stallions of four breeding areas

The plot of the first two canonical axes by breeding value, Fig. 5, shows a horizontal separation from the best exterior class 1b (44 horses), to the 2a class (274 horses) and 2b class (110 horses). The 3a class (21 horses) is separated and represents horses with poor quality. From ANOVA we know that the breeding values are highly correlated with height at withers, body length, heart girth and cannonbone circumference of a horse.

In Fig. 6 an unrooted tree (UPGMA) based on Mahalanobis distances of 85 stallions for four breeding areas, is shown. 7 stallions of Upper Austria represent quite large Noriker horses, whereas 29 Carinthian stallions and 8 Styrian stallions represent a lighter type. Breeders are of the opinion that the original Noriker Type is represented by Salzburg's stallions (39).

Can1*Can2 for Breeding Area (75%)

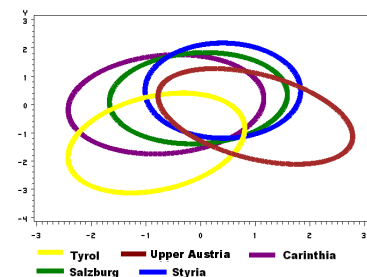


Fig. 3: Plot of the first two canonical axes for different breeding areas

Can1*Can2 for Colour (75%)

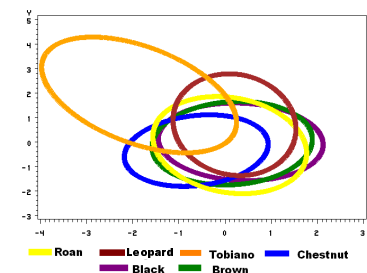


Fig. 4: Plot of the first two canonical axes for six colour groups

Conclusions

- Of the effects examined, classes of breeding value (derived from exterior classification) provide the clearest differentiation. A trend to bigger draft horses, like in South Germany is evident.
- The different breeding areas reflect this trend, with a decline in size from north to south (Upper Austria – Carinthia).
- Coat colour groups showed also morphologic differentiation, due to a very narrow family base for some of the colours.