

CONSERVATION GENOMIC ANALYSES OF CROATIAN AUTOCHTHONOUS PIG BREEDS

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ABOUT BREEDS



BLACK SLAVONIAN PIG

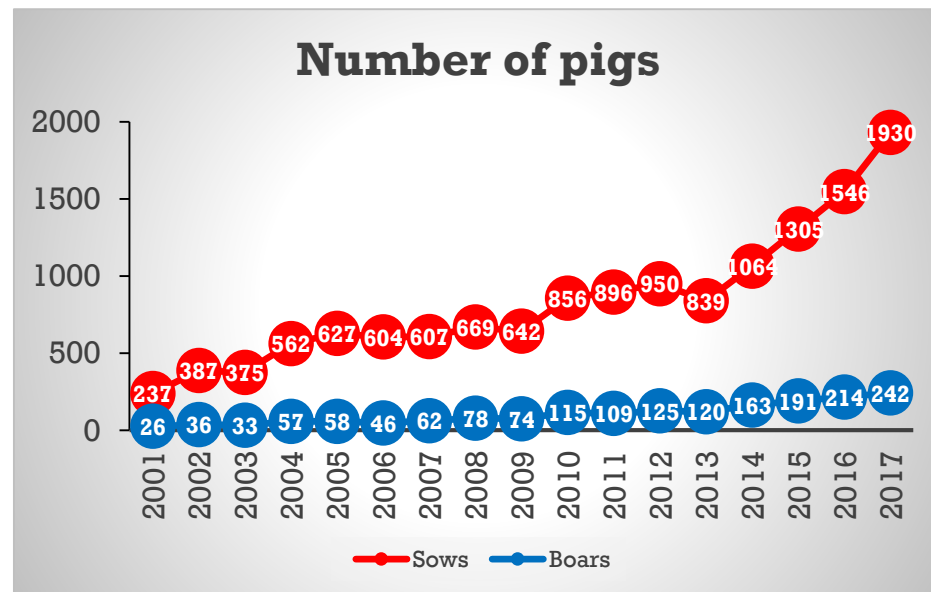


- created by earl Pffeifer in the second half of the 19th century

Mangulica x Berkshire

x USA Poland China

- 6 – 8 (10) piglets
- extensive or semi-extensive system
- great capacity to accumulate intramuscular and epidermal fat
- optimal slaughter weight ≥ 180 kg
→ ≥ 18 months



ABOUT BREEDS



TUROPOLJE PIG



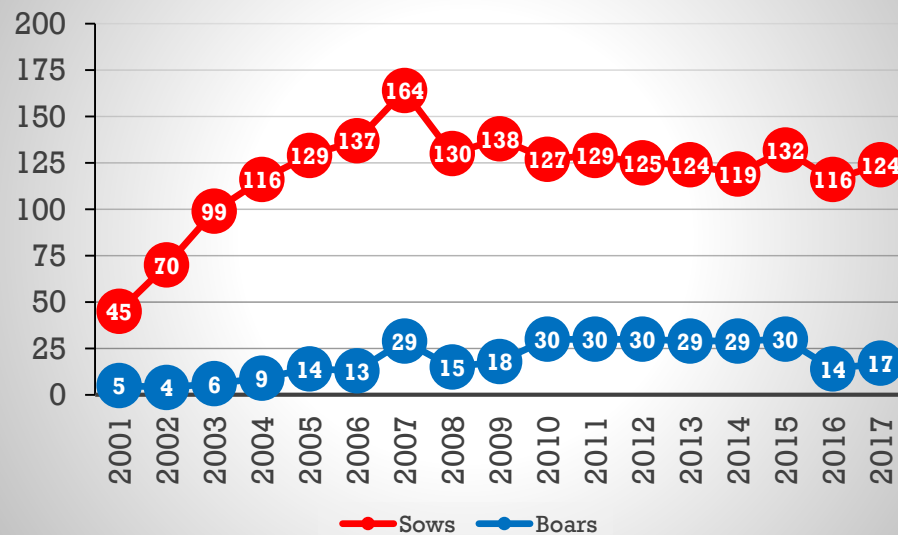
- Primitive old breed
- First written record from 1352)

Krškopoljska x Šiška

later in 1840 x unknown (Berkshire?)

- 6 – 7 piglets
- extensive system - traditional feeding based on acorns
- weight ≥ 200 kg \rightarrow 24 months

Number of pigs



MATERIALS & METHODS (ANIMALS)

Selection of 666 animals from 29 domestic breeds and from 6 wild populations (Yang et al. 2017) - 15-20 per breed

- Wild
 - Croatian
 - South Balkan
 - Italian
 - Sardinian
 - NE Europe
 - Iberian
- UK & USA
 - UK Berkshire
 - UK Hampshire
 - Gloucester Old Spot
 - Tamworth
 - Large Black
 - British Saddleback
- Italy
 - USA Berkshire
 - USA Hampshire
 - Guinea Hog
 - USA Feral
 - Mulefoot
 - Poland China
 - Cinta Senese
 - Calabrese
 - Casertana
 - Nera Siciliana
- Iberian peninsula
 - Iberian pig
 - Chato Murciano
 - Bisaro
- Central & South America
 - Guatemala Creole
 - Argentina Semi Feral
 - Brazil Monteiro
 - Peru Creole
- Continental Europe
 - Hungarian Mangalica
 - German Angler Sattle
 - Czech Prestice
 - Poland Pulawska Spot
- Comercial
 - Pietrain
 - Landrace
- + ▲ Black Slavonian (16)
- + ● Turopolje (16)



M & M - QUALITY CONTROL

Illumina Infinium
PorcineSNP60 v2
BeadChip



- GC score ≤ 0.7
 - GenTrain score ≤ 0.4
 - Only autosomal SNPs with known position
 - Gen Call > 0.9
 - Animals with $< 5\%$ missing SNPs
- 45 000 SNPs

M & M - ROH DETECTION AND INBREEDING LEVELS ESTIMATE

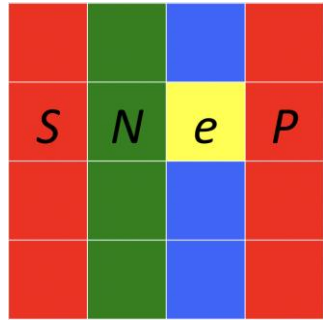


- min. 15 homozygous SNP in row
 - min. density 1 SNP every 100kb
 - no consecutive heterozygous calls
 - max. gap between 2 SNP ≤ 1000 kb
-
- ROH > 4 Mb $\rightarrow F_{\text{ROH} > 4\text{Mb}} \rightarrow 12.5$ gen ago
 - ROH > 8 Mb $\rightarrow F_{\text{ROH} > 8\text{Mb}} \rightarrow \approx 6$ gen ago
 - ROH > 16 Mb $\rightarrow F_{\text{ROH} > 16\text{Mb}} \rightarrow \approx 3$ gen ago

Ferenčaković et al. 2013 GSE



M & M - EFFECTIVE POPULATION SIZE ESTIMATE



- $MAF < 0.05$
- N_e from LD (Corbin et al., 2012)



$$N_{T(t)} = \frac{1}{(4f(c_t))} \left(\frac{1}{E[r_{adj}^2 | c_t]} - \alpha \right)$$



M & M - PCA ANALYSIS



RESULTS (PCA ANALYSIS)

■ Wild

■ UK&USA

■ Iberian peninsula

■ Italy

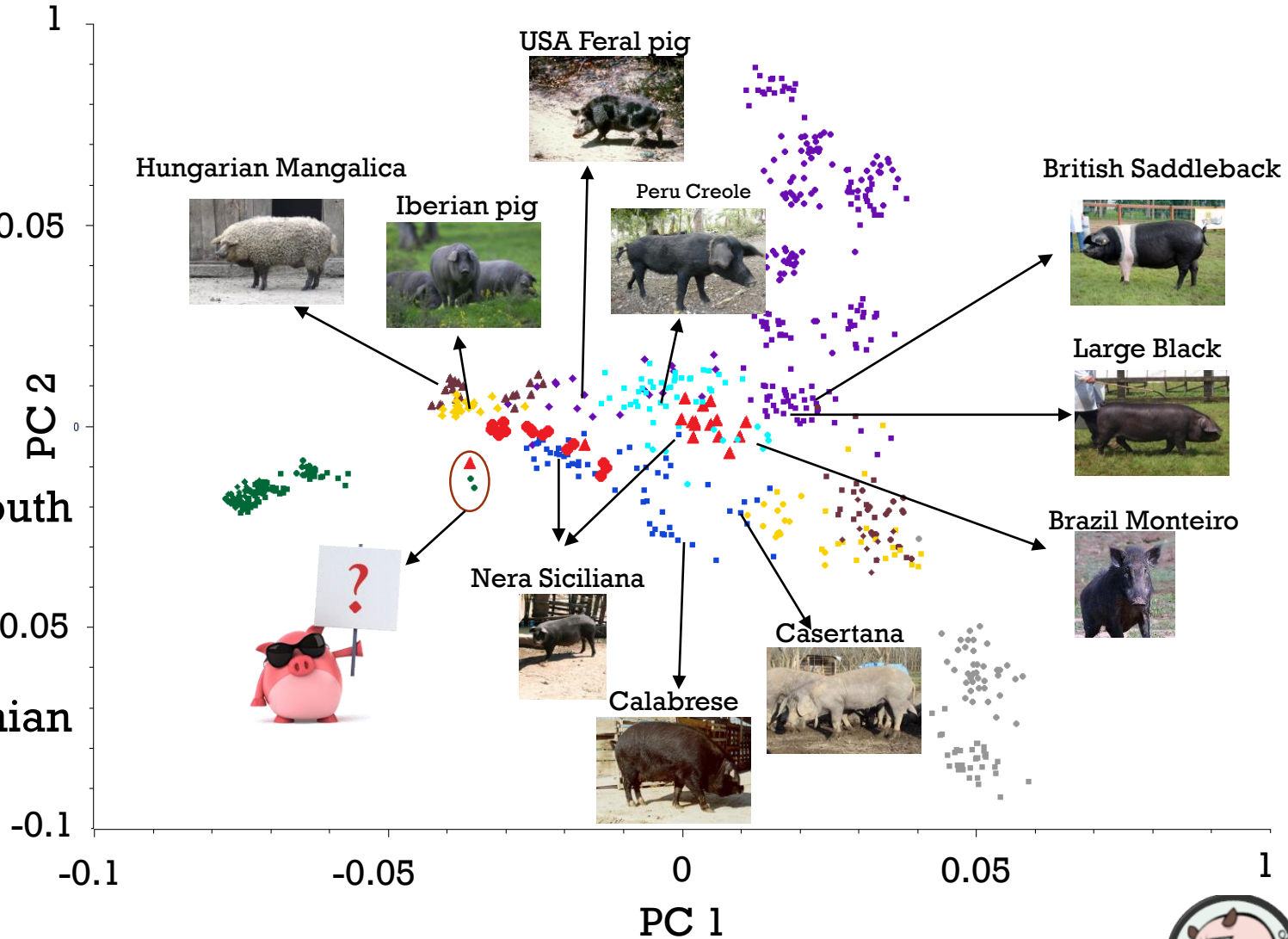
■ Continental Europe

■ Central & South America

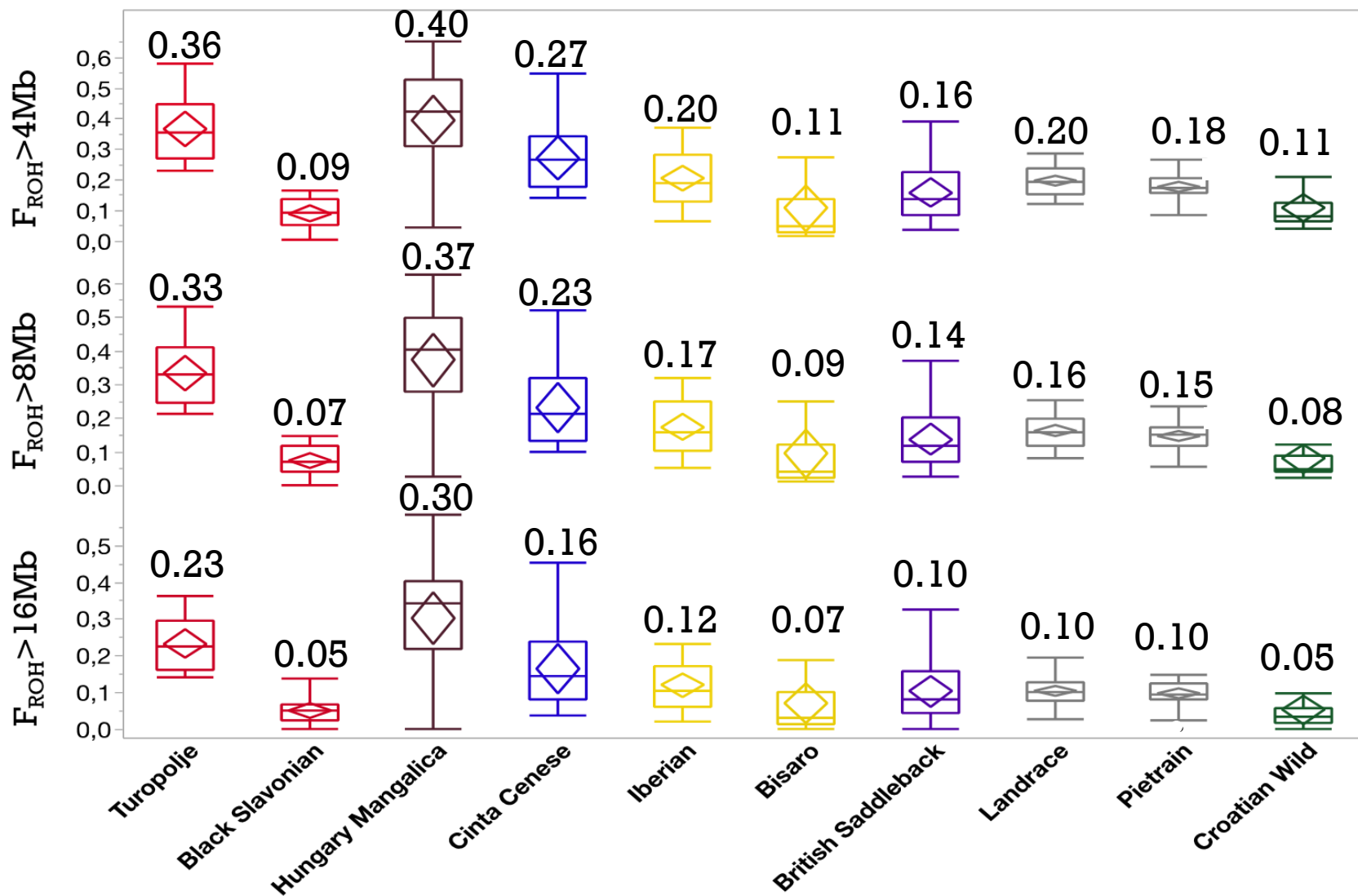
■ Comercial

▲ Black Slavonian

● Turopolje

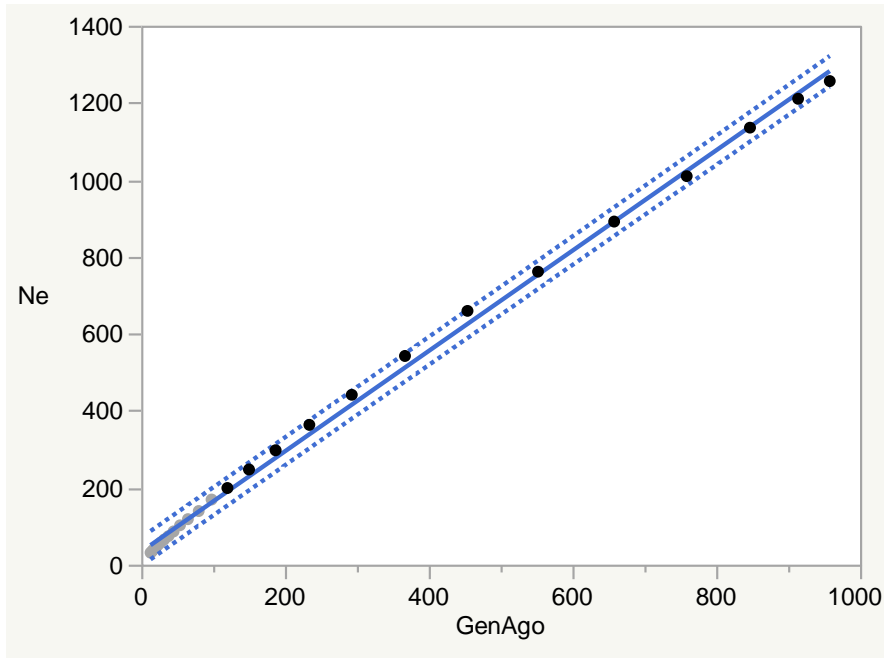


RESULTS (INBREEDING LEVELS)



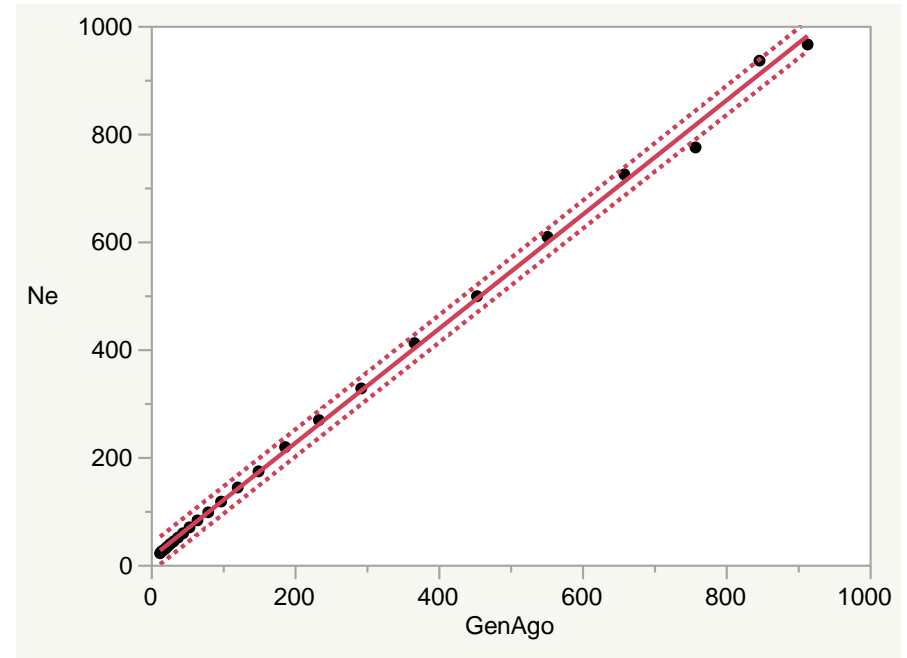
RESULTS (EFFECTIVE POPULATION SIZE)

BLACK SLAVONIAN PIG



$Ne_0 = 33.45$ (95%CI; 24.21 – 42,76)

TUROPOLJE PIG



$Ne_0 = 12.19$ (95%CI; 5.66 – 18.72)



CONCLUSIONS

Black Slavonian

- Good management and marketing of the product lead to increase in number
- Inbreeding is small compared to other breeds
- Effective population size should be monitored
- Closer to the USA and UK breeds

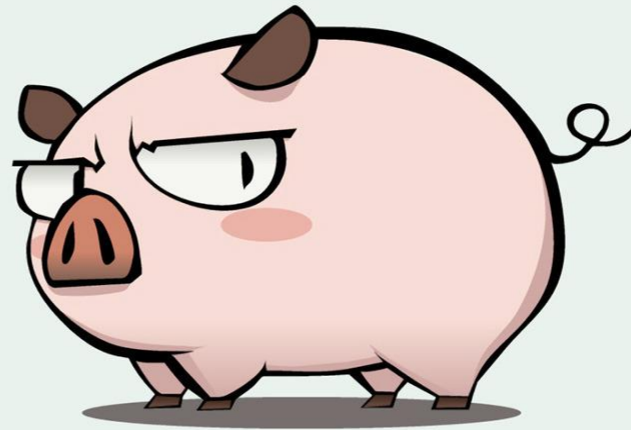


Turopolje

- Near to extinction
- High inbreeding levels
- Low effective population size
- Closer to old and Mediterranean autochthonous breeds
- Much joint effort should be put in revitalisation of the breed
- Need for good sustainable strategy of preservation



DON'T MESS WITH THE PIG



Thank you for your attention!



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