

First approaches for a combined use of microsatellites and pedigree data to estimate relationships

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The message

Estimating relationships to measure and manage *intra*-breed genetic variability

Traditional estimation based on: **Pedigree** (often incomplete or limited in depth, very informative for close relations)
Genotypes (very informative, expensive)

→ **Combined use of pedigree and DNA information** avoid losing information

Objective

Estimating relationships in the Skyros pony breed by combination of DNA and pedigree information

Methods

Estimation of the relationships thanks to:

- Lynch & Ritland (L&R) estimator
- Combined estimator → $Cr_{XY} = 0.5 * [\omega * r_{XY} + (2 - \omega) * PIC_m * r_{XY, mol}]$

Comparison

- Correlations (Pedigree vs. Estimation)
- Principal Component Analysis (space representation of the results)

DNA coefficient: depends on total allelic relationship

Weighting: depends on generation equivalent

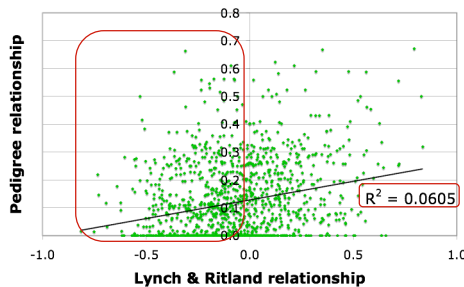
Reference data

- Skyros pony breed
 - Indigenous local breed
 - 3 sub-populations
- Preliminary studbook of the breed
- DNA analysis of 99 hair samples

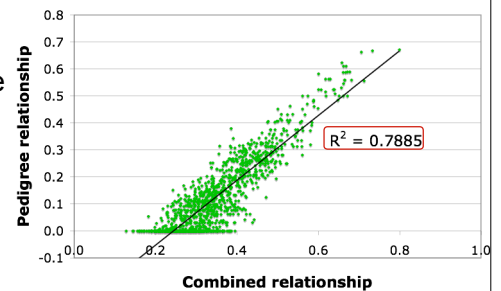


Results

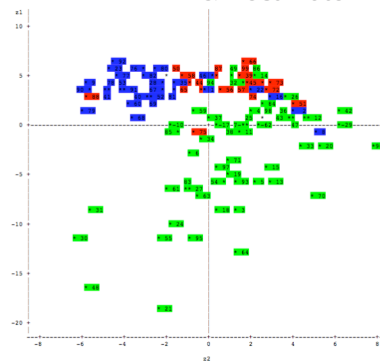
- No correlation between pedigree coefficients and L&R estimated coefficients, high percentage of negative value (> 75%)



- High correlation between pedigree coefficients and combined coefficients



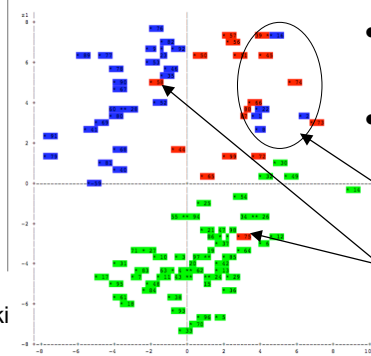
L&R estimator



- No real distinction between the three sub-populations of horse

Green = Skyros
 Blue = Thessaloniki
 Red = Corfu

Combined estimator



- Distinction between the 3 sub-populations
- Few exceptions
 - ✓ Animals with descendants only in another sub-population
 - ✓ Animals with no descendant and parents from another sub-population

Conclusions

Classical DNA-based estimators assume **zero relatedness between sampled individuals** → often not the case in small and/or captive populations → negative values

Combined estimator → **pedigree corrected the DNA-based estimation for close relationships** between sampled animals → reflects better the reality for small population