Determining breed purity in native Dutch cattle with a DNA test to increase number of breeding animals

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Goal

Increase the purebred breeding population of native Dutch dual-purpose cattle breeds.

Develop an easy applicable, high accurate DNA-test for the purpose of breed purity determination for unregistered breeding animals where pedigree is unknown or unable to verify with traditional methods.


Groningen White headed


Dutch Red and White Friesian


Dutch Friesian


Deep Red Cattle

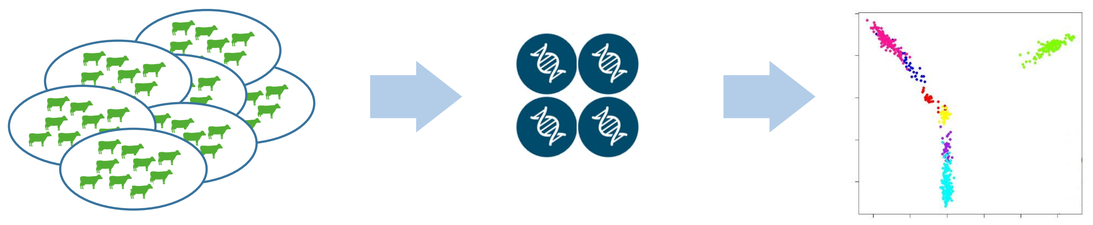

Dutch Belted


Meuse-Rhine-Yssel

Photos: Veeteelt and CGN

Native Dutch dual-purpose cattle

Development steps



1. Compiling reference populations
2. DNA typing
3. Selecting informative SNPs
4. Detecting probability settings STRUCTURE software
5. Validation with known pure- and crossbreds
6. Testing animals with missing pedigree data

Results

A reference population of 572 purebred animals with known pedigree and breed of origin including 6 native Dutch cattle breeds and Holstein Friesian.

A limited number of 133 SNPs can discriminate the breeds.

Using STRUCTURE and pre-specifying the reference population resulted in 88.9% correctly classified individuals.

Conclusion

An easy applicable and accurate DNA-test was developed succesfully

Background

Breed registries have been established to maintain purity of cattle breeds and document ancestry of animals. The number of registered purebred breeding females of many local breeds is so low that they are “at risk”. Including unregistered animals belonging to the same breed will improve the situation, but due to missing and incomplete pedigree data this is generally not possible.

A DNA test was developed to confirm breed purity of unregistered animals in order to increase the number of herd book registered breeding animals

Implementation

The DNA-test has now been implemented in practice and herd books are increasing their breeding population by registering purebred animals without pedigrees, on the basis of DNA test results

Protocol DNA-test

1. Breed society identifies candidate animals
2. Phenotype check by breed society
3. Perform DNA test
4. Herd book registration

Reference
Ina Hulsegge, Mira Schoon, Jack Windig, Marjolein Neuteboom, Sipke Joost Hiemstra and Anouk Schurink, 2019, Livestock Science 223:60-67

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