Genetic analysis to support the re-establishment of the Kempen breed

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The Kempen cattle breed is a local dual purpose cattle breed from the north-eastern part of Belgium. Since the 1950s, emphasis was put on milk production and Kempen cattle were crossed with Dutch MRY and Red Holstein bulls. In 1972, the herd book was renamed red-pied breed of Belgium. In 2012, due to the insistence of farmers, a herd book was re-established. However many animals are still unregistered and pedigree information is absent. Therefore the genetic diversity and population structure of the breed and the amount of genomic information shared with related breeds was evaluated. For the Kempen breed 340 samples were genotyped with Illumina 54k SNP and for 9 others breeds, 421 samples were available. PCA analysis was used to evaluate the population structure within the Kempen breed. Due to the absence of a breeding goal, there is substantial variation between the farmers. However the breeding bulls included in the analysis are positioned central in the population, ensuring a more uniform population in the next generation. Unregistered Kempen animals were identified and the effective population size was estimated to be 67. Further inbreeding values based on runs of homozygosity and F-statistics have been analysed. PCA analyses revealed that the breeds Eastern Belgium Red Pied, Improved Red Pied and Brandrood are genetically similar to the Kempen population. Furthermore the admixture events between the Kempen breed and related breeds were evaluated. These genomic analyses may help to preserve genetic diversity in the Kempen breed and ensure its uniqueness.