

Comparison of Microsatellite and Single Nucleotide Polymorphism Markers for the Genetic Analysis of a Galloway Cattle Population

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Highly informative genetic markers are essential for efficient management of cattle populations, as well as for food safety. After a decade of domination by microsatellite markers, a new type of genetic marker, single nucleotide polymorphism (SNP), has recently appeared on the scene. In the present study, the exclusion power of both kinds of markers with regards to individual identification and parental analysis was directly compared in a Galloway cattle population. Seventeen bovine microsatellites were distributed in three incremental marker sets (10, 14 and 17 microsatellite markers) and used for cattle genotyping. A set of 43 bovine SNP was used for genotyping the same cattle population. The accuracy of both kinds of markers in individual identification was evaluated using probability of identity estimations. These were 2.4×10^{-8} for the 10 microsatellite set, 2.3×10^{-11} for the 14 microsatellite set, and 1.4×10^{-13} for the 17 microsatellite marker set. For the 43 SNP markers, the estimated probability of identity was 5.3×10^{-11} . The exclusion power of both kinds of markers in parental analysis was evaluated using paternity exclusion estimations, and, in addition to this, by estimation of the parental exclusion probability in 18 Galloway family trios. Paternity exclusion was estimated to be over 99% for microsatellites, and approx. 98% for SNP. Both, microsatellite and SNP sets of markers showed similar parental exclusion probabilities.

Key words: Microsatellite, Single Nucleotide Polymorphism, Exclusion Power