Genetic diversity and population structure of the endangered Tanzanian Mpwapwa cattle breed

Mpwapwa cattle is a synthetic dual-purpose breed developed at the Mpwapwa Cattle Research Station, Tanzania, in the 1920s. The development and maintenance of Mpwapwa cattle have faced many challenges, and this breed has never been characterized at the genomic level. Our objectives were to assess the current genetic diversity and population structure of Mpwapwa cattle owing to its highly admixed origin and decline in active genetic management in recent years. Hair samples were collected from 251 cattle from different agro-ecological zones in Tanzania and were genotyped with the Bovine 100K SNP chip (Neogen Geneseek®). After quality control (using PLINK 1.9), we assessed heterozygosity (PLINK 1.9), inbreeding (detectRUNS package in R), and admixture (LEA package in R). We found the observed heterozygosity (0.32) was higher than the expected based on observed allele frequencies (0.29). Furthermore, more than 75% of studied animals had a runs-of-homozygosity-based inbreeding higher than 20%. Admixture analyses have indicated separation of the sampled animals by agro-ecological zones. Our results provide information for developing conservation and improvement strategies for this endangered Tanzania cattle breed.