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Population Parameters for Trypanotolerance Traits in an N'Dama × Boran Crossbreeding Population

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Abstract

In 1983 the crossbreeding between trypanotolerant N'Dama (*Bos taurus*) and trypano-susceptible Boran (*Bos indicus*) cattle was initiated at the International Livestock Institute (ILRI) in Kenya to construct a population with a pedigree structure fit to detect quantitative trait loci (QTL) for trypanotolerance. QTL contributing to the three major tolerance indicators anaemia, body weight (BW) and parasitaemia control were found. To evaluate the use of this information in a breeding programme with special focus on trypanotolerance, the estimation of population parameters is required.

Phenotypic and genetic variances and correlations as well as heritabilities have been estimated for the sixteen defined traits used to detect QTL in 176 F2 offspring. Heritability estimates range from 0.11 to 0.45 with sufficient variances in the phenotype suggesting successful breeding opportunities. The estimates confirm the genetic control of the three major tolerance indicators. The genetic correlations between the traits give further evidence to the suspected independence of the mechanisms for the control of parasitaemia in comparison to red packed cell volume (PCV) and BW. While PCV-traits and BW traits are rather strongly correlated, parasite count and detection rate appear to be independent from the others. BW at the age of 12 months before challenge (BWI) is favourably though little correlated with any of the PCV traits, indicating that good nutrition would have a small positive effect on the ability of an animal to fight the infection. The starting value for PCV is slightly correlated with a less severe reduction in PCV and a better regeneration from the lowest PCV reached during infection. The very limited correlation between both prechallenge traits (initial PCV and BWI) clearly demonstrate that selection for trypanotolerance depends on traits that require data from infected animals unless marker information for QTL could be used instead.

With the estimated population parameters, it is now possible to evaluate genetic merit for trypanotolerance traits in a simulated breeding scheme and from there develop a breeding programme for cattle with a special focus on trypanotolerance to address locations where alternative control strategies would be difficult to implement or maintain due to the lack of resources and infrastructure.

Keywords: Boran, heritability, N'Dama, population parameters, trypanotolerance

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