

**Identification of the polled trait in
Bonsmara cattle using microsatellite
markers**

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All honor and glory to God the creator of heaven and earth:

“The heavens tell out the glory of God, heaven’s vault makes known his handiwork. One day speaks to another, night to night imparts knowledge, and this without speech or language or sound of any voice. Their sign shines forth on all the earth, their message to the ends of the world.” (Psalm 19:1-4)

ABSTRACT

Several Breeders within the Bonsmara cattle breeders' association have been selecting for polledness otherwise known as the trait for the genetic absence of horns. There are less costs associated with polled animals, as they require less management input than horned animals. International stud breeders are willing to pay a premium for Bonsmara stud animals certified as homozygous polled, and Bonsmara breeders therefore requested a study for the identification of polled status, using DNA markers. Several microsatellite markers were tested in a linkage analysis on a number of Bonsmara families originating from three polled herds. All of the markers tested in the final Twopoint linkage analysis showed significant linkage with the polled trait. This indicates that the current model proposed for the gene action of polledness is applicable to the Bonsmara breed. Furthermore, by using the Transmission disequilibrium test (TDT), an allele of one of these microsatellites was found to be strongly associated with the polled trait. Due to an inherent lack of phase-known, three-generation families, tracing this allele through the test pedigrees to determine polled status was not possible. These results indicate that phase-known family data must be available so that microsatellite markers linked to the Polled trait can be traced visually to differentiate homozygote polled animals from heterozygote polled animals. Microsatellite markers are a tool that can add additional information in the conclusive determination of Polled status, but cannot as yet be used in isolation to test for polledness in the South African Bonsmara breed.

OPSOMMING

Verskeie telers wat aan die Bonsmara telers genootskap behoort, selekteer al geruime tyd vir die poena eienskap of te wel, die genetiese afwesigheid van horings. Daar is minder uitgawes by poena diere omdat hulle minder bestuur vereis as horing diere. Internasionale telers is bereid om 'n premie te betaal vir poena diere wat gesertifiseer is as homosigoot poena en Bonsmara telers het daarom 'n study aangevra wat sou lei tot die identifikasie van poena status deur middel van DNA merkers. Verskeie mikrosatelliet merkers is getoets op families afkomstig van drie verskillende Bonsmara kuddes. Al die merkers wat in die finale "Twopoint" koppelings analiese getoets is het betekenisvolle koppeling getoon met die poena eienskap. Dit dui daarop dat die huidige model wat voorgestel word vir die geen aksie van die poena eienskap ook toepaslik is vir die Bonsmara ras. Verder is een alleel deur middel van die "Transmission disequilibrium test" (TDT) gevind wat hoogs betekenisvol geassosieer is met die poena eienskap. As gevolg van die inherente tekort aan fase bekende, drie generasie families, was dit nie moontlik om die alleel deur die proef stambome te volg om poena status te bepaal nie. Hierdie resultate dui aan dat fase bekende familie data beskikbaar moet wees sodat Mikrosatelliete gekoppel aan die poena eienskap visual nagespoor kan word om tussen heterosigoot en homosigoot poena diere te onderskei. Mikrosatelliet merkers is nog 'n werktuig wat gebruik kan word om addisionele inligting toe te voeg in die definitiewe bepaling van poena status. Dit kan wel nog nie in isolasie gebruik word om vir die poena eienskap te toets in die Suid Afrikaanse Bonsmara ras nie.