

Research project: Double muscling in beef cattle

Double muscling has been reported in a number of South African beef breeds. During 2016 breed societies indicated that they consider this condition as a research priority. The Department of Animal and Wildlife Sciences at the University of Pretoria has launched a project to investigate causative mutations for double muscling in South African beef cattle breeds.

Double muscling is a condition in cattle that is transmissible from parents to their offspring. This condition occurs as a result of changes that occur in the DNA sequence, specifically within the myostatin (MSTN) gene. Myostatin is a substance produced by muscle cells that regulate muscle growth and development. If a mutation occurs within the myostatin gene, it results in both muscle hypertrophy (increased muscle cell size) and -hyperplasia (increased muscle cell number), which are innate signs of this condition.

Although the condition holds some advantages such as increased lean yield, higher production of desirable cuts and more tender meat; there are also potential disadvantages including calving difficulty, reduced stress tolerance, reduced fertility and reduced calf survival. It is widely considered as a less desirable characteristic under extensive conditions such as in South Africa. Most breed societies in South Africa discriminate against double muscled animals.

The aim of this project is to identify the genetic variants of double muscling that cause the phenotype in the various breeds. Currently there are nine known genetic variants that can cause this condition and some of them are breed-specific. It will be to the advantage of the breeds to be able to distinguish between the variants associated with the positive vs. negative effects. To identify which variants occur in which breeds (and at what frequencies within the SA populations) we will need the help of breeders.

Beef cattle breeders are requested to notify Reinhardt Steyn (0764802505/ email: u12083284@tuks.co.za) if a double muscled calf is born / has been identified on a farm. A photo of a suspected calf can be sent to confirm if the calf is double muscled. If such a calf is confirmed to have double muscling, 40 or more tail hair samples should be collected from the affected calf, the dam, and the sire (as far as possible) according to the following protocol: (Next page)

The identity of breeders will be kept anonymous and data collected will be confidential.

Researchers:

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In collaboration with SA Studbook (Dr Helena Theron)

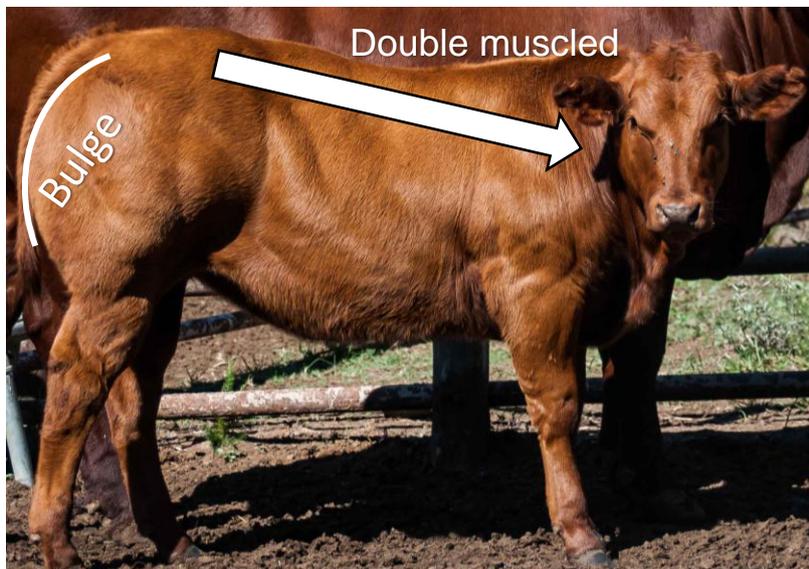
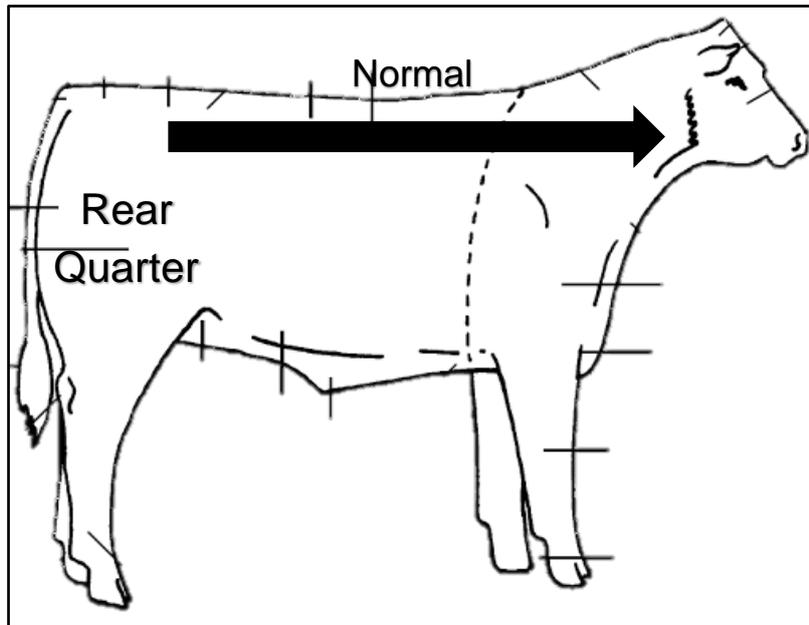
helena@studbook.co.za

This project is financially supported by the Beef Genomics Program



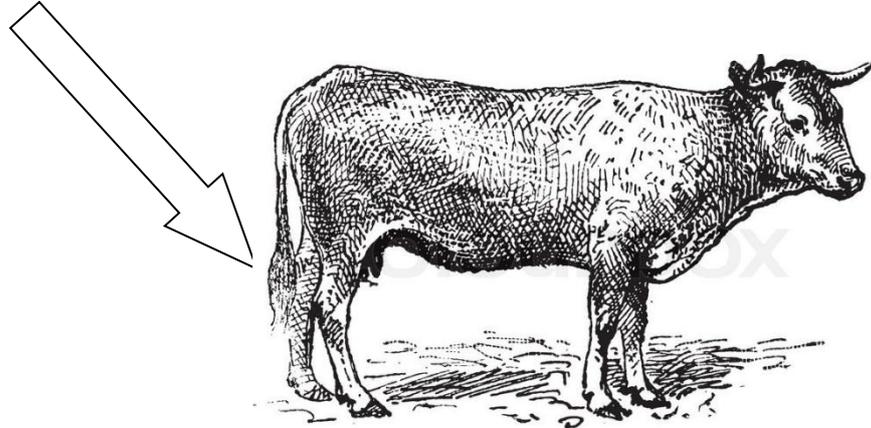
Protocol for identifying double muscled calves:

- ✓ Double muscled calves usually cause dystocia (difficulty at birth).
- ✓ When born, the double muscled phenotype will be very apparent in some cases.
- ✓ Abnormally high birth weight
- ✓ Animals that are excessively muscled in their rear quarter
- ✓ The rear quarter bulges out when observing the animal from the side
- ✓ As illustrated in the pictures below, the top-line of the animal shows a clear slope downwards from the rear quarter (pin bone) towards the head.



Hair sample collection protocol

- ✓ DNA is contained within the **root of the hair follicle**, not within the shaft of the hair.
- ✓ Using pliers, pluck the hairs from the switch or bush of the tail [at least-40 hairs per animal]. Do not cut the hair.



- ✓ If possible, also pluck hair of the parents of the affected calf. Please insert these samples in **separate envelopes**.
- ✓ Place the hairs inside an envelope. [1 envelope per animal]
- ✓ Use the template attached to the last page of this form to fill in the particulars of the animal. [Place template inside envelope with hair]
- ✓ Mark the envelope on the outside with the following details:
 - Breed
 - Allocation [Affected calf/ Dam of affected calf/ sire of affected calf]
 - Herd Designation Mark [HDM]
 - Animal's ID number
 - Computer registration number [10 digits]
 - Add the following: **BGP – DOUBLE MUSCLING PROJECT**
- ✓ If at all possible, please take a photo of the animal
- ✓ Remember to include your own contact details.

Template/ Templaat

Animal Number										Genetic Dam Number																			
HDM		Sex		Year		Sequence				HDM		Sex		Year		Sequence													
				Y	Y							F	Y	Y															
Computer number										Computer number																			
Sire Number										Beef Genomics Program Genomic Test DOUBLE MUSCLING PROJECT																			
HDM		Sex		Year		Sequence																							
		M		Y	Y																								
Computer number																													
Herd Number					Date Collected																								
					Y Y Y Y M M D D																								
Breed										Animal recorded on LogixBeef? Yes <input type="checkbox"/> No <input type="checkbox"/>					Collected by: Name _____ Surname _____ Signature _____														
																				Please send to: Double Muscling Project SA Stud Book PO Box 270 BLOEMFONTEIN 9300									

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As meer van die template benodig word in PDF format is u welkom om u versoek na u12083284@tuks.co.za toe te stuur – Gebruik “**Dubbelbespieroingstemplaas + Plaasnaam**” as die onderwerp