

## SHEATH AND MATING ABILITY MEASUREMENTS AND THEIR INTERRELATIONSHIPS IN SANTA GERTRUDIS BULLS

J. D. Bertram <sup>1</sup>, R. G. Holroyd <sup>2</sup>, M. R. McGowan <sup>3</sup> and V. J. Doogan <sup>2</sup>.

<sup>1</sup> Queensland Department Primary Industries, Goondiwindi, Qld 4390

<sup>2</sup> Queensland Department Primary Industries, Animal Research Institute, Brisbane, Qld 4105

<sup>3</sup> Department of Farm Animal Medicine & Production, University of Queensland, St. Lucia, Qld 4072

### SUMMARY

Santa Gertrudis bulls were assessed for sheath characteristics which may influence their performance in a serving capacity test. There was a poor relationship between sheath depth and width and the number of mounts and serves that a bull achieved. Of the traits recorded, the 'rosette' score (conformation of the umbilicus) was negatively correlated with serving ability. The mean number of effective serves was 0.9, 1.5 and 1.4 for 2yr old, 2.5 and 3yr old bulls respectively.

**Keywords:** Bulls, sheath, umbilicus, mounting ability.

### INTRODUCTION

There is a paucity of objective measurements describing the variation in sheath characteristics in tropically adapted breeds and particularly in relation to the bull's mating performance. Small scrotal circumference and large pendulous sheaths which are prone to injury, are two major factors adversely affecting bull fertility (McCosker *et al.* 1989 and Hoogenboezem and Swanepoel 1995). Positive correlations ( $P < 0.05$ ) between sheath area and the bulls average daily liveweight gain, and between average daily liveweight gain and scrotal circumference have been reported by Hoogenboezem and Swanepoel (1995).

When selecting bulls, consideration should be given to physically normal sheath and leg structure of bulls, scrotal circumference, semen quality and libido and mating ability scores. This implies a need to recognise normal values and variation ranges in structural soundness and the relevance of those measurements to the bulls mating performance.

In Santa Gertrudis bulls, Smith *et al.* (1981) showed a negative relationship between prepuce length (distance from the ventral abdomen to the preputial orifice) or sheath depth and the percent of estrous females that became pregnant. They found no significant relationship between sheath length (distance from the front of the scrotum to preputial orifice) and either the percent pregnant of estrous females or the percent pregnant of females mated. However, prepuce length was positively correlated ( $P < 0.01$ ) with body weight and masculinity score in 2yr old Santa Gertrudis bulls. There was no significant relationship between sheath length, prepuce length and scrotal circumference.

The objectives of this study were to investigate the variation in sheath and umbilicus characteristics and determine their possible relationships with the mating performance of Santa Gertrudis bulls of differing ages, weights and condition scores.

#### MATERIALS AND METHODS

Data were collected in 4 herds from southern, central and western Queensland between 1993 to 1996 as part of a larger study focussing on determining pre-mating predictors of bull fertility in multiple sire matings in beef herds. There were 287 Santa Gertrudis bulls examined. These bulls had been subjected to some selection already by the various producers where bulls with obvious scrotal or leg abnormalities had been culled prior to this study.

Age and weight of each bull were recorded and a condition score assigned using a 1 (emaciated) to 9 (fat) range. Sheath depth was measured as the vertical distance from the ventral abdominal wall to the preputial orifice, whilst the sheath width was recorded as the anterior horizontal distance from the vertical measurement (depth) at the anterior sheath opening to the intersection of the curvature of the sheath. Sheath score was assessed with the recording format used in the national BREEDPLAN validation project where 1 = an extreme pendulous sheath to 9 = an excessively trim sheath. Two components of the umbilicus were assessed. The umbilical cord or navel thickness score was assessed on a scale of 1 = approximately 0.5cm to 5 = 3.0 cm. The 'rosette' or inverted fold of skin in the sheath at the external interface of the umbilical cord was recorded as 0 = absent, 1 = small and 3 = large (an inverted semi circle about 5cm dia.).

The bull's mating performance was evaluated using a 20 minute serving capacity test (starting from the bull's first mount) with restrained oestrous females. Virgin yearling bulls were given a period of sexual experience prior to the test (Bertram *et al.* 1996). Observations recorded were sexual interest = flehmen and false mounts, mounts = number of mounts only in the test period, and serves = number of effective serves, independent of mounts. Mounts plus serves were added together as a collective total.

Means, standard deviations and correlations were calculated within age groupings. Age categories were 2yr. old (490 - 787 dys), 2.5yr old (790 - 1088 dys) and 3yr old + (1108 - 2908 dys). In addition, all age groups were combined and correlations calculated after adjusting for age in days as a covariate.

#### RESULTS AND DISCUSSION

Means and standard deviations are reported in Table 1 for age, growth, sheath and mating performance measurements.

**Sheath assessments.** Mean sheath score varied little across age groups. Many of the sheath measurements were correlated, particularly for 2yr olds, eg sheath width vs depth ( $r=0.41$ ;  $P < 0.01$ ) for 2yr olds and ( $r=0.38$ ;  $P < 0.01$ ) for 2.5yr olds. Sheath depth was negatively correlated with sheath score at all ages ( $r=-0.61$ ;  $r=-0.40$  and  $r=-0.60$ ;  $P < 0.01$  respectively). Adjusted for age, sheath depth was negatively correlated to sheath score and number of interests ( $r=-0.53$ ;

$P < 0.01$  and  $r = -0.16$ ;  $P < 0.05$  respectively) and positively correlated with sheath width, rosette and navel thickness score ( $r = 0.47$ ,  $0.26$   $P < 0.01$  and  $r = 0.16$ ;  $P < 0.05$  respectively).

Of the sheath measurements only sheath width was correlated with live weight ( $r = 0.35$ ; and  $r = 0.37$ ;  $P < 0.01$  at 2 and 2.5 yrs old respectively). The sheath depths reported in our work for the Santa Gertrudis bulls in the 2yr and 2.5yr old groups were smaller than those for bulls measured by Smith *et al.* (1981) who reported sheath depths of 220 and 234 mm corresponding to live weights of 561 and 637 kg respectively.

**Umbilical components.** Mean navel thickness score and rosette score had little variation across age groups. In bulls 2yr old and older than 3yr old, the navel thickness score and 'rosette' score were positively correlated ( $r = 0.56$ ;  $P < 0.01$  and  $r = 0.58$ ;  $P < 0.05$ , respectively). In 2yr olds, 'rosette' score was positively correlated with sheath depth ( $r = 0.32$ ;  $P < 0.01$ ). When adjusted for age, 'rosette' score was positively correlated with navel thickness score ( $r = 0.55$ ;  $P < 0.01$ ) and negatively correlated with serves ( $r = -0.19$ ;  $P < 0.05$ ).

**Table 1 Mean and standard deviations of Santa Gertrudis bull structural traits and serving capacity by age**

Trait	2yr. old		2.5yr. old		3yr. old+	
	No.	Mean±SD	No.	Mean±SD	No.	Mean±SD
Age of bulls ( days )	161	655 ± 81	77	903 ± 72	17	1591 ± 476
Weight.(kg.)	137	547 ± 53	47	752 ± 75	4	794 ± 72
Condition. score	152	5.0 ± 0.8	73	5.5 ± 0.8	17	5.6 ± 0.9
Sheath depth (mm)	160	202 ± 27	62	210 ± 28	17	201 ± 47
Sheath width (mm)	160	182 ± 27	62	194 ± 28	17	190 ± 39
Sheath score	127	4.7 ± 1.1	69	5.0 ± 1.0	17	4.7 ± 1.2
Navel thickness score	159	2.9 ± 1.3	62	2.8 ± 1.2	17	3.0 ± 1.1
Rosette score	123	1.8 ± 1.0	31	1.9 ± 1.0	15	2.0 ± 1.1
Interest	148	2.5 ± 2.9	53	2.0 ± 3.4	17	3.2 ± 2.4
Mount	161	5.6 ± 4.0	77	5.3 ± 3.9	17	4.8 ± 3.6
Serves	161	0.9 ± 1.2	77	1.5 ± 1.5	17	1.4 ± 1.3
Mounts plus serves	161	6.5 ± 4.3	77	6.8 ± 4.5	17	6.2 ± 3.7

**Mating Performance.** Santa Gertrudis bulls showed interest levels that fluctuated from 2.5, 2.0 to 3.2 in 2, 2.5 and 3yr old plus bulls, respectively, whereas mounts decreased slightly with age (5.6, 5.3 and 4.8 mounts in 2yr old, 2.5yr old and 3yr old plus bulls). As the bulls increased in age from 2 to 3 years there was a trend for increased serves relative to mounts (0.9 and 5.6 relative to 1.5 and 5.3 respectively). Overall mean number of serves were low with values of 0.9, 1.5 and 1.4 in the three age classes. Combined mounts and serves were highest in the 2.5yr old bulls. In all of the mating performance measures, standard deviations were large in relation to the mean values.

In general, mating performance measures were not related to weight, or sheath measurements. The exceptions were that in 2yr old bulls, liveweight was correlated with interest ( $r= 0.25$ ;  $P < 0.01$ ) and sheath depth was negatively correlated with interest ( $r= 0.17$ ;  $P < 0.05$ ). The serving activity of bulls older than 3 year old appeared to plateau with possibly a drop in the number of mounts. The number of serves achieved by the Santa Gertrudis bulls in this study ( 1.9, 1.5 and 1.4 for 2yr, 2.5yr and 3yr old plus bulls, respectively) were fewer than the 2.5 serves per 20 minutes reported by Bertram (1993) for mature bulls.

There were poor correlations between the majority of traits assessed and the serving capacity of the bulls. This would suggest that the serving capacity of the bull is not strongly related to the common sheath characteristics.

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