

Scrotal circumference in young beef bulls: Relationships to growth traits

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Data from 129 young Simmentaler bulls, 97 Santa Gertrudis bulls and 100 Hereford bulls taken at the end of the Phase C growth tests, were used to study the relationship of mass and growth parameters on testes size. Scrotal circumference was positively correlated with body mass and average daily gain per day of age. Pre-weaning gain appears to positively influence testicular circumference more than post-weaning gain during a feedlot test. Therefore the probability of finding bulls with relatively small testes among bulls selected for weaning mass would be relatively small. Growth rate and reproductive potential appear to be compatible in young performance-tested bulls. Selection for scrotal circumference will thus be useful not only because of its compatibility with growth rate, but because improved fertility will increase productivity.

Fase-C-groeitoetsdata van 129 jong Simmentalerbulle, 97 Santa Gertrudisbulle en 100 Herefordbulle is gebruik om die verwantskap tussen groeiparameters en skrotumomvang te ondersoek. Skrotumomvang was betekenisvol positief gekorreleer met liggaamsmassa en gemiddelde daaglikse toename per dag van ouderdom. Uit die resultate wil dit voorkom of voorspeengroei 'n groter invloed het op testikulêre omvang as die groei na speen onder voerkraaltoestande. Die waarskynlikheid om bulle met 'n relatiewe klein skrotumomvang te vind is relatief skraal indien bulletjies volgens speenmassa geselekteer word. Dit blyk verder dat groeivermoë en reproduksiepotensiaal gemeet in terme van die skrotumomvang versoenbaar is in jong prestasiegetoetse bulle. Seleksie vir skrotumomvang is dus gewens, nie net vanweë die versoenbaarheid met groei nie, maar omdat verhoogde vrugbaarheid ook produktiwiteit verhoog.

Keywords: Young beef bulls, scrotal circumference, growth parameters, compatible

In South Africa, artificial insemination is widely used in dairy cattle, but natural mating accounts for most of the pregnancies achieved each year in the beef cattle industry. Therefore, emphasis on the fertility of breeding bulls used for natural service has increased. Scrotal circumference is an important component in examining beef bulls for breeding soundness. Scrotal circumference as an indicator of testes size is highly correlated with sperm production and semen quality in growing bulls (Rossouw, 1975; Coulter, 1982). Many factors such as breed, age, season and body mass influence testes size or scrotal circumference (Makarechian, Farid & Berg, 1984; Venter, van Zyl & Vasconcellos, 1984). Body mass affects scrotal circumference and is a function of birth mass, pre-weaning and feedlot growth rate and age, all of which may influence testes development (Makarechian, *et al.*, 1984). A large variation in the pregnancy rate of beef cattle exists owing to differences in bull fertility (Parish, Wiltbank, Smith & Morris, 1979). Small scrotal circumference is one of the main factors causing this variation. According to Marinovitz (1975) dominance among bulls may also play a role in the conception rates obtained. Much greater selection pressure is placed on growth rate and feed efficiency than on scrotal circumference. Information on the relationship between growth rate and scrotal circumference would be helpful since both are considered in the selection of young bulls. The objective of this investigation was to enhance the existing knowledge of the relationship between growth parameters and scrotal circumference.

Growth test data from Phase C (National Beef Cattle Performance and Progeny Testing Scheme) from 129 Simmentaler bulls, 97 Santa Gertrudis bulls and 100 Hereford bulls were obtained from the different Cattle Breeders' Societies of southern Africa. The processing of the data was done with the Univac 1100-computer at the University of the Orange Free State, Bloemfontein. Correlations are determined by the standard procedures. Scrotal circumference of the bulls was taken at the end of the performance test.

The correlations between scrotal circumference and growth parameters for the different breeds are presented in Table 1. From the results presented in Table 1, it is evident that highly significant correlations ($P < 0.01$) exist between the initial body mass and scrotal circumference and between final mass and scrotal circumference for the different breeds of bulls. Significant correlations ($P < 0.05$) exist between scrotal circumference and age and between scrotal circumference and average daily gain per day of age (ADA), which can be explained because ADA is a function of age and, in addition, body mass and age are positively correlated in young animals. Although the correlations between scrotal circumference and average daily gain (ADG) as well as feed conversion ratio (FCR) are non-significant, they are favourable and it would seem that there is a trend towards a higher correlation between final mass and scrotal circumference in the Hereford, Simmentaler and Santa bulls. Johnson, Robinson & Dillard (1974) reported a high correlation between pre-weaning growth and testicular development in beef bulls. Their results indicated that the chances are

Table 1 The correlation coefficients for scrotal circumference with growth parameters in Simmentaler, Santa Gertrudis and Hereford bulls

Growth parameter	Correlation between scrotal circumference and growth parameters		
	Simmentaler bulls	Santa Gertrudis bulls	Hereford bulls
Number of bulls (<i>n</i>)	129	97	100
Initial mass	0,3214 ^a	0,3158 ^a	0,3583 ^a
ADG	0,1323	0,1253	0,1445
ADA	0,1473 ^b	0,1508 ^b	0,1841 ^b
FCR	0,0611	0,0534	0,1252
Final mass	0,3879 ^a	0,3709 ^a	0,3841 ^a
Age	0,1504 ^b	0,1298 ^b	0,1846 ^b

ADG = Average daily gain

ADA = Average daily gain per day of age

FCR = Feed conversion ratio

n = number of bulls

^a *P* < 0,01

^b *P* < 0,05

fairly small to select beef bulls with small testes, for breeding purposes, when pre-weaning gain was considered in the selection program. This also explains the significant correlation between scrotal circumference and average daily gain per day of age (ADA), but non-significant correlation between scrotal circumference and average daily gain (ADG), because ADA includes pre-weaning gain. It is evident that the pre-weaning stage is a critical period for testicular development. Bulls with inferior testicular development at a young age showed an increase in scrotal circumference with both age and body mass, but those bulls with superior development at a relatively young age maintained that advantage throughout life (Venter, *et al.*, 1984). Therefore the probability of finding bulls with smaller than average testes among bulls selected for weaning mass would be smaller than in bulls selected on growth rate in a feedlot test. This conclusion is also supported by the work of Swanepoel & Heyns (1986) with Simmentaler bulls only. Van Rooyen (1987) reported, not only favourable, but a significant correlation between scrotal circumference and average daily gain (ADG) in Bonsmara bulls. Furthermore, the fact that all correlations between the different growth parameters and scrotal circumference presented in Table 1 are favourable, suggests that growth rate and scrotal circumference as an indicator of reproductive potential are compatible in young bulls, especially in performance-tested bulls, as shown in this study. This conclusion is supported by Swanepoel, Venter, van Zyl & Heyns (1986). Such a relationship is conceivable if genes for improved scrotal circumference as indicator of fertility improve physiological function in general, thereby increasing growth rate. Selection for scrotal circumference will be useful not only because it is compatible with selection for growth, but because

improved fertility will increase productivity. The fact that the correlations between scrotal circumference and average daily gain are non-significant in this study, indicates that bulls with a higher average daily gain (ADG) would not necessarily have an acceptable scrotal circumference. Scrotal circumference therefore is a very important selection criterion.

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