SCROTAL CIRCUMFERENCE IN YOUNG BEEF BULLS: RELATIONSHIPS TO GROWTH TRAITS

FRANS J.C. SWANEPOEL & H. HEYNS, Department of Animal Science,
University of Fort Hare, Alice, 5700, Ciskei, Southern Africa

SUMMARY

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. Preweaning gain appears to positively influence testicular circumference more than postweaning 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 appears 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.

INTRODUCTION

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, preweaning- 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 due to differences in bull fertility (Parish, Wiltbank, Smith, Morris, 1979). Small scrotal circumference is one of the main factors causing this variation. According to Marincovitz (1975) dominance among bulls may also play a role in the conception rates obtained. Much greater selection pressure is put on growth rate and feed efficiency than on scrotal circumference. Information on the relationship between growth rate and scrotal circumference would be helpful due to the fact that both are considered in the selection of young bulls. The objective of this investigation was to enhance on the existing knowledge of the relationship between growth parameters and scrotal circumference.

MATERIAL AND METHODS

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.

RESULTS AND DISCUSSION

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 as ADA is a function of age and, in addition, body weight and age are postively 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 preweaning growth and testicular development in beef bulls. Their results indicated that the chances are fairly small to select beef bulls with small testes, for breeding purposes, when preweaning 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 preweaning gain. It is evident that the preweaning 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). Thus the probability of finding bulls with smaller than average testes among bulls selected for weaning weight 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

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 (n)	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
a = $p<0,01$
b = $p<0,05$
n = number of bulls

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, and 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.

ACKNOWLEDGEMENT

The authors wish to express their acknowledgement to personnel of the National Beef Cattle Performance and Progeny Testing Scheme as well as to the Simmentaler-, Santa Gertrudis- and Hereford Cattle Breeders' Societies of Southern Africa.

REFERENCES

COULTER, G.H., 1982. Proc. from the annual Conf. on Arti. Insem. and Embryo Transfer in Beef Cattle, Denver, Colorado Nat. Assoc. of Anim. Breeders, Columbia Missouri.

JOHNSON, B.H., ROBINSON, O.W. & DILLARD, E.U., 1974. J. Anim. Sci. 39, 213.

MAKARECHIAN, M., FARID, A. & BERG, R.T., 1984. Theriogennology Vol. 22, 667.

MARINCOVITZ, G., 1975. Soutpanbeesplaasprojek TRP 27. Veekundige vorderingsverslag 1974/75.

ROSSOUW, A.F., 1975. S. Afr. J. Anim. Sci. 5(31).

SWANEPOEL, F.J.C. & HEYNS, H., 1986. S. Afr. J. Anim. Sci. 16(4).

SWANEPOEL, F.J.C., VENTER, H.A.W., VAN ZYL, J.G.E. & HEYNS, H., 1986. Proc. 3rd World Congress on Genetics Applied to Livestock Production. Vol XI, 67 - 71.

VAN ROOYEN, P., 1987. Ph D thesis. Univ. of the Orange Free State.

VENTER, H.A.W., VAN ZYL, J.G.E. & VASCONCELLOS, O.A.D.R., 1984. Proc. Second World Congr. Sheep and Beef Cattle Breeding. Edit. Hofmeyr, J.H. & Meyer, E.H.H. April 1984, Pretoria.