

Nutritional Management of Skeletal Bone Growth in Cattle in the Dry Tropics

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Skeletal growth is an extremely complex process which is under endocrine regulation. The rate of skeletal bone elongation is influenced by an apparent interaction between growth pattern and nutrition (Holloway et al., 2002) and bone elongation appears important in muscle growth. Compensatory growth in liveweight (LWG) is common in cattle in the dry tropics in the wet season following weight loss in the dry season, but it is not known whether this compensation also occurs in skeletal growth.

At Swans Lagoon Research Station (north Queensland), Brahman-cross weaner steers grazing native pastures were monitored from weaning in 2004 and 2005. Steers were aged 3-7 months and were weaned in either May (~70%) or August. In each year, half of the steers (n=40) were allocated by stratified randomisation to two replicates within years to a treatment of dry season (May to November inclusive) ad lib. fortified molasses (FM), consumed at an average of 1% of body weight daily. The other half were provided with ad lib. fortified molasses until they reached 150 kg after which they had ad lib. access to urea (30%) and sulphur-based dry lick (DL), consumed at 0.03% of body weight daily.

Table 1. Nutritional affects on seasonal growth of steers

Season	Liveweight change (kg/day)				Height change (mm/100 days)			
	2004 cohort		2005 cohort		2004 cohort		2005 cohort	
	DL	FM	DL	FM	DL	FM	DL	FM
2004 dry	0.24a	0.46b			65	72		
2005 wet	0.67a	0.50b			55	64		
2005 dry	0.18	0.42	0.29a	0.56b	22	26	15a	38b
2006 wet	1.01a	0.86b	0.66	0.62	32	35	55	57

Means followed by a different letter are significantly different ($P < 0.05$)

Dry-season LWG of FM steers was higher than for DL steers ($P < 0.05$ for 2 of 3 periods), but the converse occurred during the wet season ($P < 0.05$ for 2 of 3 periods; Table 1), reflecting compensatory LWG. Although the initial hip height measurement was not taken until after weaning, the allocation process would have achieved no significant difference between treatments at that stage. Apparent gain in hip height during the dry seasons was higher in FM than DL steers ($P < 0.05$ for 1 of 3 periods), but subsequent wet season gains did not differ between treatments (Table 1). There was a strong, constant allometric relationship between hip height and liveweight across all treatments and time periods, indicating that level of nutrition was the major determinant of bone elongation rate rather than compensation as a result of a previous lower level of nutrition. These results suggest that this relationship cannot be disturbed by differences in growth paths.

These observations imply that it is at least, equally important for nutrition to be focussed on skeletal development as LWG, especially in environments where seasonal fluctuations in growth rates are experienced, in order to achieve the optimum weight for age animal for market.

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Holloway, J.W, Warrington, B.G., Forrest D.W. and Randel, R.D. (2002). *J. Anim. Sci.* 80: 911.

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