

Implications of Heart and Liver Weights of F1 Wagyu/Black Angus Feedlot Steers

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The Wagyu is the indigenous cattle breed of Japan and the F1 Wagyu/Black Angus has been the preferred genotype in Australia for supplying the long fed Japanese beef market. Australian feedlot observations suggest these cattle have a lower morbidity and susceptibility to heat stress, despite been fed to a high liveweight (>700 kg) and body condition. Research with the Brahman breed indicates that these production responses are related to a lower maintenance energy requirement (Frisch and Vercoe 1977). Koong *et al.* (1985) reported that metabolism of the heart and liver contribute 11 and 22% to maintenance energy requirement respectively. The objective of this paper is to report on heart and liver weights of F1 Wagyu/Black Angus steers.

The study consisted of 108 F1 Wagyu/Black Angus steers of known genetic background (4 Wagyu Grandires and 7 Sires). Steers were introduced to feed on the 22nd March 2001 (410.5kg, s.d. 24.4) and fed a dry rolled wheat based ration at the Queensland Department of Primary Industries, Brigalow Research Station feedlot facility. Steers were assigned to three turn-off groups on the basis of maturity, determined through assessment of body condition score (Herd and Sprott 1986), hip height and frame score (BIF 1996). Turn-off groups 1, 2 and 3 were despatched for slaughter at 386, 414 and 442 days respectively. For each turn-off group at slaughter, liver and heart weights were recorded.

Table 1 shows heart and liver weights for each turn-off group and as a proportion of liveweight. In comparison, previous research in British cattle breeds indicated heart and liver weights as a proportion of liveweight were 0.48% and 1.45% respectively (Terry *et al.* 1990).

Table 1. Effect of turn-off group on liveweight (LW), heart and liver weight, heart (Heart %LW) and liver (Liver %LW) weight as a proportion of liveweight, body condition score (BCS), hip height (HH) and frame score (FS)

	Turn-off group			SE
	1	2	3	
LW (kg)	822.1	854.1	856.8	8.10 ^{ns}
Heart (kg)	2.36	2.53	2.46	0.04 ^{ns}
Liver (kg)	8.73	8.71	8.61	0.12 ^{ns}
Heart %LW	0.29	0.30	0.29	0.02 ^{ns}
Liver %LW	1.06 ^a	1.02 ^b	1.01 ^b	0.01*
BCS	8.7 ^a	8.9 ^b	9.0 ^b	0.05*
HH (mm)	1422 ^a	1452 ^b	1462 ^b	7.74*
FS	7.7 ^a	8.6 ^b	9.0 ^c	0.14*

^{ns} not significant $P > 0.05$, * means with different superscripts within rows are significant at $P = 0.05$

Table 1 also shows that steers for turn-off group 1 were not as mature as steers of turn-off group 2 and 3 as indicated by lower body condition score, hip height and frame score ($P < 0.001$). The lower maturity of turn-off group 1 increased liver weight as a proportion of liveweight ($P = 0.036$). Brody (1945) reported the liver is a later maturing organ compared with the heart.

Internal organ size and weight contribute to maintenance energy requirement (Koong *et al.* 1985). Implications of internal organ characteristics and implications on production and effect on maintenance energy requirement within the Wagyu and Angus breed warrant further investigation.

Beef Improvement Federation, BIF (1996).

Brody, S. (1945). Bioenergetics and Growth, Reinhold, New York. Frisch, J.E. and Vercoe, J.E. (1977).

Anim. Prod. **25**, 343-358.

Herd, D.B. and Sprott, L.R. (1986). Texas Agricultural Extension Service, No B-1526.

Koong, L.J., Ferrell, C.L. and Nienaber, J.A. (1985). *J. Nutr.* **115**, 1383-1390.

Terry, C.A., Knapp, R.H., Edwards, J.W., Mies, W.L., Savell, J.W. and Cross, H.R. (1990).

J. Anim. Sci. **68**, 4200-4205.

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