Production System Elements Related to Fat Distribution in Beef Steers

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Key words: supplementation, intramuscular fat, marbling, quality grade, fat distribution

Introduction Intramuscular fat is a primary quality attribute of beef in many parts of the world. Wertz et al., 2001 indicated that marbling is a lifetime event for cattle. Smith and Crouse (1984) have shown that glucose is a more important substrate for adipose accretion intramuscularly (IM) than subcutaneously (SC). This experiment was designed to evaluate supplementation of steers on annual ryegrass as to fat accretion IM and SC.

Materials and methods Carcass traits were evaluated for 58 1/2 Bonsmara, 1/4 Angus, 1/4 other (Angus, Brahman or Tuli, DAMBREED) steers from either 2-or 3-yr old dams (DAMAGE, steers from 3-yr olds were 3/4 Bonsmara) to determine the effect of energy supplementation during a stocker period of 140 d after weaning at 210 d of age and before a high concentrate finishing period of 119 d. During this period, steers grazed TAM90 annual ryegrass in six, 1.9 ha pastures (0.21 ha/steer for non-supplemented (NS), 0.19 ha/steer for acetogenic (peanut hulls, AC) and for propiogenic (cracked corn, PR) supplemented steers, 2 pastures/treatment (REP/TRT)). Supplements were fed at 0.3% of initial body weight. Steers were harvested after the finishing period and backfat (BF) and marbling score (MARB, 500=USDA Choice) were taken by USDA (1997) methods. Hair follicles were analyzed for Leptin genetics (LEP). Data was analyzed with the model: MARB BF MARB/BF=REP TRT DAMAGE LEP DAMBREED and two way interactions.

Results MARB was related to TRT ($P=0.036$, Table 1), DAMAGE ($P=0.009$, Table 2), LEP ($P=0.09$, Table 3) and DAMBREED ($P=0.056$, Table 4). The only system element related ($P<0.1$) to BF or MARB/BF was TRT. Therefore, because DAMAGE, LEP, and DAMBREED were related to MARB but not to BF, there was a tendency for steers out of 2-yr old dams, having the cc leptin gene, and to have some Brahman breeding to have lower MARB/BF. Steers having the tt LEP allele, with Angus or Senepol breeding, out of 3-yr old females, and receiving AC supplement during the postweaning growing period had more ($P<0.1$) MARB.

Table 1 *Effect of TRT on fat distribution.*

TRT	MARB	BF	MARB/BF
NS	$351^{a}\pm27.8$	$14.61^{a}+1.595$	$29.1+4.92$
AC	$421^{b}\pm24.3$	$8.64^{b}+1.391$	$56.1+4.29$
PR	$373^{ab}\pm24.5$	$12.46^{b}+1.402$	$33.1+4.32$

[ab] Least square means with different superscripts are different ($P<0.1$)

Table 2 *Effect of DAMAGE on MARB.*

DAMAGE, Yr	MARB
±2	$351^{a}\pm20.5$
±3	$412^{b}\pm16.5$

[ab] Least square means with different superscripts are different ($P<0.01$)

Table 3 *Effect of LEP on MARB.*

LEP	MARB
cc	$329^{a}\pm35.6$
ct/tc	$402^{b}\pm15.2$
tt	$413^{b}\pm23.7$

[ab] Least square means with different superscripts are different ($P<0.1$)

Table 4 *Effect of DAMBREED on MARB.*

DAMBREED	MARB
Angus	$414^{a}\pm19.5$
Brahman	$328^{b}\pm27.4$
Senepol	$414^{a}\pm33.9$
Tuli	$370^{ab}\pm24.1$

[ab] Least square means with different superscripts are different ($P<0.1$)

Conclusions Several system elements can possibly be manipulated to alter fat distribution in the beef product. Among the system elements studied, we have the greatest evidence that feeding a supplement postweaning can alter the site of lipogenesis. Specifically, feeding an acetogenic supplement postweaning can possibly increase IM relative to SC fat.

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