



BEEF CATTLE RESEARCH UPDATE

Britt Hicks, Ph.D.

Area Extension Livestock Specialist

Oklahoma Panhandle Research & Extension Center

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Effects of Optaflexx™ on Palatability

Optaflexx (ractopamine hydrochloride) is approved for increased rate of weight gain, improved feed efficiency, and increased carcass leanness in cattle fed in confinement for slaughter during the last 28 to 42 days on feed. Limited information documenting the effect of Optaflexx on beef tenderness has been published. The FDA reported that supplementing Optaflexx (10 or 20 ppm) during the final stages of finishing did not affect palatability of beef from mixed-breed steers and heifers.¹

Recent research evaluated the effect of Optaflexx supplementation and postmortem aging on palatability of beef from steers representing three distinct biological types: British, continental crossbred, and Brahman crossbred.² The steers were fed either 0 or 200 mg/hd/day of Optaflexx during the final 28 days before slaughter. The tenderness of longissimus muscle (LM) samples was determined using Warner-Bratzler shear force measured at 3, 7, 14, and 21 days postmortem. In addition, trained sensory panel evaluation was conducted using LM samples aged for 14 days postmortem.

These researchers found that within each breed type, steers fed Optaflexx produced steaks with greater WBSF values than steaks from control steers (Figure 1). However, the effect of Optaflexx on WBSF was greater among Brahman crossbreds than among Continental crossbreds and British steers. The effect of Optaflexx on WBSF decreased slightly with aging but was not completely offset with 21 days of aging. Aging improved WBSF values of steaks from steers of all biological types; but, 21 days of aging did not eliminate breed differences (Figure 2). Samples from Brahman crossbred steers required 21 days of aging to have comparable WBSF values to those from Continental crossbred and British steers aged for 3 or 7 days. Steers fed Optaflexx also produced steaks that received lower taste panel rating for tenderness, juiciness, and beef flavor compared with steaks from control steers. Taste panel ratings were lowest for steaks from Brahman crossbred steers.

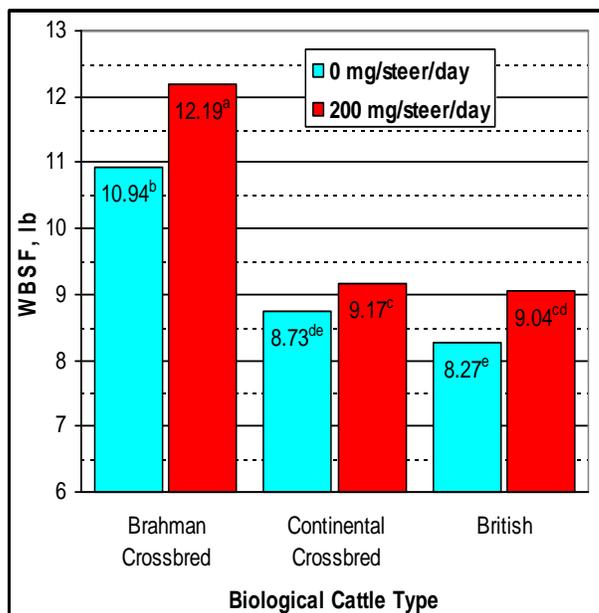


Figure 1: Effect of Optaflexx X biological cattle type interaction on Warner-Bratzler shear force. Means (bars) without a common superscript differ ($P < 0.05$).

Adapted from Gruber et al., 2008

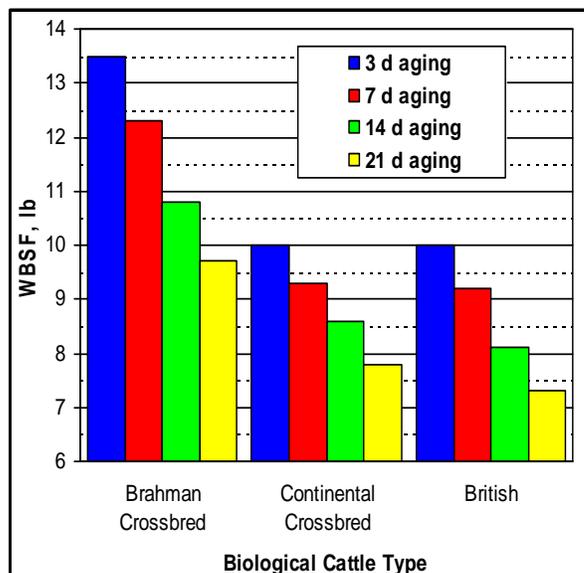


Figure 2: Effect of biological cattle type X aging period interaction on Warner-Bratzler shear force.

Adapted from Gruber et al., 2008

In summary, this research suggested that Optaflexx supplementation decreases LM tenderness of British, Continental crossbred, and Brahman crossbred steers. The effect of Optaflexx may be more pronounced in steaks from Brahman crossbred cattle than among steaks from Continental type or British steers.

Forage Selectivity by Grazing Cattle

The ability of grazing animals to enhance quality of diet by selection is important in production. Research conducted nearly 40 years ago on grassland near Tucson, AZ used rumen-fistulated steers to study the botanical composition of the diet.³ This early research showed that the species composition of rumen samples was considerably different from available forage on the range. These researchers also noted that the steers were very selective not only in their choice of available plant species but in the part of the plant they chose to graze. It was reported that the crude protein (CP) content of rumen samples was markedly greater (~3 to 4%) than the estimated protein content based on a weighted average of percent composition of the predominant plant species of the diet and the protein values for hand-clipped species (Figure 3). Data collected from esophageally-fistulated steers grazing big and little bluestem range in the Kansas Flint Hills in 1975 and 1976 shows the same effects of grazing selectivity on diet quality (Figure 4; 3 to 4% higher CP in esophageal vs. hand clipped samples).⁴

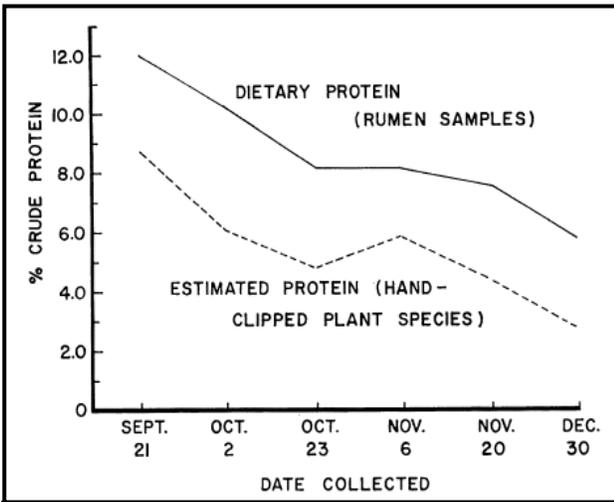


Figure 3. Comparison of protein in rumen samples from grazing steers with estimated average protein based on percent weight of plant species and protein content of hand-clipped species.
Source: Galt et al., 1969

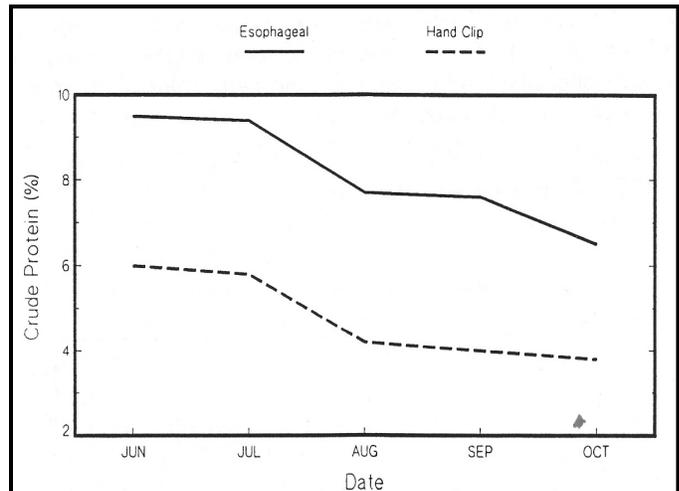
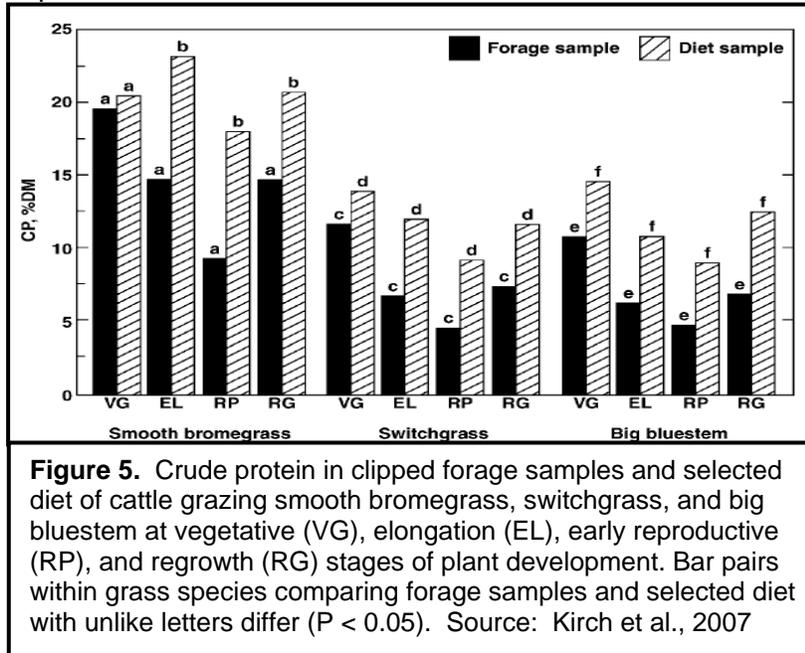


Figure 4. Crude protein content (%) of forages collected by esophageally-fistulated steers and hand clipping in the Kansas Flint Hills. Adapted from Woolfolk et al. (1975) and Allen et al. (1976).
Source: Owensby, 1997

A recent University of Nebraska and USDA study (2007) determined the effects of grazing selectivity on dietary quality of cattle grazing monoculture pastures of one cool-season grass, smooth bromegrass (SB), and two warm-season grasses, switchgrass (SG) and big bluestem (BB) as influenced by plant maturity.⁵ Three ruminally-fistulated steers (650 lb) strip-grazed SB, GS, and BB pastures at vegetative, elongation, early reproductive, and a regrowth stage of development. The steers were moved daily and allotted to areas with sufficient forage to maximize selection ability (provided at least 88 lb of forage dry matter per head per day). Clipped forage samples were compared with dietary samples accumulated during 45 minute grazing periods following total rumen evacuation. These researchers noted that the CP content of dietary samples was higher than that in clipped samples, 3 to 4% for SG and BB, and 8% for SB (Figure 5). The CP content of dietary samples never dropped below ~9%, whereas forage samples CP dropped to ~4%. Dietary fiber contents (NDF and ADF) were always lower than that in clipped samples. It was concluded that if

adequate forage is available, the selection ability of cattle can provide a superior diet compared to clipped forage samples.



Recent Iowa research (2008) looked at the phosphorus (P) concentration of smooth bromegrass selected by ruminally fistulated steers versus clipped forage samples (clipped at ground level and from the upper half of the forage sward).⁶ The P concentration of selected forage (0.39%) was almost twice as high as that in the available forage (0.21% for ground clipped sample) and was higher than the live forage clipped from the top half of sward (0.29%). These researchers concluded that cattle grazing cool-season pastures are able to select forage with adequate P content to meet their P requirements.

In conclusion, these studies clearly indicate that cattle grazing either mixed pastures or monoculture pastures can select diets higher in quality than standing forage provided there is adequate forage available. This suggests that pastures could be stocked more heavily when forage quality is high and then stocking rates could be reduced when there is less opportunity for cattle to selectively graze. This grazing selectivity may also influence supplementation programs.

¹ FDA. 2003. Freedom of information summary. Original new animal drug application. NADA 141-221. Available: <http://www.fda.gov/cvm/FOI/141-221.pdf>.

² Gruber, S. L., J. D. Tatum, T. E. Engle, K. J. Prusa, S. B. Laudert, A. L. Schroeder, and W. J. Platter. 2008. Effects of ractopamine supplementation and postmortem aging on longissimus muscle palatability of beef steers differing in biological type. *J. Anim. Sci.* 86:205-210.

³ Galt, H. D., B. Theurer, J. H. Ehrenreich, W. H. Hale, and S. C. Martin. 1969. Botanical composition of diet of steers grazing a desert grassland range. *J. Range Manage.* 22:14-19.

⁴ Owensby, C. E. 1997. Page V-87 in *Introduction to Range Management*. Department of Agronomy, Kansas State University, Manhattan, KS.

⁵ Kirch, B. H., L. E. Moser, S. S. Waller, T. J. Klopfenstein, G. E. Aiken, and J. R. Strickland. 2007. Selection and dietary quality of beef cattle grazing smooth bromegrass, switchgrass, and big bluestem. *Prof. Anim. Sci.* 23:672-680.

⁶ Assman, D., M. M. Haan, and J. R. Russell. 2008. Phosphorus concentrations of forage selected by grazing beef cattle. *J. Anim. Sci.* 86 (E-Suppl. 3):78 (Abstr.).

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