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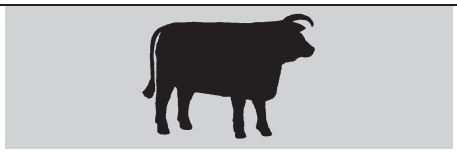

Effects of USDA feeder cattle frame and muscle grades on stocker and feeder cattle performance and profitability

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ABSTRACT

A total of 395 calves (180 ± 25 kg) were purchased from sale barns in Oklahoma and Texas in the fall of 3 consecutive years to measure the effect of USDA feeder cattle frame and muscle grades on performance and profitability. Individual purchase weight and price were recorded, and steers were assigned USDA feeder cattle grades of Large (LG), Medium (MED), or Small (SM) frame size and Number 1 or Number 2 muscle thickness by the same official USDA market graders. Steers were grazed on rye pasture and were then valued by commercial order buyers in frame and muscle grade groups. Muscle grade did not affect ($P > 0.60$) animal performance or profitability during the grazing phase. Grazing ADG increased linearly ($P < 0.001$) as frame grade increased, but purchase price was lower ($P < 0.001$) for SM steers than for MED and LG frame steers, respectively, resulting in greater ($P < 0.001$) grazing-phase net returns for SM steers. Following finishing on a high-concentrate diet, the lesser total weight gain during finishing of SM steers ($P < 0.001$) resulted in lesser per animal revenue. Feed and interest costs were also less ($P < 0.001$) and marbling score greater ($P < 0.001$) for SM steers, resulting in greater finishing net returns and carcass price. In a post hoc analysis in which frame and muscle grades were reassigned to cattle based on HCW and LM area, only 44% of the cattle remained in their original grade.

Key words: profitability, stocker cattle, USDA feeder cattle grade

INTRODUCTION

Cattle of varying qualities are available to stocker producers. Quality can be described by several factors such as health, frame, condition, and genetics, which all affect the future gain and profit potential of the animal. In 2000, the USDA updated the official US feeder cattle grades (USDA, 2000; Grona et al., 2002) to better reflect the frame size and muscle thickness quality of available feeder cattle. Producers' selection of cattle from available frame size and muscle thickness categories has traditionally been based on maximizing cattle performance. Stocker producers, therefore, typically favor taller, more heavily muscled cattle (Medium and Large frame, Number 1 muscle). High demand for these cattle has resulted in price premiums, or, conversely, discounts for smaller framed, lighter muscled animals (Reuter, 2003; Troxel and Barham, 2007). If the market is efficient in assigning these discounts, then there may be little true difference in net return among frame and muscle grade categories, when real-world purchase prices are taken into account. Therefore, the goals of the study were to 1) determine the effects of frame and muscle grades on the net return of the stocker grazing enterprise and 2) determine the carry-over effects of these traits on the performance and net return of the finishing enterprise when the cattle are finished in feedlots.

MATERIALS AND METHODS

General

All procedures used in this experiment conformed to the Guidelines for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (FASS, 1999). Steers were received and grazed (described below)

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at the Noble Foundation's Red River Demonstration and Research Farm southeast of Burneyville, Oklahoma. The finishing phase of the experiment was conducted at Colorado State University's Agriculture Research Development and Education Center northeast of Fort Collins, Colorado.

Animals and Receiving Phase

Over the course of several weeks in the fall of each of 3 yr (2000, 2001, and 2002), bull and steer calves (180 ± 26 kg) were purchased individually at 6 commercial sale barns in southeast Oklahoma and northeast Texas. Cattle were selected to represent quality stocker calves typical of the region. Eighty-two percent of the cattle were black hided, and no animal exhibited visually discernable *Bos indicus* inheritance. Purchase weight and price were recorded for each individual. Animals were processed within 24 h of arrival at the research facility. Processing included administration of 1) bacterial (PolyBac B3, Texas Vet Labs, San Angelo, TX) and 2) viral (BoviShield 4+VL5, Pfizer Animal Health, New York, NY) vaccines for the prevention of bovine respiratory disease, 3) clostridial disease vaccine (Covexin 8, Schering Plough Animal Health, Summit, NJ), 4) injectable anthelmintic (Ivomec Plus, Merial Ltd., Duluth, GA), and 5) injection of tilmicosin phosphate [Micotil (300 mg of tilmicosin phosphate/mL), Elanco Inc., Greenfield, IN; dosage: 1.5 mL/45.4 kg of BW s.c.]. All products were administered according to label directions. Processing also included 6) application of a uniquely numbered ear tag (AllFlex USA, Ft. Worth, TX), 7) surgical removal of horns or horn buds (gouge or Barnes-type dehorning tool, Moore Maker, Matador, TX) followed by cauterization (Model 55A dehorning iron, L & H Branding Irons, Mandan, ND) if horns were present, and 8) application of a hot-iron brand on the hip (L & H Branding Irons). Bull calves were castrated by application of a constriction band (Callicrate Smart Bander, No Bull Enterprises Inc., St. Francis, KS).

After processing, each animal was evaluated by the same 2 employees of the Oklahoma Department of Agriculture (each with >20 yr of experience as beef market graders) and assigned a USDA frame grade (Large, **LG**; Medium, **MED**; or Small, **SM**) and muscle grade (Number 1, **MS1**; or Number 2, **MS2**). Steers were then commingled in a bermudagrass pasture and given ad libitum access to bermudagrass hay and 1.5 kg/d per steer of supplement (33% soybean hulls, 33% corn gluten feed, 34% corn distillers grains, as-fed basis) until the remaining animals were purchased and ready to begin the experiment. This receiving period averaged 63 d, and the minimum receiving period was 28 d for the last animal purchased.

Grazing Phase

After receiving, steers were commingled and continuously stocked on a common pasture established to cereal rye (*Secale cereale*). Initial and final BW were recorded for each animal on an individual animal scale (chute: C&S Heavy Duty, Basset Inc., Garden City, KS; load cells: Rice Lake Weighing Systems, Rice Lake, WI) following a 16-h period with no feed or water. The grazing phase averaged 118 d and was terminated when forage availability and quality was estimated to limit ADG. The termination date ranged from April 15 to May 1 depending on the year. At the termination of the grazing phase, steers were sorted into pens according to previously assigned frame and muscle grade categories. In an attempt to measure differences in value among the frame and muscle grades, 3 commercial order buyers visually evaluated the cattle and independently assigned a bid price to each frame or muscle grade group. Buyers were given a form indicating the average BW of each group of cattle, but the form did not indicate the frame or muscle grades. The average bid price was used to calculate the estimated value of the steers postgrazing.

Finishing Phase

After the grazing phase in each year, steers were transported 1,375 km to the Colorado State University research feedlot near Ft. Collins, Colorado. Steers were implanted (Revalor-IS, Merck Animal Health, Summit, NJ) and weighed, hip height was measured, and subcutaneous fat thickness between the 12th and 13th rib (backfat thickness) was determined using real-time ultrasound (Aloka SSD-500, Aloka Co. Ltd., Wallingford, CT) within 24 h of arrival at the feedlot. Steers were assigned randomly to 1 of 15 dirt-surfaced feedlot pens within frame and muscle grade categories (6 to 12 steers per pen; 2 to 3 pens per frame–muscle grade combination). Cattle were fed once daily a diet consisting of (as-fed basis) 69.2% steam-flaked corn, 14.8% ground alfalfa hay, 12.1% corn silage, and 3.9% commercial protein supplement. Orts were removed from the bunks and weighed on 28-d intervals. Steers were weighed and ultrasound measurements were taken on 28-d intervals. When a pen of steers was predicted by ultrasound to have reached 10 mm of backfat, that pen was slaughtered at a commercial slaughter facility (Swift and Company, Greeley, CO). Carcass data were collected by trained Colorado State University personnel.

Economic Calculations

Individual animal cost was recorded for each animal at the sale barn. Pasture cost during the grazing phase was calculated for each animal at the rate of $0.705/kg of pasture gain ($0.32/lb of gain). Individual interest cost (8% annual rate) was calculated for each animal during the grazing phase. All other pasture costs (labor, morbidity, and so on) during the grazing phase were considered equal across frame and muscle grade groups and were therefore omitted from the analysis. Gross revenue at the end of the grazing phase was calculated by multiplying the weight of each animal by the respective average price assigned by the 3 commercial order buy-