EFFECT OF AGE AT SLAUGHTER ON CARCASS CUTABILITY TRAITS AND BOXED BEEF YIELDS OF FEEDLOT STEERS

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Story In Brief

Steers (70 Angus; 70 Angus x Hereford) were randomly allocated to one of five chronological age treatments: EW = early weaned directly to the feedlot at 3.5 mo of age, NW = normal weaned and placed in the feedlot at 7.9 mo, WP = backgrounded on wheat pasture for 112 d then placed in the feedlot at 11.6 mo, SG = dry wintered and then grazed on early, intensively managed native range for 68 d prior to feedlot entrance at 15.4 mo, LG = dry wintered, season long grazed on native range for 122 d, and then placed in the feedlot at 17.4 mo of age. Steers were slaughtered at .56 in. s.c. fat thickness. Age at slaughter was 13.1, 14.5, 16.1, 19.6, and 20.7 mo for EW, NW, WP, SG, and LG, respectively. Yield grade data were collected and the left side of each carcass was fabricated and trimmed to three levels (1.0, .5, and .25 in.) for boxed beef yield determinations. EW and NW steers had lighter carcass weights than backgrounded steers. No differences were noted among age treatments for ribeye area, percentage kidney, pelvic, and heart fat, or yield grade. Carcasses from EW and NW steers had higher percentages of .25 in. fat trim and lower percentages of closely trimmed boxed beef product than carcasses from steers that were backgrounded. Percentage bone decreased with advancements in animal age with the exception of the LG steers which had higher percentage bone than did SG steers. However, boxed beef product (.25 in. fat trim) to bone ratios differed only for directly placed vs. backgrounded steers. These results indicate that despite similarities in carcass grade traits, accelerated weaning and feeding regimens may depress boxed beef yields.

(Key Words: Steers, Age, Meat Yields.)

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Introduction

Diversification of the U. S. cattle population during the past two decades has resulted in many different cattle types. Although the influx of new cattle breeds has contributed increased growth rate, size, and to an extent muscularity, these breeds as well as intensified use of crossbreeding have also increased variability and inconsistency during the growing and finishing phases of production. This has resulted in many different management and marketing strategies to achieve maximum profitability for different cattle types. For example, with increased growth rate to weaning some producers are placing calves directly into the feedlot in an effort to moderate slaughter and carcass weights to meet a more desirable weight range. Therefore, this study was conducted to determine the effect of age (maturity) at slaughter on carcass traits and boxed beef yields of feedlot steers.

Materials and Methods

One hundred and forty steers (70 Angus; 70 Angus x Hereford) obtained from two reputable Oklahoma herds were randomly assigned to one of five chronological age treatments: EW = early weaned directly to the feedlot at 3.5 mo of age, NW = normal weaned and placed in the feedlot at 7.9 mo, WP = backgrounded on wheat pasture for 112 d then placed in the feedlot at 11.6 mo, SG = dry wintered and then grazed on early, intensively managed native range for 68 d prior to feedlot entrance at 15.4 mo, and LG = dry wintered, season long grazed on native range for 122 d, and then placed in the feedlot at 17.4 mo of age. Each treatment contained 28 steers (14 head per ranch) that were fed as 7 head per pen in the feedlot.

At weaning all steers were vaccinated with IBR-PI3 (modified live virus; intramuscularly) 7-way clostridial bacterin, and injected with Ivermectin. EW steers received a shot of Nasalgen one week after feedlot arrival. All steers were implanted with Synovex-S (20 mg estradiol benzoate + 120 mg progesterone). EW calves received their first implant at approximately 101 d on feed and were reimplanted every 84 d. NW calves received their first implant at approximately 8 months of age and were reimplanted every 84 d thereafter. WP, SG, and LG steers received their first implants before going to wheat or grass and were reimplanted every 84 d, except the LG steers which received implants before grass but were never reimplanted.

Each treatment was fed a standardized feedlot diet containing 12.4 % protein with the exception of the EW calves which were started on an 18 % all natural protein diet (3 to 5 mo of age), switched to a 16 % all natural protein diet (5 to 6 mo of age), adjusted to a 13.4 % protein diet (6 to 7 mo of age), and finally placed on the standardized 12.4 % protein diet at 8 mo of age. Steers were adapted over 14 days through a series of four diets to a 91 % concentrate diet. In the workup diets, alfalfa hay and cottonseed hulls (2 to 1 ratio) replaced corn to achieve 50 , 60 , 70 , and 80 % concentrate levels, except the EW calves were initiated on 50 % concentrate and then elevated to 80 % concentrate. Steers were weighed every 28 d to monitor average daily gain and feed efficiency.

All treatments were slaughtered upon reaching a subjectively evaluated pen mean of .50 inch of subcutaneous fat thickness. However, most all cutability traits are highly fat thickness dependent, so all variables were adjusted to a constant carcass subcutaneous fat thickness (.56 in.) within each ranch x age treatment subclass to reduce the fat thickness variation that occurred within the 7 head pens at slaughter. Days on feed for the five age treatment groups were: 287, 198, 134, 124, and 100 days for EW, NW, WP, SG, and LG, respectively.

Steers were commercially slaughtered and complete quality and yield grade data were collected on each carcass approximately 48 hours postmortem (USDA, 1989). The left side of each carcass (28 per treatment) was shipped to the Oklahoma State University Meat Laboratory for fabrication into boneless subprimals to determine compositional differences at three different fat trim levels (1.0, .50, and .25 in.). A modern boxed beef cutting guideline that caters to the food service portion of the industry was used in this study. Sides were initially fabricated into the major wholesale cuts (round, loin, rib, chuck) and subsequently fabricated into boneless subprimals to determine boxed beef cutout. Weights were recorded for the untrimmed subprimals and again at each of the three subcutaneous fat trim levels (1.0, .50, and .25 in.). Minor wholesale cuts were fabricated into the various "blue sheet" reported cuts (USDA, 1991). Weights for 1.0, .50, and .25 in. fat trim were recorded. Weights for total retail product at each trim level were also recorded, as well as total bone weight for each side. Percentages were calculated using aggregate side weight.

Statistical analysis was conducted using least squares means. Orthogonal contrasts were partitioned to determine the following effects: DB = directly weaned to the feedlot (EW and NW) vs. backgrounded (WP, SG, LG); EN = EW vs. NW; WG = WP vs. native range backgrounded (SG and LG); SL = SG vs. LG. Significance was reported at the .05 level.

Results and Discussion

The results of this study must be considered relative to the fat thickness endpoint (.56 in.) and breed type (predominately Angus) used. Slaughter weight and carcass yield grade traits across age groups are presented in Table 1. Slaughter weights increased as age at slaughter increased up to the wheat

Table 1. Slaughter and carcass grade traits stratified by age treatment.

Item	Early weaned	Normal weaned	Wheat pasture	Short grazed	Long grazed	Effect[a]
Slaughter wt., lb.	1114.7	1187.4	1242.3	1254.4	1224.9	DB
Carcass wt., lb.	733.3	754.2	802.5	802.9	787.7	DB
Ribeye area, "2	11.9	12.4	12.6	12.7	12.8	- -
KPH, %	2.5	2.4	2.3	2.4	2.0	- -
Yield grade	3.4	3.3	3.4	3.3	3.2	- -

[a] DB = Significant difference (P <. 05) for steers sent directly to the feedlot (EW, NW) vs. backgrounded steers (WP, SG, LG).

pasture age group. Steers placed directly in the feedlot (EW and NW) had lower (P < .05) slaughter weights (90.4 lb. less) than backgrounded steers (WP, SG, and LG). Carcass weights followed the same general trend as slaughter weight in that EW and NW steers had lighter (P < .05) carcass weights (733.3 and 754.2 lb., respectively) than backgrounded steers (WP = 802.5, SG = 802.9, and LG = 787.7 lb.). No differences (P > .05) were noted in slaughter and carcass weights among backgrounding (WP, SG, and LG) treatments.

Ribeye area tended to increase numerically as age at slaughter and weights increased (Table 1); however, differences were too small and inconsistent for statistical significance (P > .05). Among carcasses with similar s.c. fat thickness (.56 in.), no differences (P > .05) were noted in percentage kidney, pelvic, and heart fat or yield grade regardless of age treatment.

Bone percentage decreased (P < .05) as age at slaughter increased with the exception of the long grazed steers which had higher percentages of bone than did carcasses from short grazed steers (Figure 1). Significant differences were noted for all four of the orthogonal contrasts tested (EW > NW; EW and NW > WP, SG, and LG; WP > SG and LG; SG < LG). Carcasses from steers sent directly to the feedlot (EW and NW) had .7 % more bone than did wheat pasture, short grazed, and long grazed steers. Between steers placed directly in the feedlot, early weaned steers had .5 % more bone than did normal weaned steers. Wheat pasture backgrounded steers had .5 % more bone than did grass backgrounded steers and between the grass backgrounded steers, carcasses from the long grazed steers had .6 % more bone than did short grazed steers.

As expected, trimming the excess fat from boneless subprimals and wholesale cuts to achieve a 1.0, .50, and .25 in. fat trim increased percentage of fat trim (Figure 2). Moreover, percentage fat trim tended to decrease as age at slaughter increased for all three fat trim levels (1.0, .50, and .25 in.). Carcasses from steers placed directly in the feedlot (EW and NW) had higher (P < .05) percentage fat (1.6 % higher) at the .25 in. trim level than did carcasses from WP, SG, and LG steers. At the .50 and 1.0 in. trim level directly placed steers had higher (P < .05) percentages of fat trim than did backgrounded steers, and

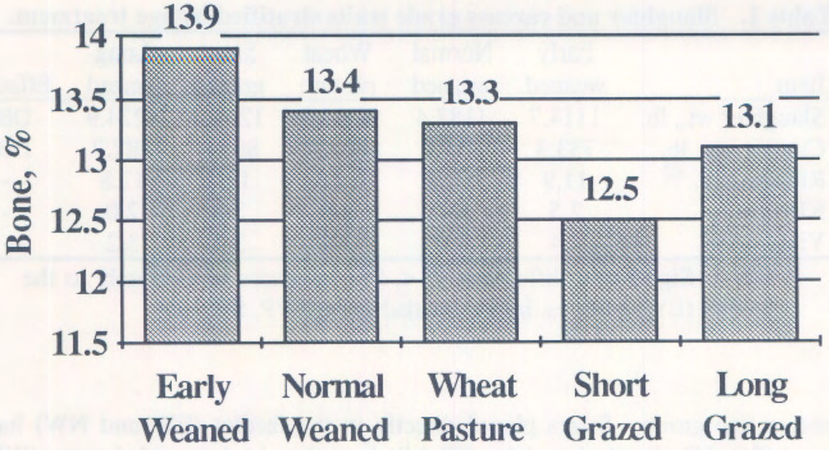

Figure 1. Percentage bone stratified by age treatment P < .05 for early vs. normal weaned, directly placed vs. backgrounded, wheat vs. native range backgrounded, and short vs. long grazed.

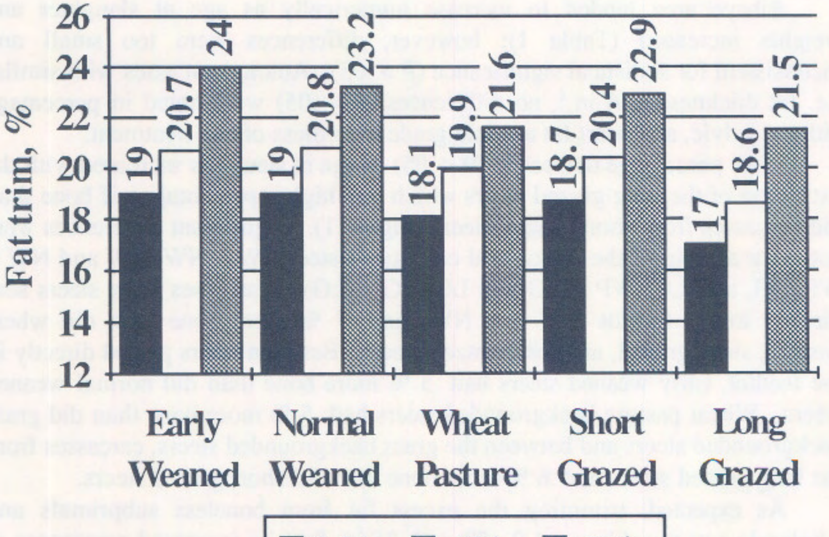

Figure 2. Percentage fat trim measured at three endpoints stratified by age treatment. At the 1.0 and .50 in. trim levels, P < .05 for directly placed vs. backgrounded steers and short vs. long grazed; at the .25 in. trim level P < .05 for directly placed vs. backgrounded steers.

carcasses from SG steers had higher (P < .05) percentages of fat trim than did LG steers.

Percentage boxed beef product yields across age treatment groups are presented in Figure 3. With increasing fat trim percentage, boxed beef product yields decreased. Percentage boxed beef product tended to increase with increasing age at slaughter at all three fat trim levels (1.0, .50, and .25 in.). At the .25 in. trim level, carcasses from EW and NW steers yielded lower (P < .05) percentages of boxed beef product (2.25 % lower) than carcasses from backgrounded steers (WP, SG, and LG). At the .50 and 1.0 in. trim levels, carcasses from steers sent directly to the feedlot (EW and NW) had decreased (P < .05) percentage boxed beef product yields (1.8 % lower) compared to carcasses from backgrounded steers (WP, SG, and LG). Likewise, carcasses from steers backgrounded on wheat pasture had lower (P < .05) percentage boxed beef product yields (1.0 % lower) than did carcasses from native range backgrounded steers (SG and LG), and carcasses from SG steers had less (P < .05) boxed beef product (1.2 % lower) than carcasses from LG steers.

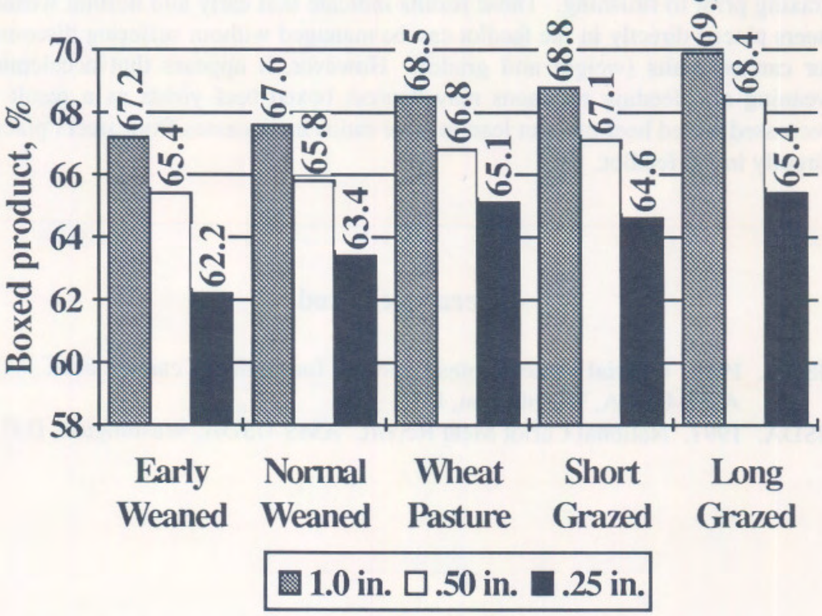

Figure 3. Percentage boxed beef product at three fat thickness levels stratified by age treatment. At the 1.0 and .50 in. trim levels P < .05 for directly placed vs. backgrounded steers, wheat vs. grass backgrounded, and short vs. long grazed; at the .25 in. trim level P < .05 for directly placed vs. backgrounded steers.

Boxed beef product lean to bone ratios, evaluated at the .25 in. fat trim level, differed between carcasses from steers placed directly in the feedlot vs. backgrounded steers. Carcasses from EW and NW steers had lower boxed beef product lean to bone ratios (4.5 and 4.7, respectively) than did carcasses from WP (4.9), SG (5.2), and LG (5.0) steers. Apparently, carcasses from backgrounded steers had more muscle mass surrounded by a constant carcass subcutaneous fat thickness (.56 in.) than carcasses from steers sent directly to the feedlot.

Differences ($P < .05$) between the two ranches were noted only for percentage fat trim and percentage boxed beef product (A = 22.2, 64.5; A x H = 23.1, 63.8) at the .25 in. fat trim level.

Implications

During the feedlot phase of production, early and normal weaned calf-fed steers reached a carcass fat thickness endpoint (.56 inch) at lighter weights than steers backgrounded on wheat pasture, early intensive grazing, or season long grazing prior to finishing. These results indicate that early and normal weaned steers placed directly in the feedlot can be managed without suffering discounts for carcass traits (weight and grade). However, it appears that accelerated weaning and feeding regimens may depress boxed beef yields as a result of decreased boxed beef product lean to bone ratios in carcasses from steers placed directly in the feedlot.

Literature Cited

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