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Summary

One load (n = 72; initial BW = 745 ± 54.5) of grass-raised Angus-cross yearling steers was purchased from a sale barn in north central South Dakota. The steers were sorted into load lots by sale barn personnel from a larger group of 1200. Upon arrival, steers were used in the 4-day Feedlot Shortcourse before being weighed and appraised for visual differences. Cattle were divided (randomly) into 8 groups of 9 head each. One steer was randomly selected from each of the eight groups to make a 9th group of steers comprised of each classification. The steers were fed until they reached an average visual ribfat depth of 0.40 in. The data would show that even though cattle came from one owner, variation does exist for feedlot and carcass characteristics. This variation can affect marketing endpoints, and if not managed properly, can cause a decrease in profitability.

Introduction

Beef producers and feedlot operators are being more concerned about variation within groups of cattle. A greater concern is functionality due to an increase in the number of cattle being marketed on a "grid" pricing system. Final selling price can be reduced if a pen of cattle is marketed with a greater number of under-finished or over-finished animals which would receive discounts, or if cattle are marketed on a grid that dose not fit their type. Currently, the Choice/Select spread and discounts are historically low due to higher demand of fed cattle. Yet, one must be concerned about the number of cattle that are heavy/light or YG 4's in a pen. Trenkle (2001) showed that differences in frame size and initial backfat resulted in differences in profitability. Bruns and Pritchard (2003) summarized various research methods used to sort cattle and the costs associated with sorting. However, little work has been done to quantify the extent of variation within a group of cattle.

The objective of this study was to quantify the variation that is present within the group of cattle evaluated. The variation represented here may not exist in other pens of cattle.

Materials and Methods

Angus cross yearling steers (n = 72) were purchased from a salebarn in North Central South Dakota and hauled 255 miles to the SDSU Nutrition Unit where they were used for the SDSU Feedlot Shortcourse. Upon arrival animals were processed. Processing included vaccination against IBR, BVD, PI_3, BRSV, Haemophilus (Resvac-4, Pfizer, Eaton, PA), 7-way clostridia (Dectomax, Pfizer, Eaton, PA), and a Synovex-C implant (100 mg. progesterone and 10 mg estradiol benzoate; Fort Dodge Animal Health, Fort Dodge, IA).

Cattle were weighed and evaluated for Condition Score (CS) as defined in Table 1 and for Frame Score (FS) (Table 2) by one, experienced individual. Steers were then ranked by CS, weight, and FS and allotted to eight specific groups of 9 head each (Table 3). Pens 1-3 were the thinnest cattle and were allotted to pen by weight. Pens 4 and 5 were average CS (CS = 5) cattle broken into a light and a heavy weight group. Pens 6 and 7 (CS = 5.4 average) were fleshy cattle with Pen 6 being comprised of the larger framed half while Pen 7 were the small framed steers. Pen 8 was comprised of large framed, late maturing cattle that were thin. One steer was randomly chosen from each of the first 8 pens to fill Pen 9 with a mixed set of steers.

Steers were fed in paved outdoor pens measuring 25 ft x 25 ft, with a 25 ft fence-line feed bunk. Steers were fed twice daily and had continual access to water. A clean bunk management system was used with a series of 4 step-up diets before being switched to the finishing diet. Steers were brought up to ad libitum on the finishing diet within 20 days. The

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diet contained, on a dry matter basis, 5% oatlage, 30% high moisture corn, 56.25% whole shelled corn, 4.5% soybean meal, and 4.25% liquid supplement with urea. The diet contained 75.5% DM, 11.8% CP, and had an estimated energy content of 0.91 Mcal/lb NE_m and 0.61 Mcal/lb NE_G.

Cattle were weighed and re-implanted on d 49 with Revalor IS (16 mg Estradiol-17β and 80 mg trenbolone acetate; Intervet, Millsboro, DE).

One steer from Pen 5 was removed from the study after death due to respiratory illness. Body weight contribution to the pen mean was deleted at the time the steer was pulled due to health and deleted from the dataset. Carcass measurement data was not attainable on 6 head; 5 were pulled for plant audit (AQL) from Pens 2 and 3, and one carcass from Pen 9 was condemned due to osteomalacia.

Due to the nature of the study and the variation that existed between pens, it was decided to market the cattle in two groups, 2 weeks apart at an average visual fat depth of 0.40 in. Pens 4, 5, 6, 7, and 8 were marketed on day 126 while pens 1, 2, 3, and 9 were marketed on day 140. Cattle were hauled 125 miles to a commercial packing facility where steer identification was maintained and carcass data was obtained by university personnel. Marbling Score was assigned by an official USDA grader. Upon completion of calculating Yield Grade and Quality Grade, the following premiums and discounts were assigned to calculate a pen premium; Prime = +8.00, upper 2/3 Choice = +2.00, Select = -5.00, and Standard = -15.00, with the following Yield Grade premiums/discounts - USDA YG 1 = +3.00, YG 2 = +1.50, YG 3 and YG 4 = -14.00.

Results

The purpose of this report is to give a better understanding of the amount of variation that exists within a load of steers. Even though levels of significance were obtained between pens for various traits, these differences will not be addressed in this article. However, a discussion of the variation of performance and carcass traits will be shown.

Performance measurements are reported in Table 4. The average initial weight among pens differed by 17.7% with the lightest individual weighing 606 lb vs. the heaviest weighing 895 lb (32.3%). On day 126, the difference between the lightest pen (Pen 1, 1125 lb) and the heaviest (Pen 6, 1360 lb) narrowed to 17.3%, a reduction of 15%. When the lighter pens were fed for two more weeks, this variation was reduced further to 14%. Cumulative pen performance is shown in Table 4. The group mean for ADG, DMI, and F:G was 4.1 lb/d, 22.6 lb/d, and 5.434 lb/lb of gain. An 18% difference existed between the highest and lowest ADG, with a 24% difference in DMI, and an 11.6% difference in F:G. When evaluating pens 1-8 only, Pens 2, 3, 6, and 8 gained greater than average and also had DMI's that were greater than the average for Pens 1-8.

Carcass data is reported in Table 5. Differences for dressing percent and HCW are not well correlated. Cattle with the heavier HCWs exhibited a greater than average ribfat depth (0.49 vs. 0.35 in.) with the average ribfat for all 72 head of 0.42 in. Intramuscular fat was determined by using an Aloka 500 ultrasound machine with a 3 mHz probe. Cattle marketed in the second group, (day 140) had lower marbling compared to cattle marketed on d 126, but when fed to d 140 had caught up to those marketed on d 126.

Percent Choice and % heavy & light and % 4's are listed in Table 5. Because of the few numbers of animals per pen, and the lack of replication, these data are presented to demonstrate the variation that can exist among sorted cattle.

Implications

The data reported here gives useful information concerning the amount of variation that can be present within a semi-load of cattle. Sorting can be beneficial at the start of the finishing phase to group cattle into outcome groups. These outcome groups require different management decisions to insure maximum performance parameters are met and animal's carcasses are marketed at an optimal endpoint. In the future, larger numbers will be needed to calculate statistical parameters.

Literature Cited

Trenkle, A. 2001. Effects of sorting steer calves on feedlot performance and carcass value. A.S. Leaflet R170. Pages 14-17 in Iowa State Univ. Beef Res. Rept.

Bruns, K. W. and R. H. Pritchard. 2003. Sorting cattle - a review. Beef 2003-10. Pages 60-69 in SD Beef Rept. SDAES, Brookings.

Tables

Table 1. Condition score and frame score chart

Condition Score	
1 -	
2 -	
3 -	Outline of spine and all ribs present, experiencing slight muscle atrophy; 8% empty body fat.
4 -	Slight outline of spine; 3-5 ribs visible; outline of hips and pin bones visible; 12% empty body fat.
5 -	No visible protrusion of the spine; 1-2 ribs visible outline of hips and pin bones 16% empty body fat; < 0.10 in. of ribfat
6 -	No outline of ribs; some fat in flank and brisket; 20% empty body fat; between 0.10 - 0.20 in. ribfat.
7 -	Full look in the flank and brisket; 24% empty body fat; between 0.20 - 0.30 in. rib fat.
8 -	
9 -	
10 -	
Frame Score	
Small -	Expected to reach the Choice grade at less than 1,100 lb.
Medium -	Expected to reach the Choice grade between 1,100 and 1,250 lb.
Large -	Expected to reach the Choice grade at weights in excess of 1,250 lb.

Table 2. Mean value of one load of steers (72 head)

	Mean	Std Dev.
In Wt., lb	748	54.5
Condition	4.8	0.92
Frame	3.26	44.6
# Head thin	33	
# Head average	30	
# Head fleshy	9	

Table 3. Cattle descriptions

Pen	In Wt.	Std Dev	Condition Score[a]	Std Dev	Frame Score[b]	Std Dev	Characteristics
1	661	30.4	4.0	0.0	3.21	0.25	lightweight, thin, flighty group
2	726	20.0	4.0	0.0	3.34	0.18	Lightweight, thin
3	747	30.6	4.3	0.20	3.37	0.29	Heaviest of the thin cattle
4	736	29.7	5.0	0.09	3.28	0.36	Thin to average flesh
5	773	52.1	5.2	1.8	3.14	0.79	Average flesh
6	803	45.9	5.6	0.35	3.08	0.36	Stout, big bodied, heavy muscled
7	752	27.4	5.6	0.56	2.78	0.41	Small framed; fleshy steers
8	778	47.2	4.75	0.93	3.62	0.19	Large framed; thinner cattle
9	759	66.7	4.93	0.94	3.23	0.49	Mix of 1 steer from each of eight groups

[a] Condition score (CS) 1 - 10; description in Table 1.
[b] Frame score 1.00 = small; 2.00 = medium; 3.00 = large.

Table 4. Pen anatomy - performance data

Pen[a]	1	2	3	4	5	6	7	8	9
n =	8	8	8	8	7	8	8	8	8
In weight, lb	661	726	747	736	773	803	752	778	759
Days on feed	140	140	140	126	126	126	126	126	140
Weight, 126d, lb	1125	1262	1335	1240	1272	1360	1251	1363	1266
Weight 140d, lb	1169	1300	1383	-	-	-	-	-	1307
Change, lb	44	38	48	-	-	-	-	-	42
Cumulative performance[b]									
ADG, lb	3.6	4.1	4.5	4.0	4.0	4.4	4.0	4.3	3.9
DMI, lb	19.3	23.2	25.4	21.1	22.5	23.8	21.9	22.8	23.6
F/G	5.3	5.7	5.6	5.3	5.7	5.4	5.5	5.4	6.0

[a] Cattle type described in Table 3.
[b] Pen data used to calculate mean values.

Table 5. Pen anatomy - carcass data

Pen[a]	1	2	3	4	5	6	7	8	9
n =	6	7	7	8	7	8	8	8	7
Harvest group[b]	2	2	2	1	1	1	1	1	2
Final Wt, lb	1169	1300	1383	1240	1272	1360	1251	1363	1307
Dressing %[c]	61.3	62.4	63.2	62.3	61.6	61.4	61.5	62.1	62.5
HCW, lb[d]	688	779	840	741	752	802	739	783	816
Ribfat, in.	0.28	0.39	0.45	0.37	0.53	0.48	0.48	0.36	0.45
Ribeye area, in^2	11.6	12.8	13.2	13.6	13.5	13.5	13.0	13.9	12.6
KPH, %[e]	1.5	2.1	2.3	1.8	1.7	2.0	1.7	1.4	2.1
Yield Grade	2.6	2.9	3.1	2.4	2.9	2.9	2.8	2.4	3.1
Marbling score 126[f]	514	483	533	534	559	553	563	514	483
Marbling score 140[g]	580	548	591	-	-	-	-	-	578
Cumulative									
% Choice	66.6	71.4	85.7	87.5	71.0	62.5	87.5	62.5	85.7
% YG 1 & 2	66.6	57.1	33.0	87.5	57.1	62.5	62.5	87.5	63.0
% 4's	0	0	0	0	0	0	12.5	0	0
% Heavy or lights	0	0	0	0	0	0	0	0	0
Premium/Discount	1.00	0.50	0.67	0.50	0.57	-0.44	-0.75	-0.32	0.36

[a] Cattle type described in Table 4.
[b] Harvest group = determined by visual estimation of when cattle reach 0.40 in. backfat.
[c] Dressing % = [HCW / (Live Wt • 0.96)].
[d] HCW = Hot carcass weight.
[e] KPH = Kidney, pelvic, and heart fat.
[f] Marbling score 126 determined by use of ultrasound for Pens 1, 2, 3, 9.
[g] Marbling score 140 determined by USDA Grader.