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Evaluation of Growth, Feedlot and Subsequent Carcass Data obtained from Steers Produced at the San Juan Basin Research Center

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As more pricing grids become available to producers, we are looking for ways to quantify and predict carcass performance without sacrificing feedlot performance. While collecting actual carcass data on a wide assortment of cattle is probably the most reliable method, it can be expensive (upwards of $6.00 per head) and difficult to obtain. Inter mountain cow-calf producers ship their calves to feedlots in NM, TX, Eastern CO or NE. While some producers ship their calves immediately after weaning, others may winter their calves and place them in the feedlot as yearlings. Information on feedlot performance is readily available and easy to interpret. However, carcass data often gets “lost” before getting back to the producer or simply is not interpreted correctly. This study hopes to quantify factors affecting feedlot performance and subsequent carcass data.

Cattle Management. Data was collected on calves born at the San Juan Basin Research Center (SJBRC) in Hesperus, CO from 1993-1999. Calving occurred from late January through mid-April with weaning at approximately 7 months of age in October. Each year 45 of the purebred bull calves with above average performance were placed in the Four Corners Bull Test and an additional ten steers representing two sire groups were placed on feed at the Great Western Beef Expo. The remaining steers were backgrounded and fed in a local feedlot. Heifer calves were developed until the following spring when culling criteria was applied. While some heifers were placed in feedlots, no heifer data was analyzed in this study.

Growth, feedlot and carcass data were collected and analyzed on all available steer calves (n=509). Beginning in 1998, steers were sent to the feedlot in two different groups, therefore data were analyzed using a combination of birth year and slaughter month (BY/SLGR). **Table 1** shows the breakdown of observations, age on feed, age off feed and days on feed by BY/SLGR.

Steers were fed at the Navajo Agricultural Products Industry (NAPI) feedlot in Bloomfield, NM for an average of 163 days. Cattle were shipped to Friona, TX to be processed at the Excel plant. Carcass data was collected by Cattlemen’s Carcass Data Service.

Traits analyzed. Growth data available included birth weight, actual weaning weight and adjusted 205 day weaning weight (ADJWW). Preliminary analysis indicated that ADJWW was the best growth trait indicator as it relates to feedlot and carcass data. Feedlot data included age on feed (Age), weight on feed (onfeedwt), market weight (marketwt), average daily gain (ADG) and Total Gain.

Carcass data collected included hot carcass weight (HCW), marbling score, %KPH, backfat, ribeye area (REA) and the resulting yield grade (YG). Dressing percentage (DP) was calculated using HCW and market weight. Marbling score was a two digit number with the first number referring to the abbreviated marbling category and the second number representing the percentage of marbling within that marbling category. Abbreviated marbling categories range from 1 for practically devoid and 9 for abundant. Therefore a sample marbling score recorded in this analysis of 44 would refer to Small 40. These numbers can easily be converted to quality grade equivalents. Marbling scores and %KPH were not available on 1994 born calves. Yield grade was calculated using a weighted index of HCW, REA, KPH and backfat.

Breed Designation. The SJBRC began a project in 1985 to develop phenotypically alike but genetically diverse sources of germ plasm for composite cattle breeding. These composites were developed using the Hereford and Angus cow base at the station. The resulting composites, System 1 and System 2 were complete in 1991 and 1993, respectively. The System 1 is comprised of 1/4 Marc III, 1/4 RX3, 1/4 CASH and 1/4 Hereford and the System 2 cattle were 1/4 Brangus, 1/4 Barzona, 1/4 Beefmaster and 1/4 Angus. The System 1 cattle are still being produced while the System 2 herd was dispersed in 1996. Artificial insemination sires and initial clean up bulls of like breeds are used on SJBRC cows. Beginning in 1997, the late clean up bulls for all cows were two Charolais bulls. Preliminary analysis revealed 28 different breed compositions, therefore steers were grouped into similar breed categories (see **Table 2**) to discern differences between the breeds used in each of the composites.

Statistical Analysis. The General Linear Models analysis of variances procedure of SAS (1996) was used in the analysis of independent variables which included birth year/slaughter month, breed category and grouped age of dam (2, 3, 4, 5-9 and 10+). On feed weight was included as a regression coefficient. Least squares means, regression coefficients and partial correlations were taken from this analysis. The General Linear Models analysis was also used to explore the birth year by breed interactions.

Preliminary analysis looking at the effects of both age and weight on feedlot and carcass traits determined that weight was a more reliable predictor. Therefore only onfeed weight was used in the final model.

Additional analysis within the System 1 and Hereford breed were performed to quantify sire differences. Thirty-nine and 20 different sires were identified within the System 1 and Hereford calves, respectively. Observations per sire ranged from 1 to 18. Least square means for System 1 sires were obtained while the Hereford data was non estimable.

RESULTS AND APPLICATION

Impact of Birth Year/Slaughter Month on Growth, Feedlot and Carcass Traits. Birth year/slaughter month combination was highly significant for all growth, feedlot and carcass data included in this study (Table 3). Other than a slight increase in DP, few trends were found over the six year period. However year differences were definitely found. Calves born in 1994 and 1996 performed better in the feedlot than those from 1995 and 1998. The dispersion of the System 2 herd in 1996 and the addition of Charolais bulls in 1997 definitely attributed to the birth year differences found in this study. A significant Birth year by Breed interaction was also found indicating that the addition and dispersion of breeds over the years did have an impact on the overall analysis.

Impact of Breed on Growth, Feedlot and Carcass Traits. Breed of calf was highly significant for all traits except KPH and DP ($P<.05$). The British breeds (Angus, Red Angus and Hereford) had lighter ADJWW while the Charolais calves had the heaviest ADJWW. Feedlot data indicated that Charolais cross calves had the highest ADG, market wt and total gains while the System 2 calves had the poorest feedlot performance. Hereford calves gained better than all of the Sys1breeds, Sys2breeds, System 1 and 2 composites.

The A/RA calves had the highest marbling scores while the Sys1breeds, Sys2breeds and System 2 composite had the lowest scores. While the System 2 cattle were 1/4 Angus, the remaining breeds are primarily Bos Indicus. Charolais calves came out of the feedlot with the least amount of backfat, largest REA and therefore resulted in the lowest yield grades. Even though all of the Charolais calves were out of the same two sires, literature results support the high incidence of heavy muscled, lean carcasses.

Sys1breeds and System 1 composites also had larger REAs. Meanwhile, Sys2breeds and System 2 composites exhibited the lowest REA measures and poorest YG in the study. These results are supported by other studies that found that carcasses from cattle with Brahman breeding have smaller ribeyes than those from British breed carcasses (Damon et al., 1960, DeRouen et al., 1992). A difference in DP between the British breeds and those containing Bos Indicus breeding was also found. The higher dressing percentages found in the System 2 and Sys2breeds is supported by numerous studies (Koch et al., 1982; Peters and Vesely, 1988).

Impact of Age of Dam (AOD) on Growth, Feedlot and Carcass Traits. AOD was only significant for marbling score and backfat. Those calves out of 2-year-old dams had the highest marbling scores while those from 10+ dams had the lowest. These values may be a result of the increased selection pressure, related to carcass traits, being placed on our cow herds in more recent years.

Impact of On Feed Weight on Growth, Feedlot and Carcass Traits. Many calf producers use weight as the deciding factor for placing cattle on feed. These analysis found that weight was a more reliable predictor of feedlot and carcass performance than was age. Results found in Table 4 indicate that for each 10 pounds heavier a calf was when they went on feed, it had weighed 3.7 lb more at weaning. These figures indicated compensatory gain was a factor. For each additional 10 pounds of onfeed weight, calves gained .012 more per day resulting in an additional 2 lb total gain on feed. Analysis of the carcass traits revealed that for each additional 10 pounds of on feed weight, REA increased by .056 square inches and DP decreased by .061%. On feed weight did not appear to have an effect on marbling score, KPH, backfat or YG.

Partial Correlations between Growth, Feedlot and Carcass Traits.
Table 5 shows that ADJWW had a slightly positive significant correlation with ADG, marketwt and total gain. Understandably ADG had a very high positive relationship with marketwt and total gain. ADG was also positively related to marbling, backfat, REA and YG (.15, .19, .24 and .17, respectively). Marketwt and total gain showed similar significant relationships to these carcass traits as well. Those calves with increase ADG, total gain and marketwt had a slight tendency to to have carcasses with higher marbling scores, more backfat, larger REA and higher YG.

Within carcass traits, marbling had a small positive relationship with backfat and YG (.16 and .20, respectively) but showed no relationship with either REA or DP in this study. As expected KPH had a slight positive relationship with backfat and subsequently YG. Backfat had a small negative relationship with REA indicating that when calves are fed a fixed number of days, heavier muscled calves have a slight tendency to have less backfat and higher DP. Calves with more backfat also had a small positive increase in DP.

As expected, YG was correlated to the components used to calculate it. HCW and KPH had small positive correlations (.17 and .20, respectively) while backfat had the greatest influence on calculated YG with a .74 correlation. Furthermore, REA and YG had a high negative correlation (-.69) indicating that heavier muscled calves at a constant weight and backfat will have lower YG.

LITERATURE CITED

Damon, R. A., Jr, R.M. Crown, C.B. Singletary and S.E. McCraine. 1960. Carcass characteristics of purebred and crossbred beef steers in the Gulf Coast Region. J. Anim. Sci. 19:820

DeRouen, S.M., D.E. Franke, T.D. Bidner and D.C. Blouin. 1992. Two-, three-, and four-breed rotational crossbreeding of beef cattle: Carcass traits. J. Anim. Sci. 70:3665.

Koch, R.M., M.E. Dikeman and J.D. Crouse. 1982. Characterization of biological types of cattle (Cycle III). III. Carcass composition, quality and palatability. J. Anim. Sci. 54:35.

Peters, H.F., and J.A. Vesely. 1988. Brahman-British beef cattle crosses in Canada. II. Postweaning growth and carcass characteristics. Can J. Anim. Sci. 68:345.