Changes in Gain Through the Feeding Period

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Summary

Three years of research trials were compiled to determine how weight gain changes throughout the feeding period. Results suggest that body weight and carcass weight increase linearly through the feeding period. While daily gain decreases on a body weight basis, it remains constant on a carcass basis suggesting that nearly all of the weight gain is transferred to the carcass at the end of the feeding period.

Introduction

Beef producers now have a variety of marketing options when selling fed cattle. Most options result in prices paid per pound of live animal weight or carcass weight. It is important to know an optimum marketing date to maximize profitability; however, optimum marketing date encompasses a variety of factors and may depend on marketing strategy used. Profitability can generally be increased until a point at which the cost of producing an additional unit of weight (live or carcass) becomes greater than the price received for the additional unit of weight. In order for producers to make appropriate decisions about optimal marketing date for each marketing option, it is important to know what happens to animal gain and feed conversion on a live weight and carcass weight basis throughout the feeding period. Information related to the end of the feeding period when marketing decisions are made is especially important. The purpose of this report is to document changes in animal gain and feed conversion on a live weight and carcass weight basis by compiling data from previous research trials conducted at the University of Nebraska.

Procedure

Three years of data were compiled to determine how weight, gain, dry matter intake, and feed conversions change throughout the feeding period on a shrunk body weight basis and carcass weight basis. The data set included 115 pens of steers from three research trials consisting of 920 head. The trials were selected because all steers within a trial were on similar diets, treatments had no effect on animal performance, and interim weights were collected on individual animals throughout the feeding period. Average initial body weight was 750 lb (SD=43 lb) and steers were on feed for 120 to 150 days from May to September or October. Individual animal weights were collected at approximately 30-day intervals which resulted in four or five interim weights collected for each steer. Initial body weights were collected for at least two consecutive days following three days of limited intake to equilibrate gut fill. However, interim weights were single day full fed weights which were shrunk 4%.

Interim carcass weights were calculated using a dressing percentage based on the amount of time steers had been on feed. Changes in dressing percentage with time on feed were determined by reviewing published research trials in which cattle were serially slaughtered and dressing percentages reported. Two studies meeting these criteria were identified. One was a calf-fed study (187 days on feed to achieve 0.55 inch 12th rib fat thickness) and the other used yearlings (112 days on feed to achieve 0.57 inch 12th rib fat thickness). Since studies had groups of cattle that were serially slaughtered until 12th rib fat thickness was greater than industry averages, cattle groups that were slaughtered with an average 12th rib fat thickness that was nearest to 0.50 inch were used for final dressing percentages. The data were extrapolated to the intercept to determine dressing percentage at day 0. Dressing percentage was regressed on days on feed expressed as a percentage of total days on feed. Expressing days on feed as a percentage of total days on feed was necessary since the two trials varied by 75 days in the amount of time necessary to reach 0.50 inch 12th rib fat thickness.

Changes in weight, weight gain, dry matter intake, and feed conversion were calculated for each interim period and expressed on a shrunk body weight and carcass weight basis. Regression analysis was conducted using the mixed

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procedures of SAS with repeated measures of all response variables. Some trials contained different weight blocks. Therefore, trial and block within trial were included as random variables.

**Results**

Analysis of the two published trials suggests that dressing percent increased in a linear rate with time on feed (Figure 1). Remarkably, the calf- and yearling studies closely agreed in how dressing percentage changes when days on feed are expressed as a percent of total days on feed. This linear equation may be used to calculate expected carcass weight from shrunk body weight (full body weight * 0.96) at any time during the feeding period.

Analysis of the three years of research trials suggests that shrunk body weight and carcass weight both increased in a linear manner ($P<0.01$; Figure 2). However, while shrunk body weight gain decreased through the feeding period ($P<0.01$; Figure 3), carcass weight gain remained constant as suggested by a slope that is not different from 0 ($P=0.33$; Figure 3). When carcass weight gain is expressed as a percentage of body weight gain, the transfer of weight to the carcass can be estimated. These data are provided in Figure 4. The percentage of body weight gain that is transferred to the carcass increased linearly ($P<0.01$) as the feeding period progressed and approached 100% at the end of the feeding period. This suggests that every pound of additional body weight gain at the end of the feeding period was transferred directly to the carcass and resulted in an additional pound of carcass weight. Dry matter intake also increased linearly through the feeding period ($P<0.01$; Figure 5). Feed conversions (Figure 6) increased through the feeding period on both a carcass weight basis ($P<0.01$) and a shrunk weight basis ($P<0.01$). While slopes were not compared, the change in feed conversion on a body weight basis was more than double the change in

![Figure 2](image_url) Changes in shrunk body weight (SBW) and carcass weight (CW) as a function of time on feed. SBW slope > 0 ($P<0.01$). CW slope > 0 ($P<0.01$). Heavy lines are means and light lines are 95% confidence intervals.

![Figure 3](image_url) Changes in shrunk body weight gain (SBWg) and carcass weight gain (CWg) as a function of time on feed. SBWg slope > 0 ($P<0.01$). CWg slope > 0 ($P=0.33$). Heavy lines are means and light lines are 95% confidence intervals.

![Figure 4](image_url) Transfer of weight from shrunk body weight to carcass weight as a function of time on feed. Slope > 0 ($P<0.01$). Heavy line is the mean and light lines are 95% confidence intervals.
feed conversion on a carcass weight basis such that feed conversions were similar on a body weight and carcass weight basis at the end of the feeding period.

This information is important to producers as they determine marketing strategies. Producers marketing cattle on a live weight basis may choose to market cattle earlier because shrunk body weight gain and feed efficiency are decreasing. Producers marketing cattle on a carcass weight basis or on a grid formula may feed cattle longer because carcass weight gain is not reduced. These data are concurrent with previous research that suggests that producers marketing on a grid formula may benefit by continuing to feed cattle until 10-15% are discounted because carcass weights are increasing (2002 Nebraska Beef Report, pp. 39-41).

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