Research Results are Dependent on Accurate Cattle Weights

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Summary

The goal of limit feeding is to reduce variability in rumen fill at weighing. The amount of rumen fill varies by diet. Cattle included in this study were grazing cornstalks, smooth bromegrass pasture, or in a drylot and fed a forage and modified distillers grains (MDGS) mix. Cattle were limit fed for at least three days and then weighed on two or three consecutive days to obtain a beginning BW. Full weights of individuals were +99 to -86 lb compared to their limit fed weights. The correlation between two-day weights after limit feeding were greater than 0.9, and greater than correlation between full and limit fed weights. We conclude that limit-fed weights are more accurate than full weights.

Introduction

Since the 1920s, researchers have recognized the importance of accurate cattle weights and have debated the best method of obtaining accurate weights. For all research trials conducted at UNL's ARDC Research Feedlot a standard protocol is followed to obtain beginning and ending BW on all animals. Cattle are penned for at least three days while being limit fed at an estimated 2% of BW before being weighed on 2 or 3 consecutive days to obtain an average beginning BW. For growing studies, cattle are again limit fed at 2% of BW for at least three days at the conclusion of the trial and then weighed on two or three consecutive days to obtain an average ending BW. For finishing trials, ending BW is determined by carcass weight at the packing plant (no gut fill variation). There are three main sources of variation in cattle weights on different days: changes in the cattle, changes in environmental conditions, and residual or technique error (*Journal of Animal Science*, 6:237). We have implemented this protocol for many years to improve accuracy of weights, but have never verified differences in BW due to a limit feeding period. Therefore, the objective of this study was to document the differences in limit fed weights and full weights.

Procedure

In October 2009, 1-day full weights were taken on 45 steer calves (715 lb) that had grazed smooth bromegrass pasture for 165 days. Cattle were pulled from pasture at 6 a.m., moved approximately ½ mile to the handling facility and penned for one hour while being weighed. They were then moved less than ¼ mile to feedlot pens to be limit fed for seven days, and weights were taken on two consecutive days. The limit fed weights were taken at 6:30 a.m., and cattle were back in their pens by 7:30 a.m. In February 2011, 258 steer calves (668 lb) were weighed after grazing cornstalks for approximately 90 days. Cattle were pulled from the cornstalk field at 7 a.m., moved approximately one mile on foot to the handling facility, and full weights were taken between 8 and 10:30 a.m. They were then penned ¼ mile from the handling facility with 20 steers per pen, to be limit fed for six days. For the limit fed weights, cattle were weighed at 7 a.m., and returned to pens by 9 a.m. In April 2011, 509 steer calves (743 lb) were weighed after a growing study with diets consisting of choice between 60% grass hay 40% alfalfa mix or 70% straw/cornstalks 30% MDGS mix. These cattle were penned less than ¼ mile from the handling facility and were limit fed for 5 days in the same pens they were in for the growing study. For both the full and two-day limit fed weights, cattle were pulled from pens at 7:30 a.m., weighed, and returned to their pens by 10 a.m. Finally, in May 2011, 257 heifer calves (620 lb) were weighed after grazing smooth bromegrass pasture for 20 days. For the full weight, cattle were pulled from pasture at 7 a.m., moved ½ mile to the handling facility, and weighing was done by 10:30 a.m. They were then put in one pen ¼ mile from the handling facility to be limit fed for 7 days. Limit fed weights were taken at 8 a.m., and cattle were back in the pen by 11 a.m. On the first day of limit fed weights, heifers were also branded while in the chute.

Results

For steers grazing cornstalks, full weights off cornstalks averaged 27.5 lb less than limit fed weights. Full weights were between -86 lb to +17 lb compared to the average of the two day limit fed weights. The difference between the two day limit fed weights was -50 to +32 lb. Full weights averaged 37 lb greater than the average of the two day limit fed weights for steers on pasture. The weight change between the limit fed and full weight was +1 to +99 lb. The difference between the two day limit fed weights was -6 to +50 lb. Full weights of heifers grazing smooth bromegrass pastures averaged 10.2 lb greater than limit fed weights. The difference between the average of the two day limit fed weights and full weight was -35 to +45 lb. The difference between the two day limit fed weights was -22 to +28 lb. Full weights for steers on the growing study averaged 34 lb greater than limit fed weights. Weight change between the average of the two day limit fed weight and full weight was -85 to + 97 lb. Differences between the two day limit fed weights were -48 to + 34 lb.

Plotting the full weight, limit fed weight, and the two-day weights shows the correlation between the weights (Figures 1 and 2 and Table 1). In every weighing situation, correlation between the two day weights was

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Table 1. Characteristics of regression between limit fed and full cattle weights.

		Regression of full to limit fed weight			Regression of two day limit fed weights		
Trial[1]	No. of Cattle	R^2	Equation	Avg Difference (lb)[2]	R^2	Equation	Avg Difference[3] (lb)
A	45	0.941	1.03x – 67.5	+ 37.0	0.973	0.98x + 6.36	18.4
B	258	0.751	0.88x + 103	- 27.5	0.913	0.94x + 38.5	8.55
C	509	0.859	0.94x + 15	+ 34.0	0.927	0.93x + 49.4	9.84
D	257	0.977	1.01x – 9.63	+ 10.2	0.986	1.01x – 4.32	8.28

[1]A= steers grazing smooth bromegrass pasture October 2009.
B= steers grazing cornstalks February 2011.
C= steers on forage based growing study April 2011.
D= heifers grazing smooth bromegrass May 2011.
[2]Positive number indicates full weight greater than limit fed weight, negative number indicates limit fed weight greater than full weight.
[3]Absolute difference.

greater than the correlation between the full and limit fed weights with r^2 values greater than 0.9 for each of the two-day weights.

These data show how crucial accurate weights are to measurement of absolute amounts and variation in ADG estimates. If cattle had been weighed off cornstalks and put directly on smooth bromegrass without limit fed weights, ADG would have been misrepresented for each portion of the system. Limit fed cornstalk weights resulted in ADG 0.31 lb/day greater than full weights indicated. Limit fed weights for steers after grazing smooth bromegrass for 165 days resulted in ADG 0.22 lb/day less than full weights indicated. Limit fed weights for heifers grazing smooth bromegrass for 20 days resulted in ADG of 0.51 lb/day less than full weights indicated. Relying on full weights would have shown ADG to be 0.65 lb/day greater than limit fed ADG for the growing study.

Weights taken on consecutive days while cattle were limit fed were highly correlated and less variable than full weights. Using this method allows us to more accurately weigh cattle and identify small statistical differences between treatments.

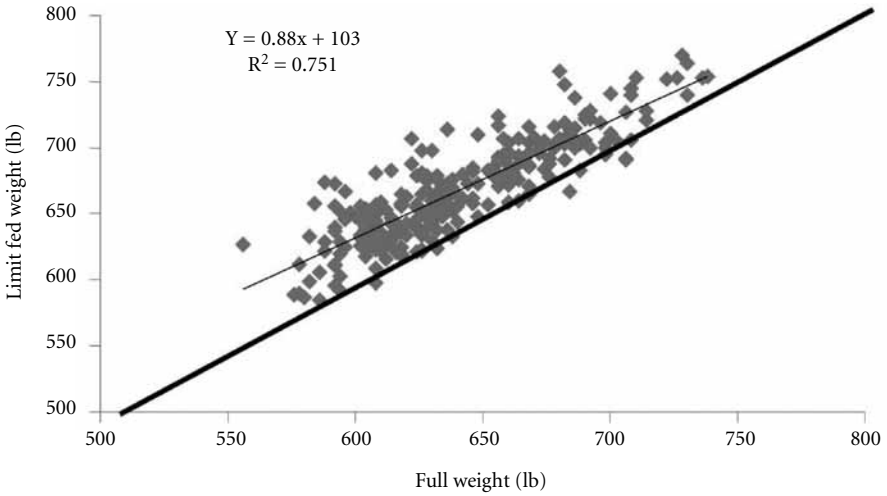

Figure 1. Regression of full to two-day average limit fed weight for cattle grazing cornstalks.

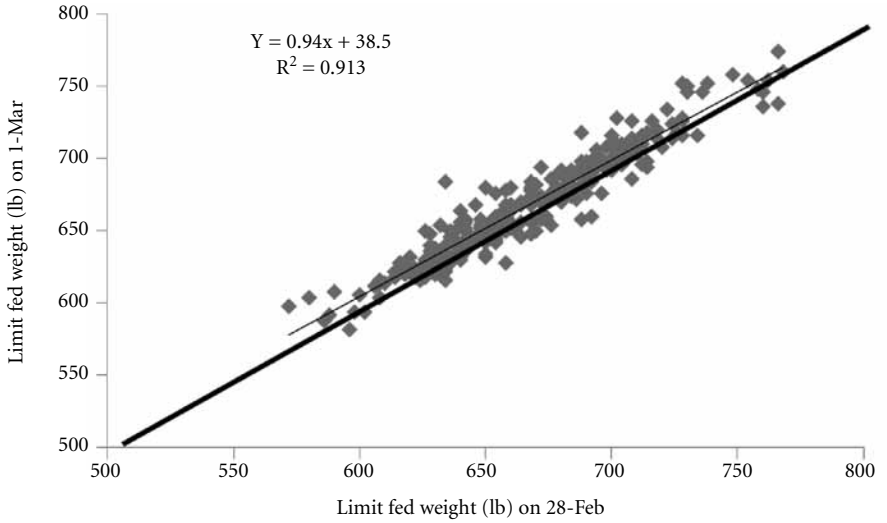

Figure 2. Regression of two day limit fed weights for cattle grazing cornstalks.

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