Table 5. Slaughter and Carcass Information

	Dry Rolled Milo	Dry Rolled Wheat	Coarse Ground Wheat	Fine Ground Wheat	Whole Wheat
Dressing, %[1]	62.2	60.8	61.2	60.7	61.6
Carcass grade[2]	9.9	9.8	10.0	9.3	10.2
Ribeye area, sq. in.	12.2	11.4	11.8	12.2	12.1
Fat thickness, in.[3]	0.89	0.89	0.90	0.80	0.93
Marbling[4]	16.6	16.1	16.8	14.9	17.6
Cutability, %	47.65	47.70	47.62	49.18	47.55

[1] Calculated on basis of live shrunk weight and chilled carcass weight.
[2] U.S.D.A. carcass grade converted to following numerical designations: high prime-15, average prime-14, low prime-13, high choice-12, average choice-11, low choice-10, good-9, average good-8 low good-7.
[3] Average of three measurements determined on tracing at the 12th rib.
[4] Marbling scores: 1 to 30, 11 — slight, 14 = small, 17 = modest.

Influence of Dietary Potassium Levels on Net K^{40} Count in Beef Steers

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Story in Brief

Thirty-six Angus-Hereford crossbred steers were used to study the influence of three levels of dietary potassium on net K^{40} count and blood serum and muscle tissue potassium concentrations. The experiment was balanced so that the carryover effect of each diet (the influence of a ration fed in one period on the measurements taken in the following period while steers were on another ration) as well as the direct effect of a diet could be evaluated.

Essentially no carry-over effect of diets was observed. Dietary potassium levels significantly affected K^{40} count of the steers, although they did not have a significant effect on blood serum or muscle tissue potassium levels. These data also indicated animal to animal variation in

potassium concentration may be an important source of variation in K^{40} estimates of fat-free lean in live animals. Thus, the experiment indicated that the primary influence of dietary potassium on K^{40} counting is the effect on the potassium content of the gastrointestinal tract and not on the potassium concentration of intracellular fluids.

Introduction

Recent research has indicated that the net K^{40} count measured by the OSU counter of a group of steers is reasonably accurate as a predictor of the average pounds of fat-free lean of steers in the group if all animals are managed alike prior to K^{40} counting. If the whole-body K^{40} counter is to become a usable tool to the cattle industry, it is necessary to determine whether or not the potassium level animals have received immediately prior to counting will influence the K^{40} count of those animals. If diet does influence count, then estimates of fat-free lean would depend to some extent on the amount of potassium in the diet. This would also mean that the accuracy of K^{40} comparisons of animals within a group would depend on whether or not all the animals were treated alike prior to counting.

This paper reports the results of an experiment conducted to evaluate the influence of dietary potassium on live animal net K^{40} count and blood serum and muscle tissue potassium concentrations of steers.

Materials and Methods

Three levels of dietary potassium were evaluated with 36 800 to 1000 pound Angus-Hereford crossbred steers. The diets, consisting of approximately 50 percent roughage-50 percent concentrate mixtures, were diet A, alfalfa-corn, diet B, wheat straw-corn, and diet C consisting of 1.7 pounds of KCl salt added to each 100 pounds of diet B. Potassium concentrations of diets A, B and C were 1.31, 0.29 and 1.03 percent, respectively. The experiment was conducted over eight weeks which were separated into four two-week periods. In the first two week period, all 36 steers received the same diet (a mixture of one-half diet A and one-half diet B). In each successive two-week period 12 steers were placed on each of the three diets. The steers were rotated to a different diet in each period so that at the completion of the study each steer had received each of the three diets.

At the end of each two-week period the steers were weighed and K^{40} counted while still on feed and water. They were then held off feed and water for 24 hours and again weighed and K^{40} counted. At this time blood samples were also collected to determine blood serum potassium concentrations. In addition to this, following the counting of each steer in the third period, a small sample of muscle tissue was surgically removed from the loin and analyzed for potassium content.

Results

Carry-over effect of a ration is defined as the increase or decrease caused by a ration fed in one period on a trait measured in the following period while the steer was on a different diet. These data were first analyzed to look at the size of the carry-over effect of each ration from one period to the next for each trait. If this value is small we can be reasonably assured that a measurement made in one period is the direct effect of the diet fed in that period and not a result of some carry-over from the diet fed in the previous period.

The carry-over effect means for each diet are presented in Table 1. In determining the relative importance of these means it should be noted that the overall averages for each trait are presented in the last column of the table. The importance of any one carryover mean can then be made by comparing its size relative to the size of the overall mean. If the carry-over effect mean is small in comparison to the overall mean, there is quite good evidence that little or no carry-over effect of the ration exists and that we can look at traits measured in any one period without being concerned about which diet was fed in the preceeding period. Also, if carry-over effects are unimportant, it means that animals that have been receiving different diets can be meaningfully compared based on K^{40} count if they are placed on a standard diet for a period of time prior to counting.

From comparison of these means it appears that the ration fed in any two-week period did not affect the measurements taken in the following period. This would indicate that feeding a standard diet for a two-week period prior to K^{40} counting would allow K^{40} comparisons to be made

Table 1. Carry-over Effect Means for Each Trait and Each Diet

	Diet			Overall Averages
	A	B	C	
Unshrunk Weight, lb.	3.03	—3.82	0.78	23.3[1]
Shrunk Weight, lb	0.51	—2.77	2.26	20.3[1]
Unshrunk Net K^{40} Count	—5.38	—98.96	104.33	13907.7
Shrunk Net K^{40} Count	0.85	—72.40	71.55	13137.8
Blood Serum Potassium, ppm	—1.48	2.33	—0.90	191.1

[1]The average increase in weight per diet for the entire experiment

among cattle within a group essentially free from the effects of previous diets these cattle may have received.

The diet averages for K^{40} count, blood serum potassium and muscle potassium are shown in Table 2.

It should be noted that regression analyses of these data indicated that as weight of the animals increased the K^{40} count also increased. Since there were differences in the weight gained by animals on each diet, this information was utilized to adjust the net K^{40} count means for the animals on each treatment to a constant weight so that more accurate treatment comparisons could be made.

Significant diet differences were found for both unshrunk and shrunk net K^{40} count means. The mean unshrunk net K^{40} count for diet A exceeded diet B by 447.5 counts per minute and diet B by 146.6 counts per minute. The diet C mean was also 301 counts per minute greater than the diet B mean. Differences between deit means were not as large after shrink. However, the differences of 133.5 and 218.0 counts per minute between the means of diets A and C and A and B, respectively, were still significant. There was a non-significant difference of 85.5 counts per minute between diets B and C.

Since diet significantly affected net K^{40} count it is interesting to compare estimates of fat-free lean from the shrunk mean net K^{40} count of each diet. This was done using prediction equations previously developed at Oklahoma State University with yearling Angus bulls. This resulted in fat-free lean estimates of 267.7, 264.5 and 265.8 pounds for the steers on diets A, B and C, respectively. Even though the differences in estimates are not large, this would indicate that the most accurate K^{40} comparisons among a group of cattle will be made when all animals of the group have been receiving the same diet for approximately two weeks prior to K^{40} counting. It would also indicate that the most precise estimates of fat-free lean in an animal will be made when that animal has received a diet similar in potassium content to the one on which fat-free lean prediction equations were developed.

Table 2. Average Net K^{40} Count[1], Blood Serum Potassium and Muscle Potassium Values for each Diet.

	A	B	C
Unshrunk K^{40} Count	14105.4	13657.9	13958.9
Shrunk K^{40} Count	13254.7	13036.7	13121.2
Blood Serum K, ppm	196.1	188.0	189.3
Muscle Tissue[2]	2.93	2.90	2.64

[1]) Adjusted for weight differences
[2]) Gms. potassium per kg. wet tissue

Potassium in the diet did not have a significant affect on either the blood serum or muscle tissue potassium concentrations This would suggest that the primary influence of dietary potassium to K^{40} counting is the effect on potassium in the gastrointestinal tract and not on the potassium concentration of fluids within the animals cells.

Analyses of these data also suggests that there are important animal to animal differences in potassium concentrations of the muscle and blood. It would appear that this is a major source of variation that affects the precision of K^{40} estimates of fat-free lean. Since K^{40} counting is done under the assumption that intracellular potassium concentrations are relatively constant, any variation that does exist between animals would cause K^{40} estimates of fat-free lean to differ to some extent from the exact value for that animal and may be a limiting factor to the precision of K^{40} estimates of fat-free lean in live animals.

The Ribonucleic And Deoxyribonucleic Acid Content Of Three Bovine Muscles At Various Post-Mortem Periods

J. J. Guenther

Story in Brief

The RNA and DNA concentration of mature bovine psoas major longissimus dorsi and biceps femoris muscles was determined at 0 hours (immediately post-mortem), 23 hours and 93 hours post-mortem. Results showed a significant ($P < .01$) difference in RNA concentration between test muscles which ranked biceps > longissimusi > psoas in the order of RNA content. RNA appeared to be directly related to in vivo activity and tenderness of the muscles. Also significant ($P < .01$) was the difference in RNA concentration at various times post-mortem. In general, the highest RNA concentration was observed at 23 hours and the lowest at 93 hours post-mortem.