Association Between Certain Live and Carcass Measurements in Swine

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Story in Brief

Fifty-nine Hampshire market pigs from the swine breeding project were evaluated for carcass merit using ^{40}K count, probe backfat thickness, carcass backfat thickness, loin eye area and yield of lean cuts. Pigs were removed form test on a weekly basis and held off feed and water for 24 hours prior to obtaining ^{40}K content measurements. Each pig was counted for two 5-minute periods prior to slaughter in a detector configuration designed specially for pigs. Immediately following slaughter, the carcasses were mounted on a rack designed to simulate the animal in a standing position to aid in carcass ^{40}K counting. The warm carcasses were counted for two 5-minute periods. Following chilling, the carcasses were divided into closely trimmed hams, loins and shoulders. These very lean cuts provided the end-point for comparing the usefulness of both live and carcass measurements.

Correlations between first and second live ^{40}K counts and first and second carcass ^{40}K counts were determined to estimate the repeatability of the ^{40}K counter. These correlations were 0.90 for live counts and 0.97 for carcass counts. Since this was a uniform group of pigs, these values indicate that the counts were quite highly repeatable.

The correlation between live ^{40}K counts and carcass ^{40}K counts was 0.86 in this study. Carcass ^{40}K count accounted for approximately 70 percent of the variation in lean cut yields while ^{40}K count on the live animal accounted for about 50 percent of the variation. The correlations between ^{40}K count and lean yield were higher when based on carcass weight than when based on live weight. Probed backfat thickness accounted for about 40 percent of the variation in lean cut yields compared to less than 20 percent of the variation accounted for by loin eye area or carcass backfat thickness.

The results obtained indicate that ^{40}K count may be a useful tool in evaluating muscling in live market hogs, but additional work is needed

to study the relationship between live ^{40}K count and a more precise endpoint than the yield of lean cuts used in this study.

Introduction

Increased emphasis placed on muscling in meat animals has created a greater need for more accurate methods for evaluating breeding animals with respect to composition. Livestock breeders have relied on carcass data of relatives to estimate the carcass merit of breeding animals, but this is not as accurate as measuring the amount of lean directly on the animal in question.

Backfat probes and ultrasonic devices are useful aids to selection but they are only estimates of composition since they do not directly measure the amount of lean in an animal. The whole body scintillation counter as an instrument for evaluating the amount of lean in an animal has been introduced recently and results obtained with beef cattle indicate that the method shows promise as a tool for live estimation of composition.

This study was initiated to evaluate the relationships between ^{40}K counts of live pigs and pork carcasses and the yield of lean cuts using a detector configuration designed specially for pigs. A second objective was to compare the ^{40}K method of evaluation with using live or carcass backfat thickness measurements or loin eye area as indicators of muscling.

Materials and Methods

The study included 59 Hampshire pigs farrowed in the fall of 1969 in the swine breeding project herd at Stillwater. All pigs were fed in groups of approximately 60 pigs per pen at the Experimental Swine Barn and weighed off test on a weekly basis as they reached 215 lbs. Three probe backfat measurements (behind the shoulder, at the last rib and in front of the ham) were taken when the pigs were removed from test with the average of the three readings being recorded. After being held off feed for 24 hours, the pigs were evaluated for ^{40}K content at the University Live Animal Evaluation Center. The shrunk live weight for the pigs used in this study was 206.9 lbs. The counter originally designed for evaluating cattle weighing up to 1200 lbs. was modified to accommodate swine by mounting the detector logs in a smaller configuration closer to the body of the animal. Each animal was evaluated using five 1-minute counts. After each pig had been counted once, they were randomly assigned to the counter for a second 5-minute evaluation period. Five 1-minute background counts were taken before and after the animal was confined to the chamber to determine the ^{40}K activity of the empty

chamber. The average of these two background measurements was subtracted from the average of the five 1-minute counts obtained while the pig was in the chamber to obtain net ^{40}K count for each animal.

The pigs were slaughtered the day after being evaluated for ^{40}K content and the carcasses were positioned on a rack designed to simulate the animal in a standing position. The warm carcasses were then returned to the ^{40}K counter and counted twice for five 1-minute periods and corrected for average background counts using the same procedure as was used for the live pigs. The carcasses were then split and processed into closely trimmed hams, loins and shoulders. Loin eye area for the right side was evaluated behind the tenth rib prior to removing the outside fat cover. The means and standard deviations for the traits evaluated are presented in Table 1.

Results and Discussion

One of the prerequisites for any evaluation measurement is that it must be repeatable. In this trial, the correlation between first and second ^{40}K live count on the same animal was 0.90, while the correlation between first and second carcass count was 0.97. Although correlations closer to unity would be desirable, these are considered satisfactory repeatabilities considering the uniform group of pigs evaluated.

The correlation between live animal ^{40}K count and carcass ^{40}K count on the same animal in this study was 0.86. Average ^{40}K counts for both the live animal and the carcass were more closely related to lean cut yield than were probe backfat, carcass backfat or loin eye area (Table 2). Although probe backfat thickness was more closely correlated with yield of lean cuts than was either carcass backfat or loin eye area, it accounted for less than 40 percent of the variation in lean yields compared to about

Table 1. Means and Standard Deviations for Traits Evaluated.

Trait	Mean	Standard Deviation
Shrunk live wt., lb.	206.9	5.5
Carcass weight, lb.	152.6	4.8
Probe backfat thickness, in.	1.29	0.15
Carcass backfat, in.	1.13	0.14
Loin eye area, sq. in.	5.80	0.45
Ham, loin, shoulder wt., lb.	84.1	4.25
Lean cuts of live wt., %	40.7	1.76
Lean cuts of carcass wt., %	55.1	2.37
Net live ^{40}K count	7526	592
Net carcass ^{40}K count	6959	533

Table 2. Correlations Among Various Methods of Evaluation and Yield of Lean Cuts.[1]

	Weight of Lean Cuts	Percent Lean Cuts of:	
		Live wt.	Carcass wt.
Live ^{40}K count	0.75	0.69	0.72
Carcass ^{40}K count	0.84	0.82	0.84
Carcass backfat thickness	—.30	—.36	—.48
Probe backfat thickness	—.56	—.61	—.71
Loin eye area	0.55	0.44	0.33

[1] All correlations significant at $P<.05$.

60 percent accounted for by ^{40}K counts. Carcass ^{40}K counts were more closely associated with lean yield than were live ^{40}K counts. Carcass count accounted for approximately 70 percent of the variation in lean yield compared to only about 50 percent accounted for by live count.

Backfat thickness was more highly correlated with lean cuts of carcass weight than with lean cuts of live weight. Carcass backfat thickness consistently accounted for a smaller amount of the variation in lean yield than did loin eye area, but probe backfat thickness was more closely associated with lean yield than was either carcass backfat thickness or loin eye area. Carcass backfat and loin eye area accounted for less than 20 percent of the variation in lean yields compared to about 40 percent accounted for by using probe backfat thickness.

Although additional work is needed to evaluate the relationship between live ^{40}K count and a more precise end-point than the yield of lean cuts used in this study, the results obtained indicate that it can be a useful tool for evaluating muscling in the live pig.