The Relationship Between Body Measurements and Performance Traits of Selected Barrows Carried to Heavy Weights

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Summary

Forty-seven Yorkshire barrows were selected for large and small scale test groups by using body height and length as a selection index. Initially the index between groups differed; however, the same measurements gave indexes that were nearly equal when the pigs weighed 210 and 300 lbs. Large scale barrows gained faster per day than did small scale barrows from start to 210 lbs; however, there were no differences in feed efficiency or backfat thickness. No differences were observed between scale groups fed to 300 lbs for the traits of average daily gain, feed efficiency, backfat thickness, carcass length, or loin eye area. Head measurements correlated poorly with performance and carcass traits. Pigs with the larger heartgirths and wider chests grew faster, but because they also had more backfat, they yielded a lower percentage of lean cuts. Pigs that had more bone and larger tail circumference and were longer tended to be the leaner pigs.

Introduction

Visual appraisal of the live animal, carcass comparison after slaughter, and production testing are tools used to determine superior animals. A term associated with superior animals is "scale", or "bigness of frame" which permits hogs to be carried to heavier weights. But how can one be objective in differentiating between large and small scale pigs? In most studies cited in the literature, visual appraisal was used initially to classify differences in scale. In this study we used scale as a factor of height and length to select the large and small frame pigs and to observe growth patterns of finishing pigs to 300 lbs. In addition, body measurements were taken to determine relationship of these measurements with performance and carcass merit.

Procedure

The selection index was constructed by measuring (1) height from the midline at the shoulders to the floor and (2) length from the point of the shoulder to the tail head. The two measurements were then multiplied together to form a numerical index. Selection indexes were compared for pigs of similar weight (5-7 lb. variation) so that weight would not be a factor in the index. Yorkshire barrows weighing between 75 and 125 lbs were selected for the test group if they had an index at least one standard deviation above or below the index mean in their weight group.

Pigs were housed in the KSU swine finishing barn, a modified environment totally slatted unit. Each pen (6' x 16') had a two hole self feeder and an automatic waterer. Throughout the test the pigs were fed ad libitum a 16% crude protein sorghum-soybean meal fortified diet.

Growth patterns of pigs were studied to 210, 250 and 300 lbs. Backfat probes were taken at 210 and 250 lbs. Barrows were slaughtered as they individually reached 300 lbs to determine carcass backfat thickness, carcass length, loin eye area and percentage of lean cuts. In addition, thirteen body measurements--three about the head, nine on the body and legs, and one on the tail--were taken at 210 and again at 300 lbs.

Results and Discussion

Using the height and length measurements at 210 and 300 lbs that were used initially to form the selection index and separate the pigs into large and small scale groups revealed that the index difference between the two groups of pigs had became negligible. However, large scale pigs gained significantly faster than did small scale pigs from start to 210 lbs (1.96 opposed to 1.83 lbs). Growth rate after 210 lbs favored the small-scale pigs, resulting in no difference in overall rate of gain to 300 lbs (Table 16). No difference was noted in feed efficiency from start to 210 or 300 lbs. Average daily gains became slower as pigs were carried to heavier weights (210 to 300 lbs), that agreeing with results of earlier studies at this station for finishing pigs fed beyond normal market weight. Feed per lb of gain averaged 3.91 for the gain from 210 to 250 lbs and 4.51 for the gain from 250 to 300 lbs.

Backfat was not significantly different between large and small scale pigs, although the small scale pigs tended to be fatter at 210, 250, and 300 lbs. There were no significant differences between scale groups for carcass length, loin eye area, or lean cut percentage.

The only body measurement that was significantly different between scale groups at 210 lbs was chest depth, which was greater for the large scale pigs. At 300 lbs, large scale pigs consistently had longer front legs (point of the elbow to the ground). All other body measurements between scale groups were similar.

Body measurements at 210 lbs correlated poorly with average daily gain. The greatest desirable correlation was .28, between circumference of back cannon and daily gain. Circumference of the front and back cannon correlated negatively (desirable) with backfat (-.33 and -.24), whereas tail circumference, chest width, and chest depth correlated positively (undesirable) with backfat (.38, .35, and .21, respectively).

Body measurements at 300 lbs. indicated that heartgirth circumference and chest width were the best indicators of growth rate (.52 and .46). Body length and tail circumference correlated negatively (desirable) with backfat thickness (-.37 and -.38); whereas heartgirth correlated positively (undesirable), .36. The greatest desirable correlation with carcass length was front leg length (.42). Loin eye area correlated poorly with all body measurements. Percentage of lean cuts of carcass weight correlated positively (desirable) with forearm circumference and tail circumference (.37 and .31), whereas heartgirth circumference correlated negatively (undesirable), -.42.

Table 16. Performance of large and small scale pigs.[d]

Growth data[a]	ADG to 210	ADG to 250	ADG to 300	F/G to 210	F/G to 250	F/G to 300
	lbs					
Large scale	1.96	1.74	1.61	2.93	3.13	3.50
Small scale	1.83	1.72	1.61	2.89	3.13	3.59

Carcass data	Length (in.)	Loin eye (sq in.)	Backfat 210 probe (in.)	Backfat 250 probe (in.)	Backfat 300 carc. (in.)	Lean cut (%)
Large scale[b]	33.7	6.15	1.14	1.26	1.50	57.8
Small scale[c]	33.3	6.15	1.22	1.34	1.57	57.5

[a]Average of 5 replicates, 24 pigs per scale group

[b]Average of 24 pigs, avg. final weight 298.9 lbs.

[c]Average of 23 pigs, avg. final weight 297.2 lbs.

[d]ADG, average daily gain; F/G, lbs of feed per lb of gain.