KSU

Relationship Between Body Measurements and Performance Traits in Boars

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Summary

Fourteen body measurements were taken on 259 boars at 65 lbs. and again at 250 lbs. to determine the relationship of external body dimensions with certain performance traits. Correlations between body measurements and growth tended to be extremely low for most factors. Our results do not support using body measurements as visual indicators of growth. This study suggests that performance testing is still the best way to predict a particular animal's genetic potential.

Introduction

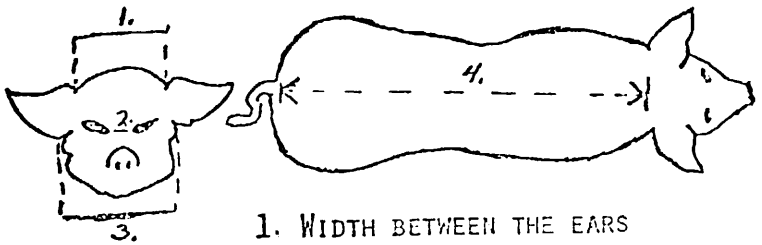
The modern hog of the 1970's has been termed the "big type". "Big type" has been described as big headed, big tailed, deep chested, big boned, deep jawed, late maturing, etc. The theory is that such traits contribute to or indicate potential for improved growth rate and efficiency over the smaller type pigs. It was the purpose of this study to evaluate these theories and to determine the relationship between body measurements and performance.

Procedure

Boars used were those entered by purebred swine breeders of Kansas in the Kansas Pork Producers Council Swine Testing Station. Data were collected from 259 boars representing 66 purebred breeders. Breeds represented were Chester White, Duroc, Hampshire, and Yorkshire. Data were collected during four test periods starting with the winter test, 1973, through the summer test, 1975,--two summer and two winter tests.

Fourteen body measurements were taken at 65 lbs. and again at 250 lbs. Measuring instruments used were a cloth measuring tape and wooden calipers. Measurements taken (see Figures 3 and 4). included three about the head, nine on the body and legs, and two on the tail. Head measurements included width between eyes taken from the inside corner of one eye to the inside corner of the other eye, width of skull between the ears, and width of jaw at its widest part directly below the ears. Measurements on the tail included tail circumference at the base of tail as close to the body as possible and tail length, from base of the tail to the tip. Body measurements included length from the altanto-occipital joint to the base of the tail, heart-girth immediately behind the shoulders, and chest depth from backbone to sternum just behind the elbow. Width of chest floor was measured immediately back of and parellel to the elbow. Stifle width was measured at the widest point of the ham. Front leg length was from the point of the elbow to the base of the hoof with the animal standing as correctly as possible.

Figure 3



1. Width between the ears
2. Width between the eyes
3. Width of jaw
4. Length
5. Stifle width

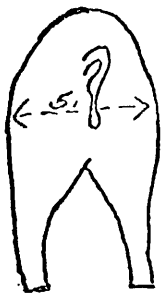
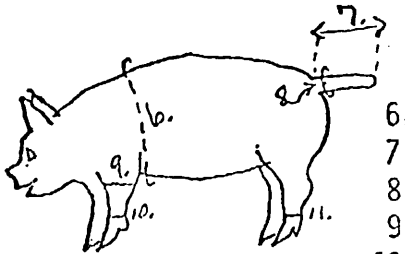
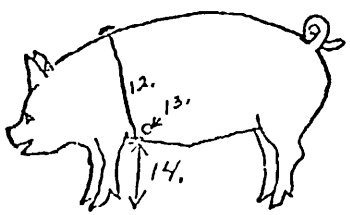


Figure 4





6. Heartgirth
7. Tail length
8. Tail circumference
9. Forearm circumference
10. Front cannon circumference
11. Back cannon circumference
12. Chest depth
13. Chest width
14. Front leg length

Forearm circumference was around the point of the elbow keeping the tape parallel to the floor and as close to the body as possible. Cannon circumference was taken equal distance between the knee and the pastern. The circumference of backleg cannon, midway between the hock and pastern.

All measurements were taken within 5 lbs. of the designated weights so body weight variations would not account for variation in the measurements.

Results and Discussion

Measurements at 65 lbs. with performance.

In general, correlations between performance traits and 65 lb. body measurements were low, indicating that predicting performance from body size would be extremely inaccurate (table 41). However, some of the relationships merit discussion. Leg measurements (front and back leg cannon circumference, and forearm circumference) had low but desirable correlations with feed efficiency from 65 to 220 lbs. None of the leg measurements correlated significantly with average daily gain. Boars with larger cannon circumferences tended to have less backfat thickness, however, again the relationship was low.

Body volume measurements at 65 lbs. were poorly correlated with subsequent average daily gain and would be poor criteria for selecting fast gaining pigs. The highest correlation for any body measurement at 65 lbs. with a performance trait was chest width with feed efficiency (r=.42). However, the positive correlation indicates that wider chested boars gained less efficiently.

Table 41. Correlations of 65 lb. body measurements with performance traits.

	ADG	F/G[a]	BF
Head measurements:			
Width between eyes	.10	-.31	-.09
Width between ears	-.01	-.14	-.13
Jaw width	.05	-.10	-.01
Leg measurements:			
Fr. leg cannon circ.	.09	-.17	-.13
B. leg cannon circ.	.14	-.38	-.19
Forearm circ.	.13	-.21	.16
Fr. leg length	-.01	.18	.12
Body volume measurements:			
Length of body	.17	-.02	-.04
Heartgirth circ.	.15	-.17	.08
Chest width	.05	.42	.02
Chest depth	.21	-.16	.00
Stifle width	.09	.25	.00
Tail measurements:			
Tail circ.	.06	-.21	-.40
Tail length	-.01	.11	-.11

[a]Minus before the correlation indicates negatively correlated.

Tail circumference correlated negatively with backfat thickness (r=-.40). Tail measurements indicated leanness more than ability of a boar to grow. Head measurements were poorly related to growth rate, backfat thickness, or feed efficiency.

Measurements at 250 lbs. with performance.

Table 42 presents the correlations of 250 lbs. measurements with performance traits. Leg measurements were very poorly correlated with both daily gain and feed efficiency. Forearm circumference seemed to be the best correlated with daily gain and feed efficiency (r=.12 and -.18 respectively). Boars with larger cannon circumferences tended to be leaner, however, the highest correlation was noted between leg length and backfat thickness (r=-.33); taller boars were leaner.

Body volume measurements of heartgirth circumference and chest width correlated positively with rate of gain (r-.34 and .31, respectively). Chest depth was poorly correlated with both gain (r-.12) and feed efficiency (r=.01). Boars with larger body volume measurements tended to have a little thicker backfat, which normally goes with faster gain.

Tail measurements again tended to be related more to backfat thickness than to average daily gain or feed efficiency.

Correlations of 65-lb. with 250-lb. measurements.

Table 43 presents correlations between 65-lb. and 250-lb. body measurements. Correlations were generally high except for front cannon circumference, chest depth, stifle width, and width of jaw. This indicates that selection on the basis of larger body size at 65 lbs. can generally result in larger measurements at 250 lbs.

Table 42 . Correlations of 250 lb. body measurement with performance traits.

Performance traits:	ADG	F/G	BF
Head measurements:			
Width between eyes	-.04	-.04	-.07
Width between ears	.03	.22	-.05
Jaw width	.09	.10	.10
Leg measurements:			
Fr. leg cannon circ.	.03	.15	-.16
B. leg cannon circ.	.02	.03	-.29
Forearm circ.	.12	-.18	.15
Fr. leg length	-.11	.04	-.33
Body volume measurements:			
Length of body	-.01	.18	.11
Heartgirth circ.	.34	-.08	.16
Chest width	.31	-.04	.08
Chest depth	.12	.01	.19
Stifle width	.04	.18	.09
Tail measurements:			
Tail circ.	-.08	-.18	-.24
Tail length	-.05	.00	-.11

Table 43 . Correlations of 65-lb. and 250-lb. measurements of the same factor.

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Head measurements:	
Width between eyes	.32
Width between ears	.57
Jaw width	.10
Leg measurements:	
Fr. leg cannon circ.	.07
B. leg cannon circ.	.30
Forearm circ.	.35
Fr. leg length	.31
Body volume measurements:	
Length of body	.22
Heartgirth circ.	.28
Chest width	.42
Chest depth	.09
Stifle width	.00
Tail measurements:	
Tail circ.	.56
Tail length	.49