eventually build up and cause a decline in performance and that the individuals that are line bred to may not be truly outstanding. Hampshire breeders need to be aware of these dangers if they plan on continuing the types of breeding systems they currently have.

Table 2. Average inbreeding of the leading Hampshire boars of 1981 and the average relationship between those boars and the most prominent boars in the pedigrees

		Relationship				
	Inbreeding	Ugh	Roughneck	Gem	Oh	Eric
Average	.103	.341	.385	.373	.202	.234
Range	0-.30	.12-.63	.14-.58	.13-.60	.06-.40	.11-.48

Correlations Between Type and Performance of Boars at the Oklahoma Swine Evaluation Station

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Story in Brief

Visual scores and performance data accumulated on 201 boars during the fall of 1980 and the spring of 1981 were used to evaluate the relationship between visual appraisal and performance data. Performance traits measured were: average daily gain, backfat thickness, feed efficiency and loin eye area. Visual scores for frame, capacity, muscling, front and rear leg structure and movement were assigned at the beginning and the end of the test.

Few of the visual scores were highly correlated with the performance traits. The correlations between average daily gain and final frame score (.329) and final capacity scores (.664) suggest that larger framed, higher capacity boars grow faster than smaller framed boars with less capacity. Correlations between initial and final body type scores were moderate (.449 to .613) while correlations between initial and final leg structure and movement scores were small (.078 to .226). There was more agreement among scorers for body type scores than for feet and leg scores, and the scores agreed more closely at the end of the test than at the beginning.

Introduction

Trends in the swine industry have often been dominated by the selection of visual characteristics that were thought to be correlated with performance traits. Performance testing was introduced so that traits of economic importance to the commercial producer could be properly evaluated prior to the selection of seedstock. Despite this, many seedstock producers still use visual evaluation as the main criterion in their selection program.

The purpose of this study was to determine if relationships exist between measurable performance traits and those traits evaluated visually. Data were obtained from boars of similar ages that were tested at the Oklahoma Swine Evaluation Station in the fall of 1980 and spring of 1981.

Materials and Methods

During the fall of 1980 and the spring of 1981, 201 boars from several swine breeders in Oklahoma were evaluated at the Oklahoma Swine Evaluation Station. The station has been in operation since 1970 and tests boars in two barns with 24 open-front pens (5 ft by 15 ft) in each barn.

Each pen held three boars or two boars and a barrow, representing a single sire. Pigs averaged 70 lb at the start of the test period and were removed from test on a weekly basis when they reached 230 lb.

Performance data included: pig weight at the beginning and end of test, average daily gain, pen feed efficiency and ultra sonic scanogram (Ithaco Scanogram Model 721) estimates for loin eye area and backfat thickness. Feed efficiency for pens containing barrows was adjusted to a boar equivalent basis. Loin eye area was measured at approximately the tenth rib. Backfat thickness was the average of the measurements at the shoulder, the last rib and the last lumbar vertebrae. Loin eye area and backfat thickness estimates were adjusted to a 230 lb basis by adjustment factors suggested by the National Swine Improvement Federation.

Pigs were scored at the beginning and the end of the period for visual traits by a committee of three comprised of an Animal Science Department faculty member, a University swine herdsman and an independent purebred swine breeder. Categories considered for visual appraisal were: frame size, body capacity, muscling and front and rear feet and leg structure and movement. The numerical scores and criteria used when assigning visual scores are given in Table 1. The scores were assigned independently, and the scores of the three evaluators were averaged.

The statistic used to estimate the association between the performance data and the visual scores is the correlation. A correlation can have any value within the range of -1.0 to 1.0. A value of 1.0 would indicate a complete agreement between two traits, and high values of one would be associated with high values of the other. A value of -1.0 also indicates a complete association between two traits, but high values of one trait would be associated with low values of the other. A value near zero ($-.10$ to .10) would suggest that no relationship exists between the two traits. A correlation should have an absolute value of at least .6 to have much predictive value.

Results and Discussion

Correlations between initial visual scores and performance traits are shown in Tables 2 and 3. The only correlation over .3 is that between initial capacity and

Table 1. Scoring system for conformation and soundness

Frame (1-10)	
1-4	small frame, short bodied
5-6	medium frame, moderate body length
7-10	large frame, long bodied
Capacity (1-10)	
1-4	thin, shallow body
5-6	medium thickness and depth of body
7-10	thick, deep body
Muscling (1-10)	
1-4	thick, heavy, bulging muscling
5-6	moderately thick muscling
7-10	flat muscling
Feet and Legs (front and rear)	
Movement	
1-2	buckkneed, goose stepping, choppy strides
3	moderate in movement faults
4-5	shows a balanced animated stride, free of faults
Structure (front and rear)	
1-2	straight set of shoulders, winged shoulders, knockkneed, toes in, etc. Straight and stiff hocks, sickle hocks, weak pasterns, steep rump, etc.
3	moderate in structural faults
4-5	free of structural faults

Table 2. Correlations between performance traits and initial body type scores

	Average daily gain lb/day	Backfat in.	Feed efficiency lb feed/lb gain	Loin eye area sq in.
Frame	.024	−.149	.206	−.021
Capacity	.307	.047	.009	−.028
Muscling	−.114	.039	.143	−.081

Table 3. Correlations between performance traits and initial feet and leg scores

	Average daily gain lb/day	Backfat in.	Feed efficiency lb feed/lb gain	Loin eye area sq in.
Front Leg				
Structure	.055	−.085	−.120	−.042
Movement	.190	−.029	−.092	−.034
Rear Leg				
Structure	−.182	−.093	−.176	.092
Movement	−.165	−.037	−.161	.058

average daily gain (.307). This suggests a small tendency for boars that have more capacity to also be faster growing.

The correlations between performance traits and initial feet and leg scores were quite low.

Similarly, performance traits were correlated with final visual scores (Tables 4 and 5). These correlations were also generally quite low. The only correlation with much predictive value was the correlation between final capacity and average daily gain (.664). This, along with the moderate correlation between frame and average daily gain (.329), indicates that higher capacity, larger framed boars tended to grow faster than smaller framed boars with less capacity. None of the correlations between the performance traits and final feet and leg scores were large enough to have any predictive value.

The low-to-moderate correlation (.499-.613) between initial and final body conformation scores (Table 6) suggests that initial body conformation is not a really good predictor of final conformation. Both the subjective nature of the scores and actual changes in the pigs may have contributed to the size of the correlations. The low correlations (.078-.226) between initial and final feet and leg scores indicate the lack of predictive value of the initial scores.

Table 4. Correlations between performance traits and final body type scores

	Average daily gain lb/day	Backfat in.	Feed efficiency lb feed/lb gain	Loin eye area sq in.
Frame	.329	−.199	.020	.015
Capacity	.664	.113	.249	.051
Muscling	−.044	−.126	.198	−.108

Table 5. Correlations between performance traits and final feet and leg scores

	Average daily gain lb/day	Backfat in.	Feed efficiency lb feed/lb gain	Loin eye area sq in.
Front Leg				
Structure	.168	.032	−.117	−.011
Movement	.178	.006	−.104	−.019
Rear Leg				
Structure	.228	−.107	−.063	.097
Movement	.188	−.101	−.069	.103

Table 6. Correlations between initial and final visual scores

Frame	Capacity	Muscling
.613	.449	.579

Front Leg		Rear Leg	
Structure	Movement	Structure	Movement
.078	.147	.141	.226

Tables 7 and 8 contain correlations among scorers and show the amount of agreement among the committee members on visual appraisal. There was more agreement on the body type scores than on the leg movement and structure scores. The correlations among the scorers were moderate to small in size, suggesting that there was a partial agreement regarding visual evaluation. However, the scorers certainly differed in some instances. There was more agreement among scorers at the end of the test period.

The data in this study gives evidence that visual appraisal cannot accurately predict how boars will grow and perform. There is some suggestion that higher capacity, larger framed boars tend to gain at a faster rate than do small capacity, smaller framed boars; however, the relationship is too small to be of much practical use. Correlations among scorers suggest that there is only partial agreement among individuals assigning visual scores to visual traits of interest. Improvement in performance will more likely occur when producers incorporate objective measures of performance into their selection of replacement breeding stock.

Table 7. Correlations among scorers for initial visual scores

Frame	Capacity	Muscling		
.545	.554	.524		
Front Leg		**Rear Leg**		
Structure	**Movement**	**Structure**	**Movement**	
.316	.271	.140	.184	

Table 8. Correlations among scorers for final visual scores

Frame	Capacity	Muscling		
.609	.668	.564		
Front Leg		**Rear Leg**		
Structure	**Movement**	**Structure**	**Movement**	
.402	.476	.294	.343	