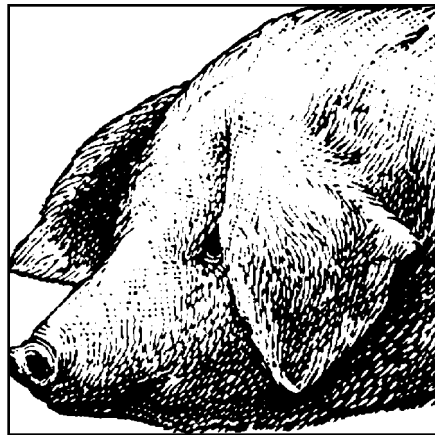


Swine



BREEDS OF SWINE

The following table compares characteristics of the breeds of swine that are common in the United States.

A 5-point scale is used, with 1 and 2 representing a breed that is above average for a particular trait, 3 is average for the trait, and 4 and 5 are below average for the trait.

Litter size and litter weight are characteristics associated with reproductive performance of females in the herd. Growth rate and feed efficiency are traits related to an animal's ability to grow rapidly and convert feed to body weight. Backfat thickness and loin eye area describe the relative merits of market animals to yield muscular, trim carcasses.

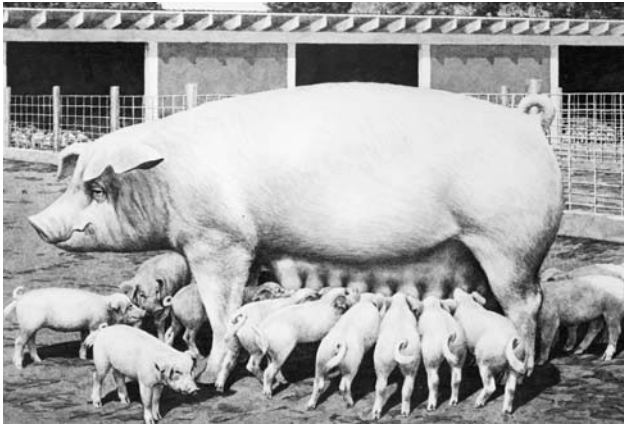
The ear set of swine is either erect or down. That ear characteristic will help you distinguish some breeds from others.

Table 9. Breeds of Swine

Breed	Litter Size	Litter Weight ^a	Growth Rate ^a	Backfat Thickness ^a	Loin Muscle Area ^a	Ear Set ^a	Characteristics
Berkshire	4	4	—	3	3	erect	black with white on face, legs, possibly the switch
Chester White	1	4	5	3	3	down	solid white
Duroc	3	3	2	3	3	down	solid red, from bright orange to chocolate-red
Hampshire	4	3	4	1	2	erect	black with white belt across the front legs
Landrace	1	1	3	5	4	down	solid white
Poland China	—	—	3	2	2	down	black with white face, legs, possibly the switch
Spotted	5	4	2	4	2	down	white with black spots
Yorkshire	1	2	2	4	3	erect	solid white

^aRanking based on 1 (most desirable) through 5 (least desirable). Insufficient data for comparison is indicated by (—).

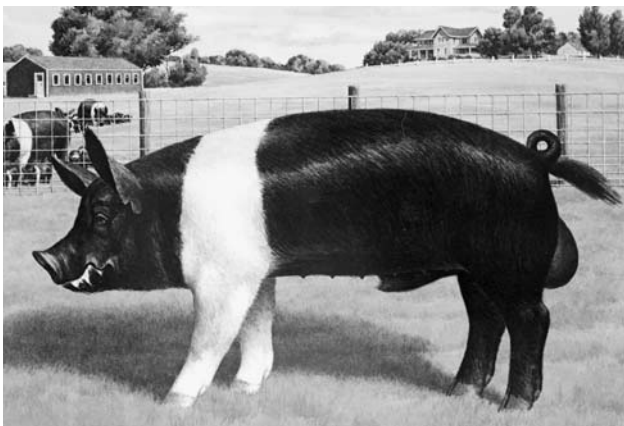
Adapted from the *Pork Industry Handbook*, 1985 Purdue University Cooperative Extension Service.



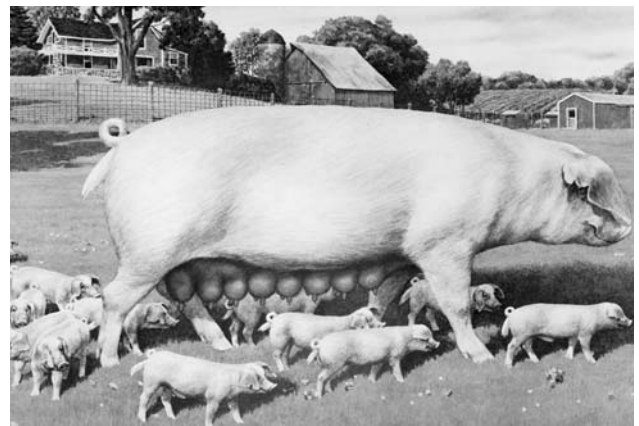
Chester White



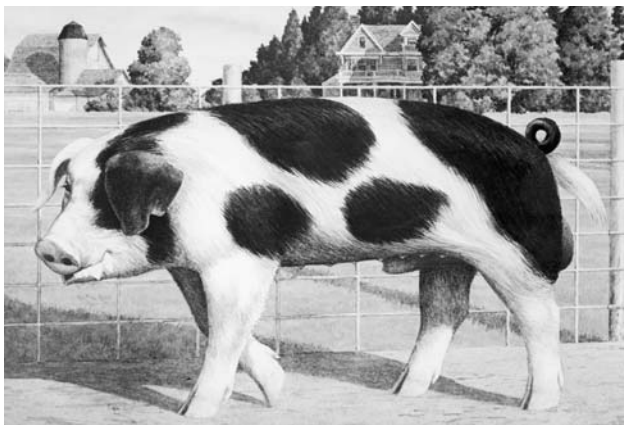
Duroc



Hampshire



Landrace



Spot



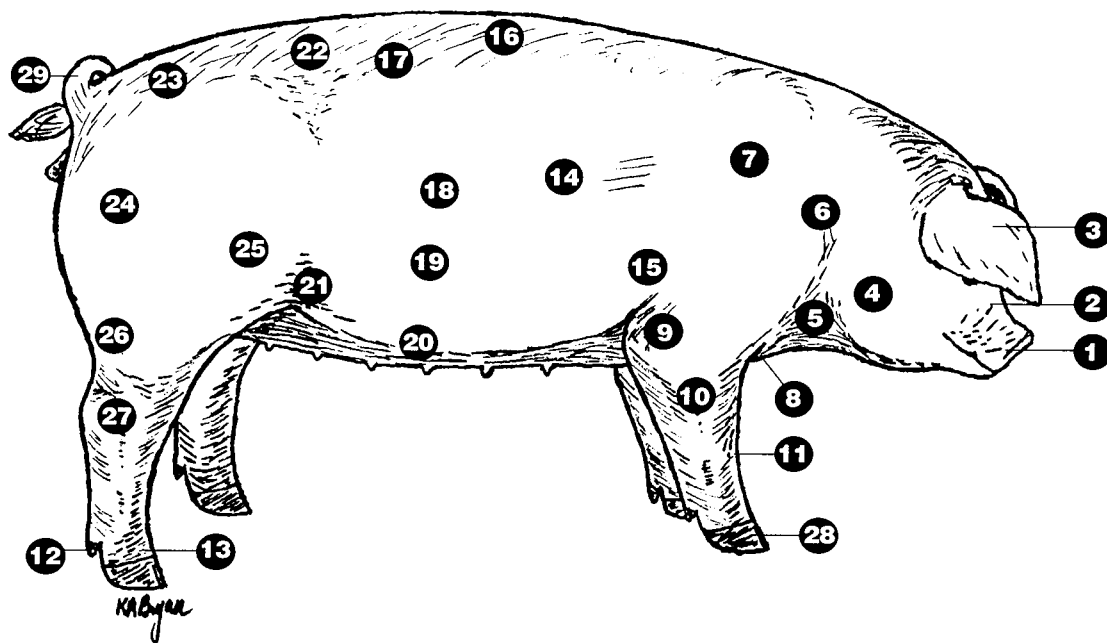
Yorkshire

PARTS OF SWINE

After you have become familiar with the breeds of swine, learn the external parts and carcass regions. This section provides diagrams of the external parts (Figure 14), characteristics of an ideal breeding gilt (Figure 15), and characteristics of an ideal market barrow (Figure 16). Take time to study all of the parts and to become familiar with them so you can refer to them without hesitation. Use these terms as part of your reasons.

Characteristics of the ideal breeding gilt and the ideal market barrow are included for reference only. Depending on the location and production situation, an ideal can take on various shapes and forms.

Figure 14: External Parts



- | | | |
|---------------------|-------------------|----------------------|
| 1 snout | 11 knee | 21 rear flank |
| 2 face | 12 dewclaw | 22 ham-loin junction |
| 3 ear | 13 pastern | 23 rump |
| 4 jaw | 14 rib | 24 ham |
| 5 jowl | 15 forerib | 25 stifle |
| 6 neck | 16 top or topline | 26 base of ham |
| 7 shoulder or blade | 17 loin | 27 hock |
| 8 chest | 18 side | 28 foot or toes |
| 9 elbow | 19 middle | 29 tail |
| 10 forearm | 20 underline | |

Figure 15: Characteristics of an Ideal Breeding Gilt

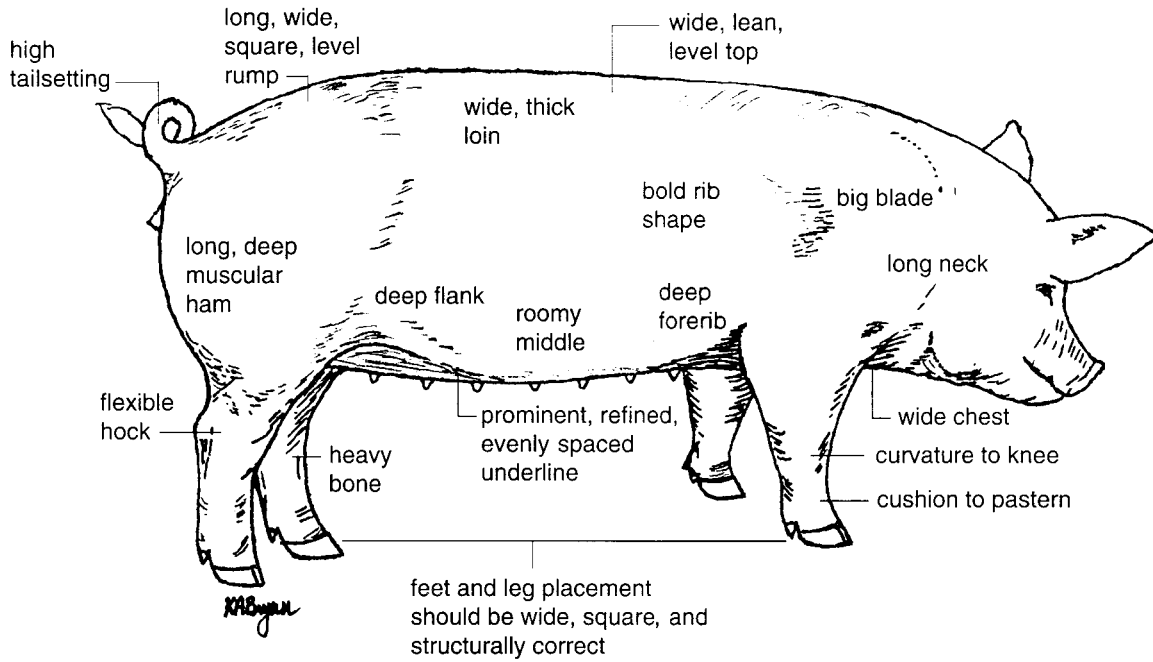
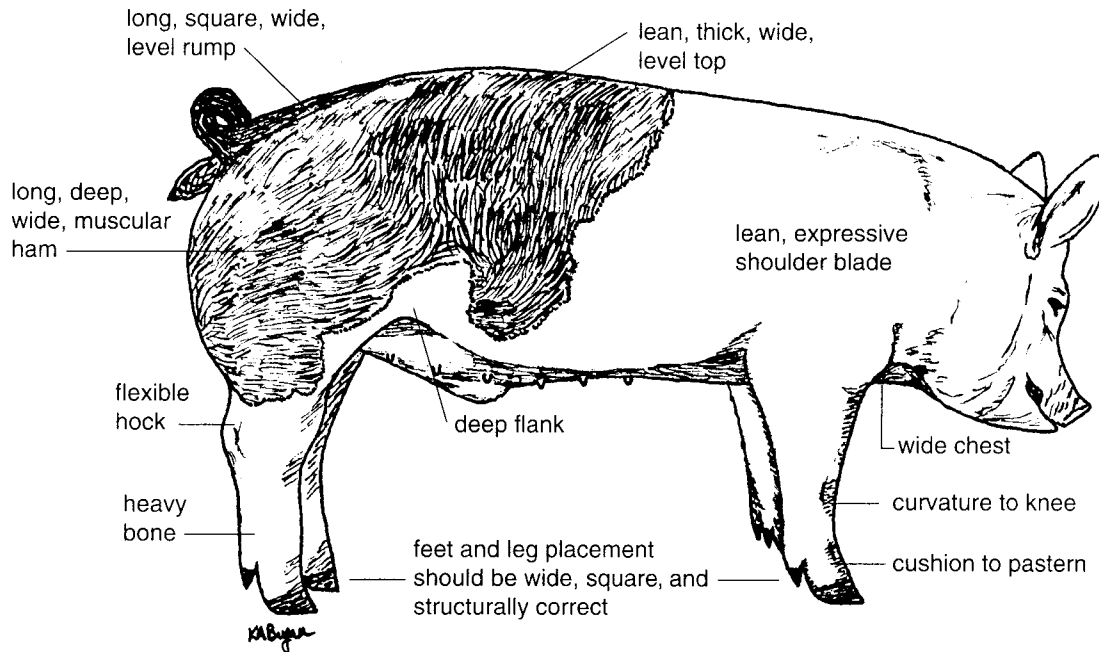


Figure 16: Characteristics of an Ideal Market Barrow



	NORMAL RANGE	AVERAGE	IDEAL
Live weight (lb)	210 - 270	245.0	245.0
Dressing percent	68 - 77	72.0	75.0
Average backfat (in)	0.7 - 2.0	1.5	1.0
Carcass length (in)	28 - 34	30.5	32.0
Loineye area (sq in)	3.0 - 7.0	4.5	5.8
Percent muscle	45 - 65	51.0	54.0

Adapted from *Live Animal Carcass Evaluation and Selection Manual*, 4th edition, 1993, Donald L. Boggs and Robert A. Merkel.

SWINE TERMINOLOGY

General

More Desirable Characteristics

growthier
 more performance oriented
 faster growing
 higher performing
 more functional
 more problem free
 more complete
 more fault free
 larger outlined
 larger scale
 longer sided
 nicer balanced
 more desirable composition of gain

Less Desirable Characteristics

 slower growing
 lower performing, poorer performing

 smaller outlined
 smaller scale
 shorter sided
 more off balance
 less desirable composition

Durability and Bone

More Desirable Characteristics

more durable
 heavier boned
 stood on more substance of bone
 more ruggedly designed
 bolder fronted
 bolder sprung
 stood on greater substance of bone
 greater diameter of bone

Less Desirable Characteristics

frailer
 finer boned
 stood on finer bone

 narrow fronted

 frailer
 finer boned

Structure and Movement

More Desirable Characteristics

more confinement adaptable
 looser _____
 looser in (his/her) skeleton
 sounder
 sounder designed
 leveler topped
 leveler rump
 leveler in (his/her) rump design
 more curvature to (his/her) knee
 more even in (his/her) toe length
 more desirable slope to (his/her) shoulder
 more flex of hock
 more animation to (his/her) hock
 more cushion to (his/her) pasterns
 looser strided
 freer strided
 longer strided

Less Desirable Characteristics

less confinement adaptable
 tighter _____
 tighter in (his/her) skeleton
 poorer structured
 tighter structured
 higher topped
 steeper rump
 steeper in (his/her) rump design
 buck-kneed, straighter through (his/her) knee
 more uneven in (his/her) toe length
 straighter in (his/her) shoulder
 straighter in (his/her) hock
 posty legged
 straighter in (his/her) pasterns
 more tightly wound

 shorter strided

more flexible
 wider tracking
 moves out with more _____

more tightly wound
 narrower tracking
 moves out with less _____

Volume and Capacity

More Desirable Characteristics

bigger volumed
 higher capacity
 roomier middled
 looser middled
 deeper chested
 deeper ribbed
 deeper sided
 deeper flanked
 looser flanked
 wider based
 wider through (his/her) lower one-third
 wider through (his/her) chest floor
 wider sprung
 bolder sprung
 more expanded in (his/her) chest floor
 more expanded in (his/her) forerib
 more natural width through (his/her) rib
 more internal capacity

Less Desirable Characteristics

 less capacious, tighter ribbed

 tighter middled
 shallower chested
 shallower ribbed

 shallower in (his/her) flank
 tighter in (his/her) flank
 narrower based
 narrower through (his/her) lower one-third
 narrower through (his/her) chest floor

 narrower chested
 pinched in (his/her) forerib
 constricted in (his/her) rib
 less capacious

Muscle

More Desirable Characteristics

heavier muscled
 more expressively muscled
 more natural thickness _____
 more natural turn of top
 more desirable turn to (his/her) top
 pushes more stifle on the move
 wider and more expressively muscled from
 stifle to stifle
 wider and squarer rump
 thicker through (his/her) rump

Less Desirable Characteristics

lighter muscled
 flatter in (his/her) muscle
 lacks muscle expression _____

 flatter in (his/her) stifle

 narrower through (his/her) rump

Condition

More Desirable Characteristics

leaner turn to (his/her) top
 less condition over (his/her) loin edge
 leaner through (his/her) lower one-third
 cleaner topped
 leaner made
 leaner designed
 had a groove down (his/her) top
 had a dimple above (his/her) tail

Less Desirable Characteristics

more condition over (his/her) loin edge
 wastier over (his/her) loin edge
 pushes more fat in (his/her) elbow pocket
 plainer down (his/her) top
 heavier conditioned
 has more fat _____
 plainer down (his/her) top

Market and Carcass

More Desirable Characteristics

- more producer oriented
- more packer oriented
- more packer acceptable
- more industry oriented
- required fewer days to 230
- took fewer days to reach 230
- should rail _____
- higher lean-to-fat ratio
- heavier muscled carcass
- carcass with the most edible lean
- carcass with a higher percentage muscle
- carcass with a higher percentage ham/loin
- carcass with a higher percentage lean cuts
- carcass with more loin muscle area
- more muscular turn to (his/her) top
- more muscle thickness deeper into the ham
- wider in the lower one-third of the ham

Less Desirable Characteristics

- less producer oriented
- less packer oriented
- less packer acceptable
- less industry oriented
- required more days to 230
- took a greater number of days to reach 230
-
-
- lighter muscled carcass
- carcass with the least edible lean
- carcass with a lower percentage muscle
- carcass with a lower percentage ham/loin
- carcass with a lower percentage lean cuts
- carcass with less loin muscle area
-
-
- narrower in the lower one-third of the ham

Femininity and Underline

More Desirable Characteristics

- more feminine fronted, as evidenced by _____
- longer in her neck
- longer fronted
- higher quality underline that was _____
- more functional underline
- more evenly spaced teats
- more refined teats
- more numerous
- more prominent underline
-
-

Less Desirable Characteristics

-
- shorter in her neck
- shorter fronted
- poorer quality underline that was _____
- blind teats
- uneven in her teat spacing
- thicker, coarser teats
-
- possessed a pin teat (where?)
- was blunt in her teats (where?)
- looser in her rear udder sections

Performance and Miscellaneous

More Desirable Characteristics

- more desirable EPDs across all traits
- more desirable _____ EPDs

Less Desirable Characteristics

-
- less desirable _____ EPDs

more potential to sire pigs with -----	should sire pigs with more -----	less potential to pigs lambs with -----	should sire pigs with less -----
width muscle growth leanness soundness confinement adaptability		width muscle growth ----- ----- confinement adaptability	

PERFORMANCE DATA FOR SWINE

As with classes of beef cattle and sheep, inclusion of performance data with a class of swine challenges you to make complex decisions while using a variety of information. Not only must the physical characteristics of each animal be evaluated, but the appropriateness of the data for the given production situation must also be considered. A complete understanding of the following swine production terms will enable you to evaluate a class of swine more critically.

- ✗ **Birth Date** – Actual date an animal was born.
- ✗ **Number Born Alive** – The number of pigs in a litter that were born alive (actual, NBAEPD).
- ✗ **Number Weaned** – The number of pigs in a litter that were weaned. The standard weaning age for swine is 21 days (actual).
- ✗ **Litter 21-Day Weight** – Weight of an entire litter of pigs between 14 and 28 days of age and adjusted to a constant age of 21 days (actual, ratio, LW21EPD).
- ✗ **Sow Productivity Index** – Also referred to as SPI. The sow productivity index is an indicator of maternal ability, and it combines the number of pigs born alive and the 21-day litter weaning weight into an index (actual, ratio).
- ✗ **Days to 230 Pounds** – An indicator of growth rate, days to 230 is the number of days that a hog required to reach 230 pounds. A lower number is more desirable than a higher number (actual, DAYSEPD).
- ✗ **Backfat Thickness** – The depth of backfat listed either as average backfat thickness or 10th-rib fat depth. A lower number indicates that a hog is leaner than a hog with a higher number (actual, ratio, BFEPD).

Expected Progeny Differences (EPDs) for Swine

Much like sheep producers, swine producers have requested more objective selection tools for selecting replacement gilts and boars within and across herds. Expected progeny differences have been used in the beef cattle industry for some time and are now also being used in swine selection programs. These EPDs are very similar to those used by the beef cattle industry to predict progeny performance of animals.

Expected progeny differences for swine have been developed primarily for the economically important traits associated with swine production: an indication of maternal ability and of growth and carcass characteristics. The EPDs include the following:

✗ Maternal EPDs

Number Born Alive (NBA) – Daughters of sires or dams with a positive NBAEPD would farrow larger litters than sows with an NBAEPD of 0.

Litter 21-Day Weight (LW21) – A positive LW21EPD indicates that daughters of sires or dams would produce litters heavier than average.

✗ Growth and Carcass EPDs

Days to 230 (DAYS) – A DAYSEPD of -3.00 indicates that progeny from this boar or gilt should reach 230 pounds 3 days sooner than progeny from an animal with a DAYSEPD of 0.

Backfat Depth (BF) – An BFEPD of -.05 indicates that a boar should sire pigs having .05 inches less backfat than pigs from a boar with a BFEPD of 0.

Careful interpretation of EPDs for swine is necessary. Most producers want large litters of pigs that wean heavier, reach market weight sooner, and have less backfat. Therefore, NBAEPD and LW21EPD should be positive, indicating more pigs in the litter and heavier pigs at 21 days of age. Also, DAYSEPD and BFEPD should be negative, indicating fewer days required to reach 230 pounds and less backfat thickness at 230 pounds.

Selection indexes have been incorporated into the genetic evaluation of swine performance records. These selection indexes provide for consistent and accurate combining of various performance traits.

X Selection Indexes

Sow Productivity Index (SPI) – Ranks individuals on the number born alive (NBA) and litter 21-day weight (LW21). It does not include any growth or carcass information.

Maternal Line Index (MLI) – This index uses growth and maternal EPDs, with emphasis on maternal EPDs for a maternal line.

General Purpose Index (GPI) – Ranks animals on both growth and maternal traits. This index is well suited for use on maternal and paternal lines, as in a rotational crossbreeding system.

Terminal Sire Index (TSI) – Ranks individuals on days to 230 (DAYS) and backfat depth (BF) only. This index does not include any maternal information.

All four indexes are listed in a manner similar to that for ratios (average = 100), with superior parents having values greater than 100 and inferior parents having values less than 100. These selection indexes have been developed based on the economic values associated with costs of production. Therefore, each index is listed in dollar units. For example, consider that a sow's SPI is 106; then each of her daughters would be expected to produce litters worth \$6 more at 21 days of age than the daughters of a sow with an SPI of 100.

PRODUCTION SITUATIONS FOR SWINE

Production situations for swine classes with performance data take on slightly different formats than for classes of beef cattle or sheep. In the scenarios for swine, a complete description of the following important factors must be addressed:

X Breeding Program

What type of breeding program is being used?

How are the selected animals to be used in that program?

X Marketing Program

How are the hogs marketed?

For what type of buyer are the hogs being produced?

X Type of Environment

In what type of environment are the hogs being raised?

Examples: confinement, partial confinement, or nonconfinement.

The combination of a situation, performance data, and visual appraisal offers you the opportunity to make real-life animal-selection decisions.

Scenario 1
Hampshire Boars

Assume these Hampshire boars are to be used as terminal sires on Yorkshire x Landrace sows. You do not retain any gilts as replacements; therefore, all hogs are sold as market hogs. You generally sell market hogs on a carcass merit buying program, and all of your hogs are raised in confinement.

Table 10: Performance Data for Hampshire Boars

No.	Birth Date	Dam's SPI	Days to 230	Adj. 10th-Rib Fat	Loineye Area
1	10/20	104	165	.81	5.95
2	10/24	101	165	.71	6.05
3	10/31	101	173	.67	5.70
4	11/2	100	157	.73	6.65

Scenario 2
Yorkshire Gilts

Rank these gilts as you would use them as replacements in a purebred Yorkshire herd. You profit mainly from the sale of performance-tested boars and gilts to commercial swine operations; however, you do sell a few boars as herd sires. All of your hogs and your customers' hogs are raised in total confinement.

Table 11. Performance Data for Yorkshire Gilts

No.	Birth Date	EPDs			
		NBA	LW21	Days	BF
1	3/27	+0.25	+1.92	-1.22	-0.03
2	4/4	+0.32	+3.40	-2.18	-0.01
3	4/8	+0.15	+2.33	-0.94	+0.04
4	4/8	-0.05	-0.39	-2.05	+ 0.04

74 Mississippi 4-H Livestock Judging Manual

Scenario 3

Duroc Boars

Assume these boars are to be used in a three-breed rotational crossbreeding system (Duroc x Yorkshire x Hampshire). Before selling feeder pigs, a group of replacement gilts is selected to be retained for breeding purposes. All hogs are maintained in a partial confinement situation.

Table 12. Performance Data for Duroc Boars

No.	Birth Date	EPDs			
		NBA	LW21	Days	BF
1	2/10	-0.11	-2.22	+1.24	+0.01
2	2/15	+0.05	+0.55	-2.15	-0.07
3	2/17	-0.07	-1.38	-0.85	-0.03
4	2/20	+0.08	+1.33	-3.42	-0.05

Scenario 1

Priorities: Select boars that will increase performance of growth and carcass traits. Growth and carcass traits are extremely important because all hogs are sold as market hogs. Soundness is a priority.

Scenario 2

Priorities: Balanced program in all areas. Select gilts that are strong in maternal, carcass, and growth traits. Soundness is a priority.

Scenario 3

Priorities: Select boars that are strong in maternal traits (NBAEPD and LW21EPD) and growth traits (DAYEPD). Backfat EPD is of no concern in this scenario.

SAMPLE ORAL REASONS FOR SWINE

Market Hogs

2-4-1-3

"My placing of the market hogs was 2-4-1-3. I started with 2, as she had the best combination of muscle volume, leanness, and capacity in this class. Ideally, I would have liked to see my class winner more correct structurally and freer moving. Even so, I used 2 over 4 in my top pair as he was more pulled apart at his blades and carried more width and expression of muscle down his top and into the center and lower portions of his ham. He was also a trimmer made barrow that showed more blade action on the move and pushed less fat into his elbow pocket; he should hang the carcass with the highest percent muscle in the class. I concede that 4, the blue-butt barrow, was a more structurally correct barrow that was leveler topped and freer moving.

In a closer middle pair, I placed 4 over 1, as 4 was a more producer-oriented and practical barrow. He was a bigger volumed barrow that had more width to his chest floor, had more dimension to his rib, and was more expanded through his lower one-third. He was a more structurally correct barrow, with more give and cushion to his knee and hock. I recognized 1 as being a trimmer made barrow,

with less fat out over his loin edge, but he was a narrow-made barrow that was constricted in his chest floor, flatter ribbed, steeper out through his rump, and straighter on his front and rear underpinning.

Nevertheless, in my bottom pair, I placed 1 over 3, as 1 was a leaner made, more packer-acceptable barrow. He was a longer bodied barrow that showed more overall muscle expression and dimension down his top and through the base of his ham. He had less fat over his blades and should hang a carcass with more packer and consumer appeal. I grant that the black barrow was deeper flanked and looser made, but he was a short-bodied barrow whose combination of wide top and narrow base indicated he was the fattest barrow in the class. *Thank you.*"

Hampshire Gilts

3-4-2-1

"My placing of the performance Hampshire breeding gilts was 3-4-2-1. I started with 3, as she combined muscling, broodiness, and performance data to the highest degree. Ideally, I would have liked to see my class winner even longer fronted.

Realizing this in my initial decision, I still preferred 3 over 4, as 3 was the thickest hipped, heaviest muscled gilt that displayed the most volume of ham and had the most shape and dimension down her top, both visually and by the paper. More importantly, she was the boldest bladed, broodiest appearing gilt that had the most depth and spring to her fore and center rib, while possessing the highest dam's SPI.

I will admit that 4 was a longer fronted gilt that was cleaner through her lower one-third.

In my middle comparison, it was 4 over 2, as 4 was a taller fronted, larger scaled gilt that was longer bodied and later maturing. She too was a nicer designed, more structurally correct female that was leveler topped and had a more correct slope to her shoulder.

I grant that 2 was another clean-headed, lean-designed gilt that scanned with a larger loineye.

With this in mind, it was 2 over 1 in my final decision, as 2 was a cleaner bladed gilt that was freer of fat through her lower body. She also had more lean muscle shape down her top both visually and by the scan data. In addition, she had a more distinct, higher quality underline, with a higher teat count.

There was no doubt that 1 was a bolder ribbed, sounder structured female that required fewer days to reach 230. However, this failed to compensate for the fact that she was the heaviest conditioned gilt with the poorest quality underline and the lowest in her dam's SPI. Quite simply, she was the least scenario-suited gilt in this class. *Thank you.*"