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Selection Guidelines for the Swine Breeding Herd

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The purpose of this publication is to assist the swine producer in the proper selection of herd boars and replacement gilts. This publication sets goals and outlines those traits which should maximize economic returns to the swine production enterprise.

GOALS

The goals in swine production, whether purebred and commercial, are as follows:

- 100 percent conception and farrowing rates.
- 10 to 11 vigorous pigs, weighing 2.75 to 3.00 pounds, farrowed per litter.
- 100 percent livability to market.
- 18- to 20-pound pigs weaned at 3 weeks with ability to be reared in confinement production systems.
- 150 days or less to reach market weight.
- 3 pounds feed per pound gain or lower for pigs from 50 to 220 pounds.
- Over 80 percent of hogs grading USDA No. 1 at marketing.

BREEDS

The genetic material to be used in maximizing economic returns to labor and management is found in our existing swine breeds. Pertinent information concerning performance of the eight major breeds of swine in the U.S. is presented in Tables 1-4.

Those breeds which rank high in litter size grow the fastest with the least feed and have the longest carcasses (Table 2). Those breeds ranking lowest in litter size rank highest for traits used in measuring carcass quantity and quality (Tables 3 and 4). The averages and rank of those breeds for the various traits give some indication of the way the breeds can be used in production programs to reach the goals outlined above.

SELECTION

Selection is the process of culling certain animals that do not meet requirements used in evaluating potential breeding stock. These requirements may be based on the individual's own records or the records of his parents or grandparents.

Amount of selection or "reach" that the producer makes determines his *genetic potential* for improved production. If he is to continue to make genetic progress, the replacement animals must be above the average of the previous pig crop. Not all of the "reach" made through selection of boars and gilts will be transmitted to the next pig crop, due to the way genes act and to the fact that the traits are not determined completely by genetics.

Genes passed from parent to offspring may give either *additive response* or *heterosis response.* Genes giving the additive response are: permanent, give their response regardless of other genes present and determine the amount of "reach" that will show in the offspring. Genes giving the heterosis response might be considered temporary, since their response depends on specific gene combinations which must be formed each generation.

Pig performance is due to both types of gene responses. The additive response sets the lower limit of performance. Heterosis response represents added performance that may be obtained with certain traits.

Relative size of the additive and heterosis response for several swine traits is presented in Table 5. Both types of gene responses, combined with the economic importance of the various traits, determine the emphasis a producer should give each trait when selecting herd replacements and choosing the mating system that will maximize returns to labor and management in his swine production program.

WHAT TO SELECT FOR

The swine producer must consider many traits when selecting replacement sows and boars. The number of traits and relative emphasis to place on each one depend on the needs of his production program. Most producers will consider the following traits when selecting replacements: (1) docility, (2) reproductive potential, (3) mothering ability, (4) underline, (5) litter size, (6) milk production, (7) pig livability, (8) soundness, (9) bone size and strength, (10) length, (11) growth rate, (12) feed conversion and (13) meatiness. Selection will be for those traits where performance is below average in the herd.

Docility

Animals with the ability to be reared in confinement are a must. When selecting or purchasing herd replacements, pay attention to those lines, breeds or crosses which do not react unfavorably to confinement production systems. This is important for all phases, but especially confinement farrowing. Animals easily spooked or sows which continue to fight the farrowing crate will probably not perform as well and are subject to more feet and leg problems in confinement than more docile animals.

Table 1. Average Litter Size by Breeds. [a]

Breed	No. of litters	Average litter size
Yorkshire	207	11.13
Landrace	192	10.52
Duroc	4850	9.66
Chester White	2129	9.53
Spotted	529	8.78
Hampshire	714	8.78
Berkshire	177	8.07
Poland China	3298	8.07
Total or average	12,096	9.12

a/ Composite of various research station and USDA reports.

Reproductive Potential

Pay particular attention to gilts from lines, breeds or crosses that consistently have high reproductive rates when bred to farrow at 12 months. Under confinement systems, only 80 percent of the gilts bred to farrow at 12 months of age will become pregnant. Thus, the producer is required to expose 125 gilts to have 100 farrow.

Since, on the average, the weight and selling price of the non-pregnant 12-month gilt (350 lbs. at $30 /cwt. or $105) will offset the feed costs for development to 12 months (1500 lbs. at 7¢/lb. or $105), the producer will realize a loss for each non-pregnant gilt equal to the fixed cost for 365 days ($36.50 at 10¢/day or $25.55 at 7¢/day). Additional losses are incurred due to lowered litter size of the herd and inefficient use of existing facilities.

With present swine populations, increased reproductive potential is observed with gilts that are not extremely meaty and with gilts developed on pasture as compared to those developed in total confinement. The effect of high-energy nutritional regimes used in development of replacements gilts needs to be reevaluated under present confinement production systems.

Mothering Ability

Mothering ability continues to be a very important trait, even in confinement production programs. Select gilts from sow lines which consistently show the least amount of "crush loss" from farrowing to weaning.

Table 2. Average and Rank of Daily Gain, Feed Efficiency and Carcass Length of Breeds, when Ranked by Litter Size. [a]

Breed (rank)	No. of pigs	Daily gain	Feed per pound gain	Carcass length
		lbs.	lbs.	in.
Yorkshire (1)	3101	1.80 (3)	297 (2)	30.4 (2)
Landrace (2)	606	1.90 (1)	300 (3)	30.6 (1)
Duroc (3)	3348	1.90 (1)	289 (1)	29.5 (7)
Chester White (4)	575	1.76 (7)	301 (5)	29.6 (6)
Spotted (5)	1341	1.80 (3)	304 (3)	29.7 (5)
Hampshire (5)	3701	1.77 (6)	300 (3)	30.2 (3)
Berkshire (7)	617	1.75 (8)	308 (7)	30.0 (4)
Poland (7)	1351	1.80 (3)	308 (7)	29.5 (7)
Total or average	14,640	1.82	298	30.0

a/ Data from Indiana, Ohio, North Carolina and Minnesota Evaluation Stations.

Although the sow cannot express the "nest building" aspect of mothering ability in farrowing crates, she can express a certain degree of the *sow-pig relationship* observed with sows and litters under less restraining production programs. Thus, if all sows are treated the same, select replacement gilts from those lines, breeds or crosses with the largest litters which show the lowest "crush kill" of pigs prior to weaning. Not all death loss observed in pigs prior to weaning is due to disease or lack of management on the part of the producer.

Underline and Nipples

The underline of replacement animals is very important. All replacement animals should have 12 to 14 evenly-spaced, large, functional nipples (6 to 7 per side). Animals which show inverted or pin nipples should not be selected.

Table 3. Average and Rank of Backfat and Loineye Area of Breeds, when Ranked by Litter Size.[a]

Breed (rank)	No. of pigs	Backfat	Loineye area
		in.	sq. in.
Yorkshire (1)	3101	1.45 (6)	4.33 (5)
Landrace (2)	606	1.45 (6)	4.20 (6)
Duroc (3)	3348	1.44 (4)	4.19 (7)
Chester White (4)	575	1.55 (8)	4.18 (8)
Spotted (5)	1341	1.44 (4)	4.38 (4)
Hampshire (5)	3701	1.28 (1)	4.73 (1)
Berkshire (7)	617	1.41 (3)	4.41 (3)
Poland China (7)	1351	1.40 (2)	4.68 (2)
Total or average	14,640	1.40	4.43

a/ Data from Indiana, Ohio, North Carolina and Minnesota Evaluation Stations.

Litter Size

The economic importance of litter size is increasing with increased fixed and variable production costs. Within all breeds, replacements should be selected from the larger litters. If possible, select replacements from those litters of 8 or more live pigs farrowed and weaned. Manage gilts and sows for maximum reproduction.

It has been estimated that an increase of one pig weaned is worth about $10. Surveys indicate that death loss from farrowing to weaning ranges from 20 to 30 percent. Crossbreeding programs can result in a 12 percent increase in number of pigs farrowed, and a 14 percent increase in pig survival to weaning due to heterosis. However, even with well-planned crossbreeding programs, death loss up to weaning continues to rob producers of many million dollars each year. Indiana producers have an annual pig loss of about 20 percent from farrowing to weaning. If one pig were saved through better breeding programs or better husbandry practices, Indiana swine producers would realize an annual savings of about $10 million.

Milking Ability

Select gilts and boars from those lines, breeds or crosses which have the largest number of pigs and the heaviest litters at 4 weeks of age. Litter size being equal, the heaviest milking sows should be those with the genetic potential for milk production. The practice of creep feeding often masks the expression of the genetic potential for milk production in the sow when pigs are weaned later than 4 weeks of age.

Large, Aggressive Pigs

The goal of 10 to 11 live pigs at farrowing weighing 2.75 to 3.00 pounds can be realized. However, this requires particular attention to the breeding program used and the nutrition and health practices followed.

Table 4. Average and Rank of Percent Ham-Loin of Breeds, when Ranked by Litter Size.

Breed (rank)	Carcass weight[a]		Live weight[b]	
	No. of pigs	Percent ham-loin	No. of pigs	Percent ham-loin
		pct.		pct.
Yorkshire (1)	1844	38.5 (5)	1577	27.2 (5)
Landrace (2)	348	38.6 (3)	258	26.4 (6)
Duroc (3)	1818	38.4 (6)	1530	26.4 (6)
Chester White (4)	106	38.2 (7)	469	27.5 (4)
Spotted (5)	602	38.6 (3)	739	27.7 (3)
Hampshire (5)	2124	40.0 (1)	1577	28.7 (1)
Berkshire (7)	270	38.2 (7)	347	25.9 (8)
Poland China (7)	488	39.1 (2)	863	27.8 (2)
Total or average	7700	38.9	7040	27.4

a/ Data from Indiana, Ohio, North Carolina Evaluations Stations, 1964-1971.
b/ Data from Minnesota Evaluation Station, 1958-1971.

Larger pigs at birth have the ability to make the best gains. However, lighter pigs will, when given the extra management required, perform as efficiently as the heavier pigs from the same starting weight.

Soundness

Structural soundness is especially important with total confinement production systems. This complex of traits is hard to measure or evaluate, since it tends to be an all-or-none trait, i.e. the animals are either sound or they are not sound.

Unsound animals might be lame, may tend to be weak in their pasterns and posty legged; consequently, they do not show the balance and style, when walking, of animals classed as structurally sound. This lack of structural soundness is accentuated when animals are placed in confinement. Growth and efficiency probably suffer but not to the extent observed with reproductive performance. Lack of ability to withstand stresses to feet and legs in confinement breeding is a common complaint of swine producers.

How much of the structural unsoundness problems are truly genetic in nature? Swine have been reared in confinement in the U.S. since the mid-1950's, with the percent of total confinement production units increasing yearly. Increased feet and leg problems are observed as more production units go to total confinement. Research observations indicate that the amount of feet and leg problems in increased with total slotted vs. solid concrete floors. Structural problems have been observed at various swine testing stations since the mid 1950's. Purebred breeders have practiced slight selection on this complex of traits during the past 20 years in their management productions systems.

Many interesting questions can be raised concerning this trait. How heritable it is? Is the increase in amount of unsoundness observed under total confinement due to: (1) genetic weaknesses in the animals, (2) stresses on the animal due to uneven foot wear, or (3) stresses on the animal due to sub-clinical disease complex probably associated with confinement systems? Do producers following a crossbreeding program observe the same incidence as producers following a non-crosbreeding program? If crossbred animals exhibit a lower incidence of feet and leg problems than do straight-bred animals managed the same way, then the trait is probably lowly heritable.

Animals to be selected as replacements should be evaluated under the same production system as that under which their progeny will be expected to perform. More purebred breeders should be testing and evaluating their breeding stock under confinement production conditions and reproducing those lines that are structurally sound and have top performance.

Table 5. Relative Size of Additive and Heterosis Responses for Various Swine Traits.

Trait	Additive response[a]	Heterosis response[b]
Docility[c]	++	++
Reproductive potential	+	+++
Male libido[c]	+	+++
Mothering ability[c]	++	++
Underline (spacing and number)	+++	+
Litter size	+	+++
Milk production[c]	++	++
Pig livability	+	+++
Soundness	++	++
Bone size[c]	++	++
Bone strength[c]	++	++
Body length	+++	+
Growth rate	++	++
Feed conversion	++	++
Meatiness	+++	+

a/ + = less than 20%; ++ = 20 to 50%; +++ = over 50%
b/ + = less than 5%; ++ = 5% to 15%; +++ = over 15%
c/ Estimated responses; genetic research is needed to more clearly identify the relative size of the additive and heterosis gene responses for these traits.

The commercial man who is using a confinement program will have fewer feet and leg problems if he purchases animals that have been tested in confinement.

Bone for Confinement

Does a producer need to select for bone size and bone strength for hogs to be reared in confinement? How are these traits related to structural soundness?

Bone size can easily be measured; however, measuring bone strength is much harder to obtain on the live animal. Producers have, for many years, visually selected animals with the largest bone, assuming that these animals would also have the strongest bone. Research indicates, however, that bones with smaller circumferences have higher breaking strength than bones with larger circumferences. In addition, bones from faster gaining, younger animals are lower in breaking strength than bones from older, slower gaining animals measured at the same weight. There is apparently little relationship between bone size and measures of meatiness.

The bone size-strength complex is actually a part of the structural soundness complex discussed previously. Therefore again, select as replacement animals those which are structurally sound after being reared in confinement.

Length

Pay attention to length when selecting herd replacements because of its importance as a measure

of sow productivity (Tables 1-4). Longer breeds tend to grow faster on a smaller amount of feed and produce larger litters; whereas, shorter breeds tend to have larger percent ham-loin and loineye areas, carry less backfat and producer smaller litters. Do not select herd replacements that are estimated to be less than 29.5 inches when measured from the first rib to the aitch bone.

Growth Rate

Growth rate becomes more important as a selection trait as feed and fixed costs increase. This is one of the production traits that is easy to measure. However, to date, the swine producer has not taken advantage of the gains to be made through increased selection pressure on growth rate.

Growth rate may be measured during any period — weaning, growing or finishing. Weight gain prior to weaning and, to a certain extent, during the growing period is a reflection of the sow's milking and mother ability. Growth rate during the finishing period (50 to 220 pounds) is a better measure of the pig's true genetic potential for growth.

The most accepted measures of growth rate today are: (1) days of age at 220 pounds and (2) daily gain in finishing period. The emphasis to be placed on growth rate will depend on the producer's production level and marketing program.

For most Indiana producers, daily gain during the finishing period is between 1.6 and 1.7 pounds per pig. Fixed costs are estimated to be 10 cents per pig per day. Thus, an improvement in daily gain during the finishing period from 1.7 pounds to 1.8 pounds (170 pounds finishing period gain) would decrease days on feed from 100 (170 ÷ 1.7) to 94 (170 ÷ 1.8) and result in a savings of 60 cents per pig. Likewise, an increase in finishing period daily gain from 1.6 pounds to 1.8 pounds would decrease days on feed from 106 to 94, resulting in a savings of $1.20 per pig.

Should the producer select the fastest gaining gilts for replacements? Yes, if the management program permits. If not, select the youngest gilts at 150 pounds and manage for maximum reproductive potential.

Average daily gain or days-to-220-pounds figures should be required on all boars purchased, since most of the selection pressure for daily gain comes through the boar. Improvement in daily gain to be made in your next pig crop depends on your present herd average for daily gain and just how well you do when selecting your next herd boar. Does he have good gaining ability and, thus, the genes for rapid gain to pass to his offspring?

For example, herds with an average of 1.6 pounds daily gain with no gilt selection pressure for daily gain, would need to use boars with daily gain of 2.26 pounds to raise the pig crop daily gain average to 1.7 pounds, resulting in 6 days' saving to market at a savings of 60 cents per pig. Likewise, the herd with an average of 1.7 pounds with no gilt selection, would need to use boars with daily gain of 2.36 pounds to raise the pig crop average to 1.8 pounds to realize a 60 cents per pig savings.

Feed Efficiency

Of all the production traits which can be measured, feed efficiency (feed per pound of gain) is one of the more important. Measurement, however, requires keeping records on all the feed consumed in the swine enterprise.

The average Indiana swine operator produces a market hog with about 750 pounds of feed as follows: about 150 pounds used for boar (10 lbs.) and sow (140 lbs.), another 50 pounds used to get the hog to the finishing stage, then about 550 pounds to produce 170 pounds of gain during the finishing period.

Boar and sow feed requirement varies with litter size; and the creep and growing phase feed will change very little; therefore, the advantages from selection for feed efficiency must be made in the finishing period. Decreasing the pounds of feed required per pound gain from 3.2 to 3.0 during the finishing period would result in a savings of 34 pounds of feed per hog marketed (170 x 3.2 = 544; 170 x 3.0 = 510; 544 - 510 = 34). If feed cost is 8 cents per pound, this represents a savings of $2.72 (34 lbs. x 8¢ per hog marketed.

However, since feed efficiency is so hard to measure, it is fortunate that we do have a favorable relationship between daily gain and feed efficiency (Table 2). By selecting for rate of gain, one can make approximately 40 percent as much gain in feed efficiency as by selecting only for feed efficiency. This is an added reason for obtaining more precise measures of daily gain during the finishing period.

Meatiness

During the past 15 years, a large amount of selection pressure has been placed on carcass meatiness traits (loineye area, backfat, percent ham-loin). Changes observed at the Indiana Swine Evaluation Station are presented in Table 6 and serve to illustrate that progress can be made in performance.

Between 1958 and 1968, rate of gain decreased by 0.02 pound per day (-1.2 %), feed per pound of gain decreased by 0.31 pounds (-8.9%), length increased 0.2 inches (+0.7%), backfat decreased 0.21 inches (-13.0%), loineye area increased 0.88 square inches (+22.6%), and ham-loin percent increased 3.2 units (+9.2%). Thus, selection pressure was higher for carcass traits than for growth and efficiency traits during that period.

Table 6. Changes Observed in the Indiana Swine Evaluation Station. [a]

Measure	Unit	1958	1963	1968	Pct. change 1958 to 1968
Age at 220 pounds	days	162	162	163	+0.6
Daily gain	lbs.	1.61	1.60	1.59	-1.2
Feed per pound gain	lbs.	3.50	3.17	3.19	-8.9
Length	in.	29.8	30.0	30.0	+0.7
Backfat	in.	1.61	1.47	1.40	-13.0
Loineye area	sq. in.	3.90	4.26	4.78	+22.6
Ham-loin percent	pct.	34.7	36.0	37.9	+9.2

a/ Market litter test (two pigs per litter, unadjusted data) with the same ration used during the 11 years.

Of the various carcass traits, backfat is the easiest to measure and is the most valuable in predicting carcass quantity of lean meat produced. Table 7 presents the averages for various production and carcass traits, by carcass backfat classes, of hogs evaluated at the Indiana Station from 1958 through 1969. Hogs with lower carcass backfat were meatier but grew slower. No relationship is shown between backfat and length, and backfat and loineye. This summary indicates a slight desirable relationship (1) between backfat and feed (either as consumption or efficiency), and (2) between backfat and total test costs (when fixed costs are 10¢/day and feed costs are 8¢/lb.).

Selections against backfat may be made visually or by several mechanical methods (simple backfat probe, sonoray, anscan, etc.). Present USDA grades are determined primarily by using carcass backfat and carcass weight, with minor changes for degree of muscling.

Thus, the producer can estimate USDA carcass grades for his hogs before sending them to market by: (1) weighing the hogs; (2) assuming average dressing percent of 70; (3) obtaining live animal backfat measurements and adjusting these to carcass basis by adding 0.1 inch; and (4) making minor adjustments for lack of muscling, if needed. At 220 pounds market weight, carcass backfat for USDA grades will be: *No. 1* — 1.3 inches or below; *No. 2* — between 1.3 and 1.7 inches, and *No. 3* — over 1.7 inches.

Average production and carcass data of the approximately 4000 hogs evaluated at the Indiana Station from 1958 through 1969 are listed in Table 8 by "estimated" USDA grade. The No. 1 hogs compared to the No. 3's were 1 pound heavier at 64 days, were 7 pounds lighter when marketed, grew 0.15 pound per day slower, required 5 days longer on feed, consumed 14 pounds less feed, had the same length and loineye measurements, but were 3.1 percent larger in ham-loin percent.

A comparison of costs for the No. 1 and No. 3 hogs shows: an advantage of 50 cents in fixed cost (5 days at 10¢/day) for the No. 3 hogs, but an advantage in feed costs of $1.12 (14 lbs. at 8¢/lb.) for the No. 1 hogs, resulting in an overall advantage of 62 cents for the No. 1's over the No. 3's.

Table 7. Production and Carcass Data by Carcass Backfat Class. [a]

Backfat class	No. hogs	Weights Initial[b]	Weights Final	Daily gain	Feed/ pound gain	Test days	Feed consumed	Carcass length	Loin-eye area	Pct. ham-loin	Test costs[c] Fixed	Test costs[c] Feed	Test costs[c] Total
		lbs.		lbs.	lbs.		lbs.	in.	sq. in.	pct.			
.9-.99	35	46	199	1.45	3.09	112	484	29.7	4.8	40.2	$11.20	$38.72	$49.92
1.0-1.09	117	46	200	1.53	3.01	105	469	29.7	4.8	39.9	10.50	37.52	48.02
1.1-1.19	273	46	202	1.57	3.00	104	470	29.7	4.8	39.1	10.40	37.60	48.00
1.2-1.29	627	47	203	1.59	3.04	102	475	29.7	4.8	38.6	10.20	38.00	48.20
1.3-1.39	819	46	204	1.62	3.01	101	476	29.7	4.8	38.1	10.10	38.08	48.18
1.4-1.49	770	46	205	1.65	3.04	100	481	29.7	4.7	37.6	10.00	38.48	48.48
1.5-1.59	662	45	205	1.67	3.04	100	483	29.7	4.8	37.1	10.00	38.64	48.64
1.6-1.69	359	46	207	1.73	3.00	97	479	29.7	4.7	36.7	9.70	38.32	48.02
1.7-1.79	196	47	208	1.71	3.02	98	484	29.7	4.7	36.0	9.80	38.72	48.52
1.8-1.89	94	46	210	1.74	3.09	97	496	29.6	4.7	35.5	9.70	39.68	49.38
1.90 +	49	44	209	1.73	3.08	99	483	29.7	4.7	35.4	9.90	38.64	48.54
Average	4001	46	205	1.64	3.03	101	479	29.7	4.8	37.7	$10.10	$38.32	$48.42

a/ Indiana Swine Evaluation Station — Market Litter Test. Data corrected for breed, sex, year, season, sow age and litter size.

b/ 64-day weight.

c/ Fixed costs — 10¢/day; feed costs — 8¢/pound.

Table 8. Production and Carcass Data by USDA Carcass Class.[a]

Estimated USDA grade[b]	No. hogs	Weights		Daily gain	Feed effic.	Test days	Feed consumed	Carcass length	Loin-eye area	Pct. ham-loin	Test costs[d]		
		Initial[c]	Final								Fixed	Feed	Total
		lbs.		lbs.	lbs.		lbs.	in.	sq. in.	pct.			
No. 1	1052	47	202	1.57	3.03	103	473	29.7	4.8	38.9	$10.30	$37.84	$48.14
No. 2	2610	46	205	1.66	3.03	100	480	29.7	4.8	37.5	10.00	38.40	48.40
No. 3	339	46	209	1.72	3.05	98	487	29.7	4.7	35.8	9.80	38.96	48.76
Average	4001	46	205	1.64	3.03	101	479	29.7	4.8	37.7	$10.10	$38.32	$48.42

a/ Indiana Swine Evaluation Station – Market Litter Test. Data corrected for breed, sex, year, season, sow age and litter size.
b/ USDA Grades – carcass backfat requirements: No. 1 = below 1.3 in.; No. 2 = 1.3 to 1.7 in.; No. 3 = over 1.7 in.
c/ 64-day weight.
d/ Fixed costs – 10¢/day; feed costs – 8¢/pound.

Other meatiness traits, such as loineye and estimated lean cuts, may be measured and used for advertisement and sales purposes, if the purchaser is willing to pay the seller for the costs required in obtaining these measurements.

BREEDING HERD HEALTH

Maximum genetic progress will be made with healthy swine herds. Diseases cost producers millions of dollars each year. Diseases that reduce growth and efficiency include: atrophic rhinitis, pneumonia, erysipelas, scours, jowl abscesses, vibrionic dysentery, transmissible gastro enteritis and mastitis-metritis-agalactia. Vaccines and/or preventive management programs have been developed for these diseases.

Diseases that lower reproductive efficiency include: leptospirosis, brucellosis and SMEDI (still born-mummification-embryo-death-infertility).

All replacements should come from herds which have not had the above diseases for at least 6 to 12 months. Replacement animals should be vaccinated for erysipelas and leptospirosis and either be from brucellosis-validated herds or tested and found negative for brucellosis.

SUMMARY

The successful producer will use genetics to maximize the economic returns to his swine operation by either selecting from his herd or purchasing from other herds, those healthy animals which:

1. Are docile and easy to manage.
2. Have a high reproductive potential.
3. Are good mothers.
4. Produce large litters.
5. Have good underlines.
6. Give large quantities of milk.
7. Produce large, aggressive pigs at birth.
8. Have adequate bone and structural soundness.
9. Have been reared in confinement systems.
10. Give maximum rate and efficiency of growth.
11. Produce an animal with a high lean to fat ratio in the carcass.

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