



Management and Nutrition of the Bred Gilt and Sow

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The most important economic trait in swine production is the number of pigs weaned per sow per year. It is essential that all breeding females conceive promptly, farrow large litters, and wean a high percentage of the pigs farrowed. When a fertile boar is properly used with optimal sow management, approximately 95 percent of the normal ova produced should be fertilized. Management for maximum reproductive performance involves correct breeding, nutrition, herd health, and environment.

Breeding Recommendations

Breed gilts as they approach a weight of 230 to 240 pounds. They should be bred by the time they reach seven months of age. To help ensure that gilts are cycling and ready to breed by this age, it is desirable to pen them adjacent to a boar by the time they are 5 1/2 months of age. The sight and smell of the boar will help induce gilts to cycle.

Sows can usually be rebred during the first estrus after weaning if the pigs are weaned at 17 days of age or later. This is usually the most feasible system. Although less efficient, some systems such as show pig production, make it necessary to permit sows to skip one or more heat periods before rebreeding to produce litters when desired. Breeding recommendations are given in Table 1.

Hand breeding is increasing in popularity. In hand breeding, boars are not penned continuously with the female. Females are brought to the boar to be bred during estrus or vice versa. Hand breeding requires more labor than pen breeding, but there are many advantages to the system. There is less stress on the boar when mating a large number of females and fewer boars are needed than in a pen breeding system. It is easier to know the exact breeding date and each female can be bred twice at the most desirable time. Research has shown that breeding animals twice during the heat period 12

Table 1. Breeding Information.

Age to breed gilts	Before 7 months
Weight to breed gilts	230-250 lbs.
Length of heat period	2-3 days
Best time to breed in heat period	1st and 2nd day
Number of services per sow	2 services at 24-hour intervals
Interval between heat periods	21 days (range 18-24)
Heat occurs after weaning pigs	5 days (range 2-10)
Gestation period	114 days (range 109-120)

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to 24 hours apart, will on the average increase litter size by approximately 1/2 pig compared with single breeding.

When pen breeding, a boar is turned in with a group of gilts with the expectation that they will be bred in a 21 day period. When sows are weaned in groups after 5 weeks or less lactation, most should breed in a 10 day period after weaning (usually 3 to 7 days). If sows have a small litter (less than 5 pigs) and/or a long lactation (greater than 6 weeks), they may ovulate before weaning and estrus can then reoccur anytime during the 21 days after weaning.

Producers using the pen breeding system should use plenty of boar power. A ratio of 8 to 10 sows per boar is recommended for mature boars and 4 to 6 sows is recommended for each young boar (less than 1 year of age). A sow-to-boar ratio of 4 to 1 for mature boars and 2 to 1 for young boars is more feasible when sows are weaned in groups. Table 2 presents a gestation schedule that will assist in determining the farrowing date of a sow if the breeding date is known.

Artificial Insemination (A.I.) of Swine

To introduce new genetic materials into the herd with a minimum risk of disease and to increase the use of a particular sire, the pork producer should consider an A.I. program. Providing a viable possibility for herd improvement, an A.I. program will require greater managerial input, but it will result in greater awareness of any reproductive problems in the herd. Very little specialized equipment is needed to carry out a successful program. One of the best uses of A.I. is to bring new genetics into the herd by using commercial semen. Semen collected on the farm is ideal for expanded use of fewer, yet superior boars. If a few simple suggestions are followed, A.I. will yield conception rates and litter sizes that are equal to or better than natural service using fresh semen. Use of frozen semen is likely to yield less favorable results. A.I. short training courses are available through the OSU Cooperative Extension Service. Also, many boar studs across the country offer A.I. training. Supplies are widely distributed by boar studs and other suppliers. To maximize pregnancy rates, be certain to follow directions for use of equipment and extenders as closely as possible. Don't be afraid to ask questions no matter how insignificant.

When considering whether or not to use A.I., a producer should evaluate both the benefits and limitations.

Table 2. Gestation Table Dates of Breeding and Farrowing for Sows (based on 114-day gestation period).

<i>Bred</i>	<i>Due</i>	<i>Bred</i>	<i>Due</i>	<i>Bred</i>	<i>Due</i>
Jan. 1	- Apr. 25	May 1	- Aug. 23	Sept. 1	- Dec. 24
Jan. 5	- Apr. 29	May 5	- Aug. 27	Sept. 5	- Dec. 28
Jan. 10	- May 4	May 10	- Sept. 1	Sept. 10	- Jan. 2
Jan. 15	- May 9	May 15	- Sept. 6	Sept. 15	- Jan. 7
Jan. 20	- May 14	May 20	- Sept. 11	Sept. 20	- Jan. 12
Jan. 25	- May 19	May 25	- Sept. 16	Sept. 25	- Jan. 17
Jan. 30	- May 24	May 30	- Sept. 21	Sept. 30	- Jan. 22
Feb. 1	- May 26	June 1	- Sept. 23	Oct. 1	- Jan. 23
Feb. 5	- May 30	June 5	- Sept. 17	Oct. 5	- Jan. 27
Feb. 10	- June 4	June 10	- Oct. 2	Oct. 10	- Feb. 1
Feb. 15	- June 9	June 15	- Oct. 7	Oct. 15	- Feb. 6
Feb. 20	- June 14	June 20	- Oct. 12	Oct. 20	- Feb. 11
Feb. 25	- June 19	June 25	- Oct. 17	Oct. 25	- Feb. 16
Feb. 28	- June 22	June 30	- Oct. 22	Oct. 30	- Feb. 21
Mar. 1	- June 23	July 1	- Oct. 23	Nov. 1	- Feb. 23
Mar. 5	- June 27	July 5	- Oct. 27	Nov. 5	- Feb. 27
Mar. 10	- July 2	July 10	- Nov. 1	Nov. 10	- Mar. 4
Mar. 15	- July 7	July 15	- Nov. 6	Nov. 15	- Mar. 9
Mar. 20	- July 12	July 20	- Nov. 11	Nov. 20	- Mar. 14
Mar. 25	- July 17	July 25	- Nov. 16	Nov. 25	- Mar. 19
Mar. 30	- July 23	July 30	- Nov. 21	Nov. 30	- Mar. 24
Apr. 1	- July 24	Aug. 1	- Nov. 23	Dec. 1	- Mar. 25
Apr. 5	- July 28	Aug. 5	- Nov. 27	Dec. 5	- Mar. 29
Apr. 10	- Aug. 2	Aug. 10	- Dec. 2	Dec. 10	- Apr. 3
Apr. 15	- Aug. 7	Aug. 15	- Dec. 7	Dec. 15	- Apr. 8
Apr. 20	- Aug. 12	Aug. 20	- Dec. 12	Dec. 20	- Apr. 13
Apr. 25	- Aug. 17	Aug. 25	- Dec. 17	Dec. 25	- Apr. 18
Apr. 30	- Aug. 22	Aug. 30	- Dec. 22	Dec. 30	- Apr. 23

Benefits

- The greatest advantage of artificial insemination is the increased opportunity to use genetically superior boars, both within and between herds, regardless of the size of operation.
- A.I. decreases both the number of ejaculations per boar and the total number of boars needed during peak breeding periods. The use of A.I. removes the necessity of taking the sow out of the breeding/gestation crate for a second insemination.
- A.I. provides a means to develop a closed herd, reduce the risk of introducing new disease organisms, breed large boars to smaller females, and save time when a large group of synchronized females are to be bred.
- A.I. helps detect boars that have marginal semen characteristics when semen is regularly examined. A.I. also provides a faster means to determine the genetic merit of a boar than does natural mating.

A.I. allows crossbreeding programs in commercial herds to be easily practiced without a large investment in required breeds of boars and encourages a good record keeping program. A greater awareness of the true reproductive status of the breeding herd will result in more effective selection of breeding stock.

Limitations

- Artificial insemination requires a higher level of management and can be time-consuming if not correctly organized. The producer must have the desire to make A.I. successful by being very thorough and paying close attention to detail in all phases of the program.
- A.I. requires that insemination be done correctly and at the appropriate time during estrus to obtain a high farrowing rate and litter size. Heat detection **must** be done at least twice daily for best results.
- Undiluted, fresh semen should be used within two hours.
- Extended liquid semen can be stored for only three to seven days. The length of storage is highly dependent on individual boars and extender used. Also, storage temperature is critical.
- Frozen semen has a substantially lower fertility level (farrowing rate and litter size) than fresh semen or natural mating.
- Sanitation of equipment is absolutely essential.

Excellent sources of information about swine A.I. are readily available. The Pork Industry Handbook has an overview fact sheet called "Artificial Insemination in Swine." The University of Nebraska Cooperative Extension Service also has printed a 19 page booklet also called "Artificial Insemina-

tion in Swine” (EC 89-264-B). A third fact sheet of interest is an OSU Fact Sheet ANSI-3607 “Using Fresh and Frozen Semen in a Swine A.I. Program.” This fact sheet is available at any OSU Cooperative Extension County Office.

Keeping the Breeding Herd Cool During the Summer

Conception rate is often lower in the summer months. Sows farrowing during the summer months often have smaller litters and lighter weaning weights than those farrowing during the cooler months. The apparent cause of lower reproductive performance of sows farrowing in the summer is heat stress during breeding and gestation.

Sows subjected to heat stress for the first 15 days after breeding tend to have lower conception rates, fewer viable embryos, and lower embryo survival rates than sows not subjected to heat stress. Heat stress two to three weeks before farrowing appears to be even more critical and results in more stillborn pigs and fewer live pigs farrowed. Sows subjected to heat stress during late pregnancy tend to wean fewer and smaller pigs. Heat stress can also cause death of the sow. Heat stress during early and late pregnancy is more critical than heat stress during mid-pregnancy. Boars subjected to high temperatures, such as we often have in Oklahoma during the summer, have a reduction in semen quality and a reduction in fertility rate for about five weeks after the end of heat stress. Exposure of boars to heat stress for only three days can result in decreased fertility. Females bred to boars that have been subjected to heat stress during the hot summer months may have decreased conception rates and smaller litter sizes.

Some type of protection from extreme summer temperatures for both sows and boars is essential to prevent heat stress and maintain maximum productivity. Adequate shade over sand that is wetted down several times on hot days can be helpful in outside lots. A sprinkler nozzle over sand or concrete is even more desirable and less time-consuming. Mechanical ventilation or evaporative cooling can be used to keep bred sows cool in confinement.

Nutrition is Important

During gestation, nutrients are necessary for maintenance and for the developing litter. Underdeveloped gilts require additional nutrients for growth. Bred gilts and sows are normally fed four to six pounds of feed per head per day during the gestation period. Under actual farm conditions, several factors influence feed requirements. The exact level to feed during gestation will vary depending on the weight, age, body (fat) condition, method of housing, age of pigs to be weaned, and climatic conditions or environmental temperature. Feeding an extra pound or two of feed per head per day during the last 10 days of gestation has been shown to increase pig survival and litter size at weaning.

The daily feeding of a limited amount to each female is the most popular and successful method of feeding. The use of feeding stalls is the best system. Its advantages include:

- Controlling feed intake for each sow makes it possible to obtain the desired weight gain.
- Feeding of large groups composed of animals of different sizes and ages in the same lot is possible with this system.



Figure 1.

- Boss or dominant sows are less of a problem with individual stall feeding.
- Less injury will occur to sows while competing at the feed trough.
- Sows can be more easily caught and handled if necessary when confined to stalls.

If it is not possible to hand feed females in individual feeding stalls, it is recommended that the ration be fed over a large area to prevent “boss” sows from getting more than their daily allowance. It is further recommended that sows and gilts should be grouped by size and body condition into lots of 15 or less.

Sows should gain approximately 65 to 90 pounds and gilts should gain approximately 90 to 110 pounds during gestation. Suggested gestation diets for producers who elect to mix their own diets are shown in Table 3.

Feed Additives

The response from feeding antibiotics or other chemotherapeutics to brood sows during the gestation period is unpredictable. The continuous feeding of these during gestation usually pays off only in problem herds. The most effective period to feed antibiotics to sows is for two weeks prior to farrowing and during the breeding period. This is considerably cheaper than feeding them throughout gestation. It is recommended in this type of program that the maximum level of antibiotics allowed by the Food and Drug Administration be fed. Chlortetracyclines, Tylosin, or combination drugs containing one of these antibiotics are commonly fed. In problem herds, research has demonstrated that the feeding of antibiotics may cause increased conception rate, number of pigs farrowed, and number weaned. When using feed additives, be sure to follow all regulations listed on the label.

Breeding Animals Must Be Healthy

Production systems used by pork producers today demand that breeding animals be of excellent health. Close confinement of large numbers of breeding animals requires a sound management program for the prevention and control of disease. Some guidelines are as follows:

- Be alert for any clinical signs of disease and get an accurate diagnosis immediately.

Table 3. Suggested Gestation Diets.

Ingredient	Ration Number							
	1	2	3	4	5	6	7	8
	Pounds							
Corn, yellow	1607	1531	1273	-	-	-	-	-
Sorghum grain	-	-	-	1597	1522	1268	-	-
Wheat, hard winter	-	-	-	-	-	-	1699	1618
Wheat midds	-	-	400	-	-	400	-	-
Soybean meal, 44%	315	295	250	326	305	260	225	210
Dehydrated alfalfa meal, 17%	-	100	-	-	100	-	-	100
Calcium carbonate	19	15	23	20	16	25	20	16
Dicalcium phosphate	44	44	39	42	42	32	41	41
Salt	10	10	10	10	10	10	10	10
Vitamin trace mineral mix ¹	5	5	5	5	5	5	5	5
Total, lb.	2000	2000	2000	2000	2000	2000	2000	2000
Protein, %	14.00	14.08	14.30	14.28	14.33	14.56	15.31	15.34
Lysine, %	.65	.65	.65	.65	.65	.65	.65	.65
Tryptophan, %	.17	.18	.17	.17	.18	.18	.22	.22
Threonine, %	.52	.53	.52	.49	.50	.50	.51	.51
Methionine + cystine, %	.51	.51	.48	.42	.43	.42	.56	.56
Calcium, %	.91	.90	.94	.91	.90	.90	.91	.90
Phosphorus, %	.70	.70	.75	.70	.70	.71	.70	.71
Metabolizable, energy, Kcal/lb.	1475	1440	1437	1419	1387	1396	1417	1385

¹ See Table 4

Table 4. Suggested Vitamin-Trace Mineral Mix.¹

Nutrient	Amount per ² pound of premix	Suggested source
Vitamin A	2,000,000 IU	Vitamin A palmitate-gelatin coated
Vitamin D	200,000 IU	Vitamin D ₃ - stabilized
Vitamin E	10,000 IU	dl-tocopheryl acetate
Vitamin K (Menadione Equivalent)	800 mgs	Menadione sodium bisulfite
Riboflavin	1,200 mgs	Riboflavin
Pantothenic acid	4,500 mgs	Calcium pantothenate
Niacin	9,000 mgs	Nicotinamide
Choline chloride	20,000 mgs	Choline chloride (60%)
Vitamin B12	5 mgs	Vitamin B12 in mannitol, (.1%)
Folic acid	300 mgs	Folic acid
Biotin	40 mgs	D-Biotin
Copper	.4%	CuSO ₄ •5H ₂ O
Iodine	.008%	KIO ₄
Iron	4.0%	FeSO ₄ •2H ₂ O
Manganese	.8%	MnSO ₄ •H ₂ O
Zinc	4.0%	ZnO(80%Zn)
Selenium	.012%	NaSeO ₃ or NaSeO ₄

¹ Vitamin and trace mineral mixes may be purchased separately. This is advisable if a combination vitamin-trace mineral premix is to be stored longer than 30 days. Vitamins may lose their potency in the presence of trace minerals.

² Premix is designed to be used at a rate of 5 pounds per ton of complete feed for sows and baby pigs and 3 pounds per ton of complete feed for growing-finishing swine.

- Control visitor traffic and other carriers of disease.
- Provide and use a foot bath with a disinfectant and/or disposable plastic boots for visitors if it is necessary to permit them into your swine facilities.
- Follow a recommended testing and vaccination program. Refer to OSU Extension Facts No. 9105, "A guide to Swine Health." Practice proper cleaning and disinfecting of buildings and equipment.
- Have facilities for proper disposal of dead or diseased animals.
- Reduce disease risk by purchasing only herd sires, or introduce new bloodlines by using A.I.
- If purchased, females should come from a single source to minimize potential health problems.

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