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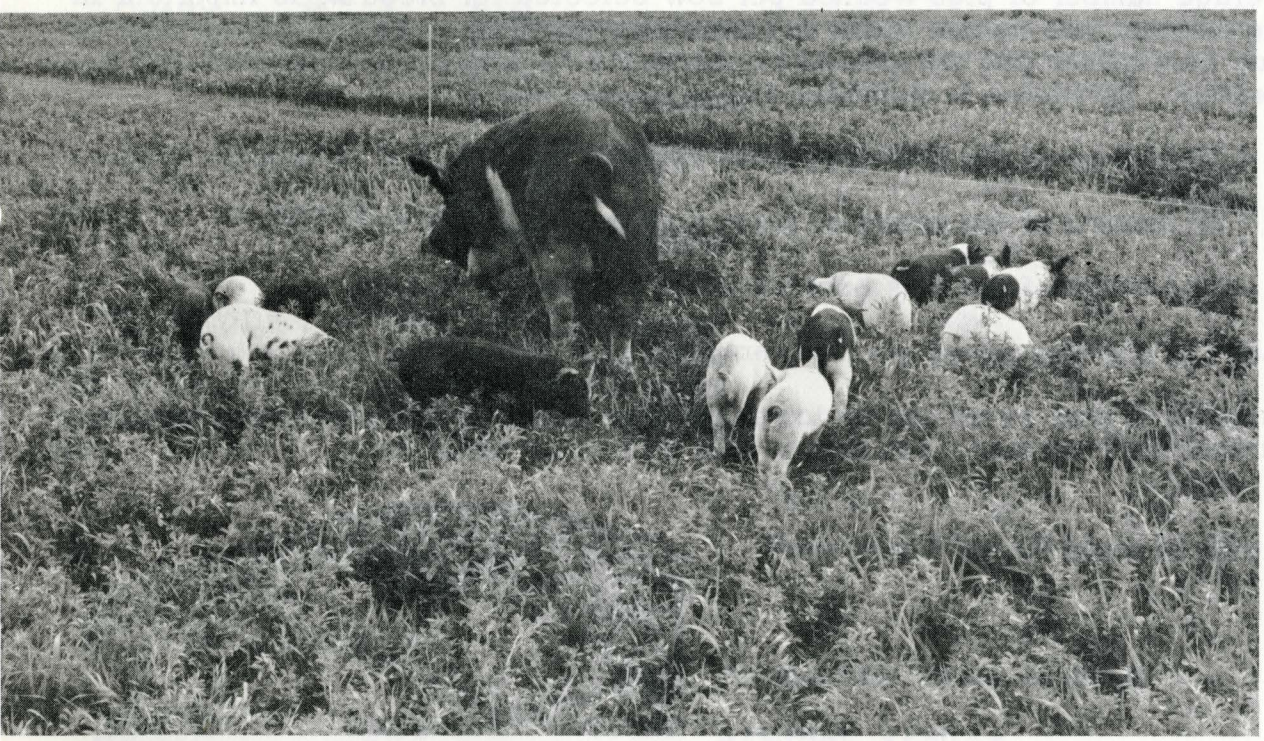
BREEDING HERD Management



EXTENSION SERVICE
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E. F. FROLIK, DEAN E. W. JANIKE, DIRECTOR

BREEDING HERD MANAGEMENT

By

Leo E. Lucas, Dwane Zimmerman, Don Hudman 1/

INTRODUCTION

The average number of pigs weaned per sow selected for breeding is important in determining whether you make a profit in your swine operation. Proper management of the breeding herd offers you the greatest opportunity for improving litter size and increasing profits. Estimates in Nebraska indicate:

1. 10 - 30 percent of the sows and gilts kept for breeding fail to produce litters.

2. 30 - 50 percent of the potential litter size is lost before farrowing.

3. 15 - 30 percent of the pigs born alive are lost before weaning.

4. Only 7.2 pigs are saved per sow farrowed.

If the number of pigs saved can be increased from 7.2 to 10 pigs per litter, production will increase 40 percent. You can do this with little added cost.

1/ Associate Professor, Assistant Professor, and Associate Professor, respectively, of Animal Science.

FACTORS AFFECTING LITTER SIZE

The question most often asked about reproduction is, "Why did my gilts or sows have such small litters?" This is an important question, but not easy to answer because of the complex nature of litter size. Litter size may vary because of differences in:

1. The female (Fig. 1a, 1b). The number of eggs or ova she produces establishes the potential or maximal litter size.

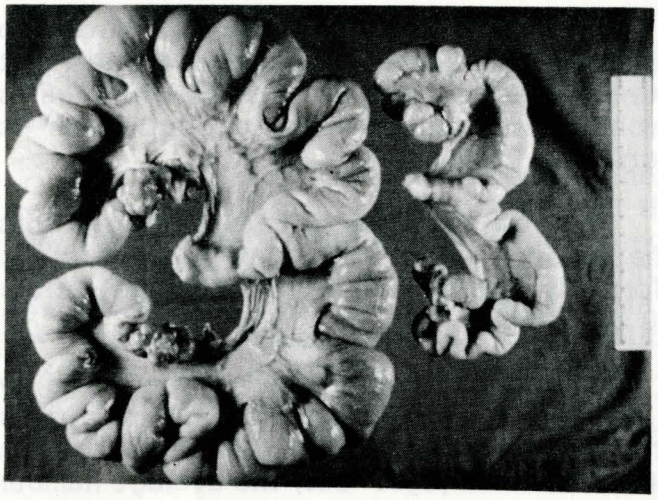
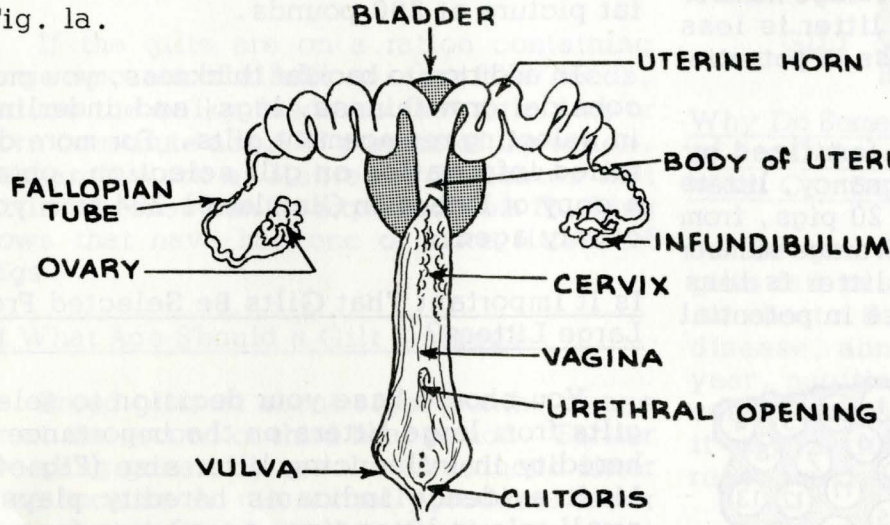


Fig. 1b. Normal (left) and undeveloped reproductive tracts of gilts of same age and weight.

Reproductive Organs of the Sow

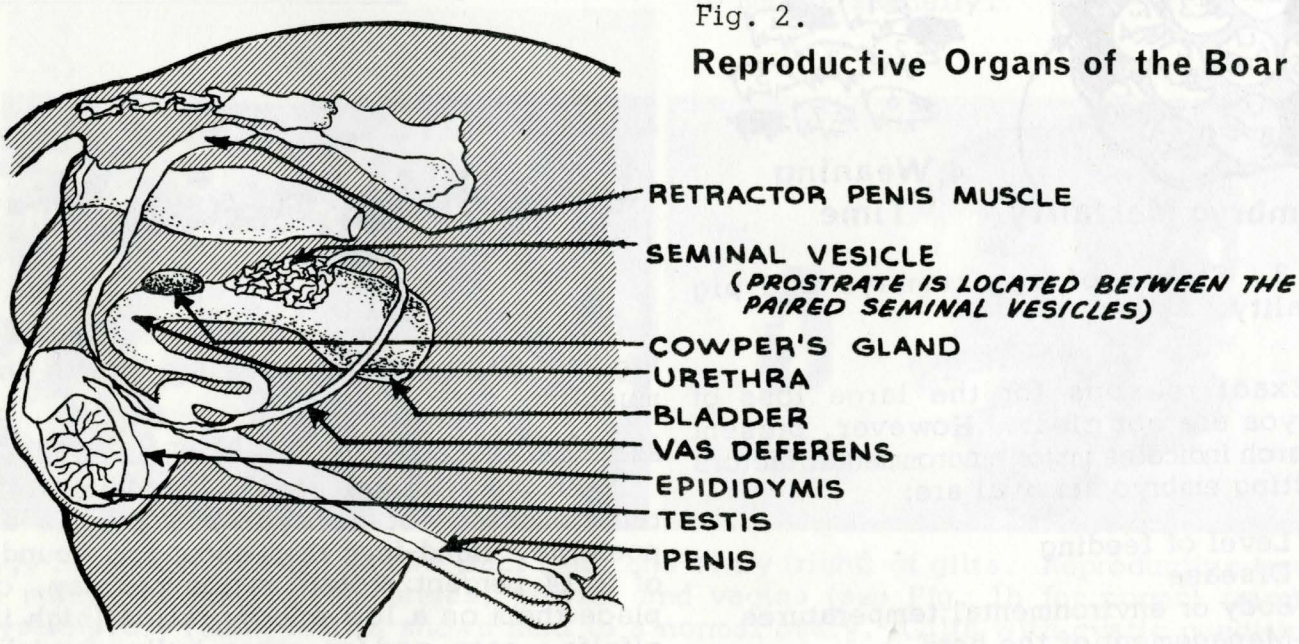
Fig. 1a.



2. Fertilization rate. The percentage of all eggs produced by the sow that unite with sperm from the boar (Fig. 2) and begin embryonic development is a factor in litter size.

Fig. 2.

Reproductive Organs of the Boar



3. Embryo and fetal survival. Variation in the percentage of the fertilized eggs that survive gestation to be born as live pigs is probably the largest single contributor to variation in litter size.

The sow ovulates or releases eggs into the oviduct where they may be fertilized. Normally, sows produce 14 to 20 eggs, gilts, 10 to 18 eggs.

If each egg ovulated were fertilized by a sperm and carried through pregnancy, litters from sows would average 14 to 20 pigs, from gilts, 10 to 18 pigs. But, the average number of pigs actually farrowed per litter is less than 10 - 30 - to - 50 percent loss in potential litter size.

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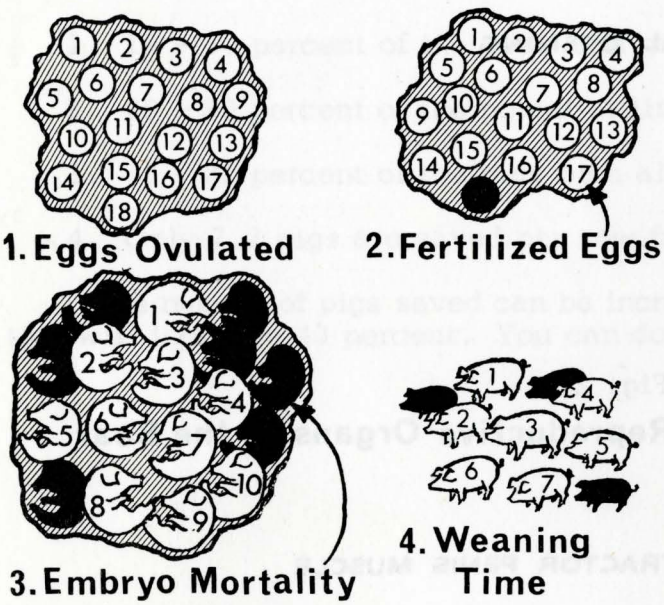


Fig. 3. Stages of egg, embryo and pig mortality.

Exact reasons for the large loss of embryos are not clear. However, present research indicates major environmental factors affecting embryo survival are:

1. Level of feeding
2. Disease
3. Body or environmental temperatures
4. Management of the herd

SOW & GILT MANAGEMENT -- PRE BREEDING PERIOD

When Should Gilts Be Selected for Replacements?

Select gilts for breeding purposes when they reach about 200 pounds. Selecting gilts earlier than 200 pounds may lead to inaccuracies, if fat thickness is one criteria for selection. Some lines of hogs apparently do not begin depositing backfat to any degree until after 150 pounds. Backfat thickness at 150 pounds would underestimate the actual fat picture at 200 pounds.

In addition to backfat thickness, you must consider growthiness, legs, and underlines in selecting replacement gilts. For more detailed information on gilt selection, obtain a copy of Extension Circular 61-204 from your county agent.

Is It Important That Gilts Be Selected From Large Litters?

You should base your decision to select gilts from large litters on the importance of heredity in influencing litter size (Fig. 4). Most evidence indicates heredity plays a small role in litter size, accounting for only 5 percent to 10 percent of the variation. Most of the variation in litter size apparently is caused by environmental influences on the breeding herd. Therefore, rate of gain and carcass meatiness should be primary factors for selecting and culling.

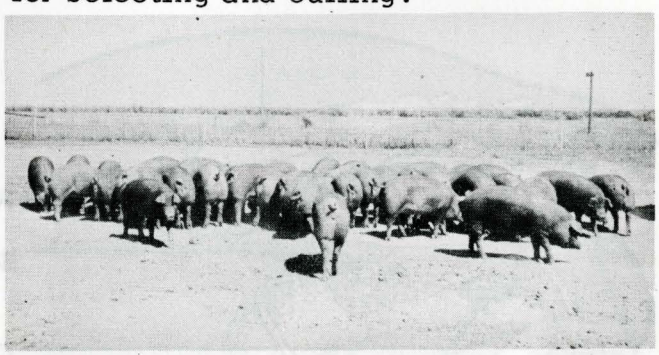


Fig. 4. Gilts showing adequate growth and muscling.

How Should Gilts Be Fed After Selection?

Remove gilts selected for breeding from the finishing lot as near 200 pounds as possible. Hand-feed them about four pounds of a 14 percent protein ration per day, or place them on a low energy ration (high in alfalfa, oats and/or other bulky feeds).

Rations for limited feeding and low energy self-fed rations are listed on page 11.

What Is Flushing and When Should It Be Done?

Flushing gets gilts in excellent breeding condition. You do this by increasing the energy intake of the female before breeding. Milo and corn, high energy feeds, are most commonly used for flushing. Gilts can be hand-flushed by feeding a 14 percent protein ration at the rate of 8 pounds per day for about 10 to 14 days before breeding.

If the gilts are on a ration containing large amounts of alfalfa or other fiber feeds, reduce the bulky feeds so that milo and/or corn constitute about 75 percent of the ration. Research work at Nebraska indicates that little response can be expected from flushing sows that have had one or more litters of pigs.

At What Age Should a Gilt Be Bred?

Breed gilts at about eight months of age or at the second or third heat period. Earlier breeding generally results in reduced litter size because the gilt normally produces fewer eggs during first heat than during later heat periods. Size of gilts at breeding is not a reliable indication of the number of heat periods they may have had. Do not assume that swelling and reddening of the vulva indicates heat. Gilts may show these signs before they show first heat.

Should Gilts and Sows Be Blood Tested For Brucellosis and Leptospirosis Before Breeding?

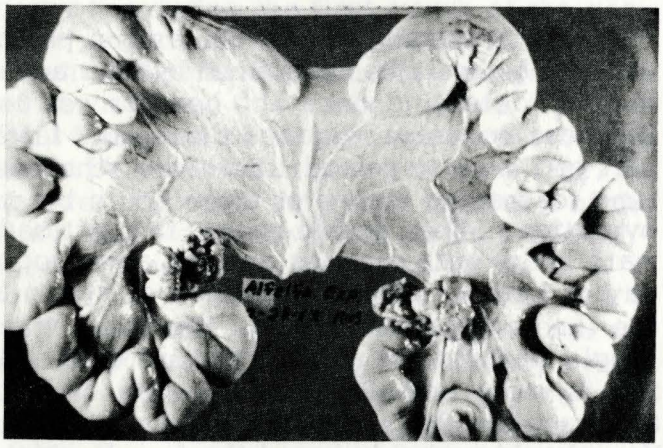
If gilts are not from a validated free herd or the health status is not known, test the sow herd at least three weeks before breeding. If positive reactors are found for brucellosis or leptospirosis, sell those animals for slaughter. Retest your herd for brucellosis at 30-day intervals, until the herd is clean. If leptospirosis is present or suspected, vaccinate the breeding herd before breeding.

GILT & SOW MANAGEMENT - BREEDING PERIOD

Why Do Some Gilts Fail To Show Heat Periods or Are Delayed in Showing Heat Periods and What Can Be Done?

Several factors may be involved when gilts fail to show heat or are delayed coming into heat. Some of these include age of gilt, disease, abnormalities, (Fig. 5), season of year, nutrition, silent heats and others. Because several factors apparently are involved, it may be difficult to determine the correct reason and solution to the problem.

Age of gilt is important because of the variation in time of first heat exhibited by gilts. Generally, gilts will show first heat at 6 1/2 months, but some may show first heat at 4 1/2 months, others at 12 months of age. You should cull gilts which are slow to mature sexually.



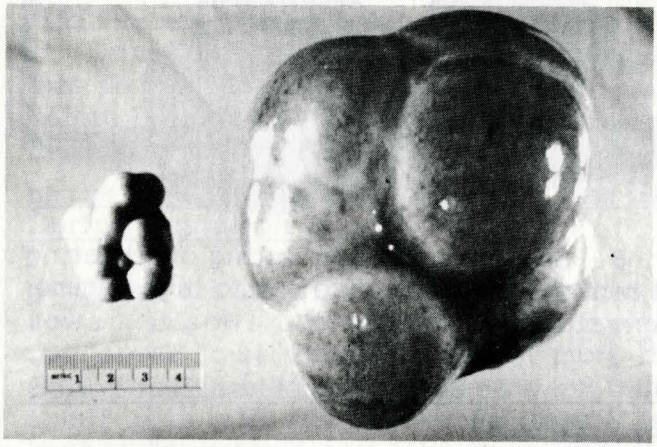


Fig. 5. Abnormal reproductive tract (left) and ovary (right) of gilts. Reproductive tract is minus the body of the uterus, cervix, and vagina (see Fig. 1b for normal tract). Cystic ovary (enlarged) is shown next to a normal ovary. Gilts with cystic condition should be culled.

Crossbred females will show heat earlier than comparable purebred gilts. They will have had more heat periods before breeding than purebred females, and will ovulate more eggs.

Some gilts may fail to show heat (estrus) because of developmental abnormalities. If there are external indications of abnormalities such as intersex conditions, sell gilts for slaughter.

When a high percentage of gilts fail to show heat, factors which retard growth and development may be responsible. These factors may include disease, poor nutrition, other environmental factors and poor management. To develop potential breeding females, excellent nutrition, environment and management must be provided.

What Is The Effect of Body Temperature on Litter Size and Conception Rate?

Body temperature is a major factor affecting the embryonic component of litter size. If breeding females are recovering from a sickness which has raised the body temperature, do not breed them until the next heat period. High summer temperatures also can cause reduced conception rates and increased embryonic mortality. During the hot summer months, provide shade, spray mists, or wallows (Fig. 6).

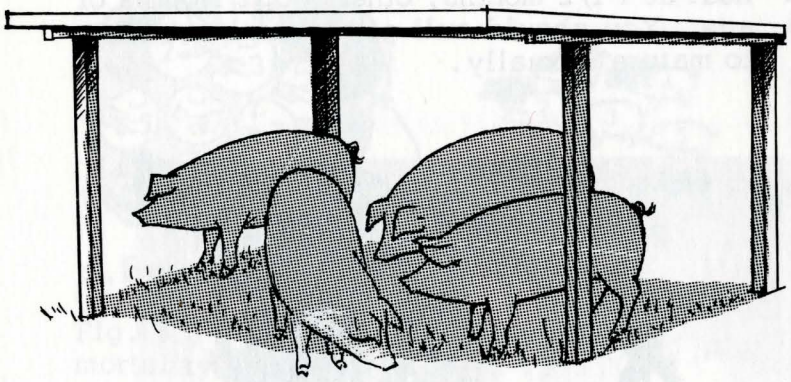


Fig. 6. Shade aids in preventing overheating and reduction in litter size due to high summer temperatures.

Should Sows Be Bred on the First Heat Period After Weaning?

Sows generally can be successfully bred at the first heat period after weaning. However, in cases where pigs are weaned early (3 weeks or less), it is usually better to breed on the second heat period. Breeding on the second heat period usually results in larger litter size.

Should Sows Be Flushed After Weaning?

There is little evidence that shows any real value in flushing sows. Apparently, removing pigs from the sows has a flushing effect.

How Important Is Feeding Antibiotics To Gilts and Sows During The Breeding Period?

Research evidence varies on this question. In herds with small litters, or herds with a history of disease problems, there may be an advantage to feeding antibiotics. Field trials in Nebraska indicate that feeding antibiotics at the rate of 250 grams per ton or 1/2 gram per sow per day, has increased litter size in some herds. Feed the antibiotics during the flushing period (10 to 14 days before breeding) and for two to three weeks after breeding. If the breeding herd has a history of farrowing disorders, antibiotics may be useful in rations one to two weeks before and after farrowing.

Should Gilts and Sows Be Bred Twice?

When ample boar power is available, two matings are recommended per female. Double mating does not usually result in larger litter size, but does result in a higher conception rate. If boar power is short and more than 15 females are to be bred per young boar during a three week period, one mating per female is recommended.

Time of mating during the estrus period will, in general, be determined by your accuracy in detecting onset of heat or estrus. Eggs are normally released during the latter part of the heat period; therefore, the best time for mating is two or three hours before ovulation. When double mating is practiced, mate boars with females on first and second day of heat to insure presence of sperm at the time eggs are released. However, when single matings are made, the time of breeding is more complex and depends on your accuracy and frequency of checking for heat. You should probably breed the female on the morning of second day of heat if you accurately check the females twice daily. Breed on the afternoon of first day if you check once daily.

Which Is the Best Practice -- Hand Mating or Pen-Pasture Mating?

Sows and gilts should be hand bred when labor is available. More females can be bred per boar because of conservation of boar usage. If lot or pasture mating is used, make sure ample boar power is available. There should be little difference in conception rate and litter size between hand mating and pasture mating if ample boar power is available.

Can Hormone Compounds Be Used Successfully to Bring Gilts into Heat at One Time?

Although considerable research has been done to date with some success, it is not recommended on a commercial basis. Several problems still remain to be solved, one of which is a high percent of cystic ovaries.

Is There Any Possibility That Stilbestrol in the Feed Will Effect Conception Rate and Litter Size in Females?

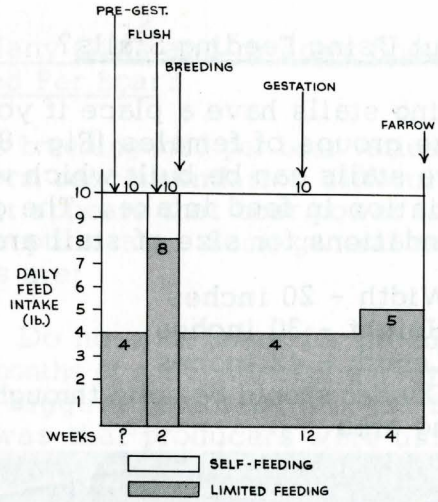
Do not let bred females follow cattle. However, should this occur, evidence does not indicate that the intake level of stilbestrol by swine under normal conditions is great enough to have any effect.

SOW & GILT MANAGEMENT -- GESTATION PERIOD

How Important Is Level of Feeding During the Gestation Period?

The most important factor affecting embryo and fetal mortality probably is the level of energy fed during the first month of the gestation period. It appears that well over 50 percent of Nebraska producers over-feed gilts and sows during this period. About 4 pounds of a 14 percent to 16 percent protein ration should be hand-fed to gilts and sows (Fig. 7). However, this may vary with condition of the gilts. Gilts and sows can be self-fed provided adequate bulk is in the ration.

Since small amounts of feed are fed per sow under limited feeding, deficiency symptoms of vitamins and minerals may be more common. Rations should be adequately fortified to meet the vitamin and mineral needs of the female. Recommended levels of minerals and vitamins are listed on bottom of page 11.



FEED CONSUMPTION OF SOWS

Fig. 7. Limited feeding during gestation will cut feed costs in half when compared to self-feeding.

What Is the Most Critical Time During the Gestation and Management Period?

The first 30 days of the gestation period are the most critical. Avoid stressing females during this period. As soon as females are bred, remove them from the flushing ration and place them on a hand feeding program or self-feed a bulky ration.

When pasture or lot breeding is practiced and the boar runs with the females, it may be impossible to determine which gilts or sows have been bred. Under these conditions, the flushing ration should be fed about one week before and one week after the boar is penned with the gilts. This reduces the time gilts are on the flushing ration after breeding to one week or less.

Should Bred Sows or Gilts Be Vaccinated or Wormed During the First 1/2 of Gestation?

Do not vaccinate or worm females during this period. Vaccinate or worm bred females before breeding or 2 to 4 weeks before farrowing.

Is the Practice of Separating Sows and Gilts During Gestation Wise?

If at all possible, separate gilts and sows. If sows and gilts are left together, the larger sows usually will eat more than their share of feed and become too fat, while small gilts will not eat enough feed. It is best to keep sows and gilts in groups of 25 or less. This will prevent some sows from getting more than their share of feed and may reduce fighting.

How About Using Feeding Stalls?

Feeding stalls have a place if you hand feed large groups of females (Fig. 8). Inexpensive stalls can be built which will reduce variation in feed intake. The general recommendations for size of stall are:

1. Width - 20 inches
2. Height - 30 inches
3. Length - 42 inches
4. Divider should be solid through trough or feeding area

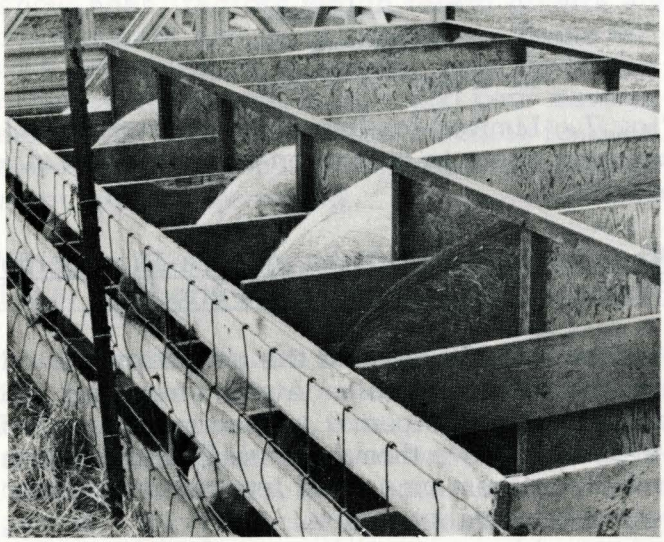


Fig. 8. Feeding stalls play an important part in controlling feed intake.

Can Silage Effectively Be Fed During the Gestation Period?

On some farms it is advisable to feed silage to bred sows and gilts, particularly if cattle are fed silage on the farm. Sows or gilts can make good use of either corn, sorghum or grass silage. It is doubtful that feeding silage to sows is practical on most farms unless other livestock are available to use the silage. It would require more than 100 sows to remove sufficient silage from the ordinary silo to assure fresh silage. Supplement corn or grain sorghum silage with about 1 1/2 pounds 40 percent protein supplement daily. Supplement grass silage with about one pound of protein supplement and 1 to 2 pounds of grain daily.

Are Animal Proteins Such as Tankage or Meat Scraps Required in the Gestation Ration?

Research at several universities including Nebraska shows that when soybean meal is used as the only source of protein in gestation and is properly supplemented with Vitamin B_{12}, the addition of animal protein does not improve reproductive performance. Rations with soybean as the only source of protein, properly fortified with vitamins and minerals, are excellent gestation rations and usually cost less than other comparable rations.

Should Beet Pulp Be Used in Gestation Rations?

Dried beet pulp has an excellent laxative effect in the gestation and lactation ration. It lowers the energy content of the ration and can be useful in preventing constipation just before and after farrowing.

What Are the Recommendations for Self-Feeding Gestating Sows?

Hand feeding 4 to 5 pounds per sow daily is recommended. However, if you wish to self-feed, this can be done with added feed expense. A gestation ration must be carefully formulated to contain a high amount of crude fiber (10 to 18 percent) so that the available energy will not make the sows overfat (See table for rations).

What Rations Would You Suggest for Hand-feeding During the Gestation Period?

With hand-feeding, a high grain ration is recommended because of the lower cost. A growing-finishing ration can be used the first 80 to 85 days of gestation. Incorporate a laxative feedstuff, (wheat bran, dried beet pulp or other high fiber feedstuff), to prevent constipation the last 30 days of gestation. This will compensate for the reduction in exercise by sows when they are maintained in a central farrowing area (See table for rations).

BOAR MANAGEMENT

When Should Boars Be Purchased?

Buy boars 30 to 60 days before use in the herd. This allows the boar to build up resistance to the disease organisms on the farm and to become acquainted with the surroundings. Buying boars early also allows time for breeding the boar to market gilts to check fertility and to prepare him for the breeding season.

Should Boars Be Penned Together?

Do not pen boars together unless they have been raised together before purchase. If boars are to be used together during breeding, they should be penned together -- but watch them.

How Much Space Should Be Provided for the Boar?

The boar should have at least 15 sq. ft. of sleeping area. Provide ample exercise area (lot 10' x 100'). Feed the boar some distance from the sleeping area so that he will have to move about.

Why do Some Boars Fail to Exhibit Sex Drive or Are Shy Breeders?

Some shyness in boars may be due to the failure of boars to become accustomed to new surroundings. Where possible, buy boars 30 days or more in advance to overcome the problem. Buy a sexually mature boar before breeding. Size and weight are not good indications of sexual maturity.

What Effect Does High Body Temperature Have on the Fertility of Boars?

High body temperatures, due either to sickness or external hot weather, can affect the number of normal sperm produced. All precautions should be taken to prevent sickness or overheating during the three weeks before breeding and during the breeding period. You may wish to allow boars to run with females only at night to prevent overheating. If the boar has had high temperature due to sickness, he should not be used for breeding for 2 to 3 weeks after recovery.

How Many Gilts and/or Sows Should I Plan to Breed Per Boar?

The breeding load per boar varies, making a uniform recommendation difficult. However, it appears that boar power is a factor in conception rate. Some general recommendations are:

1. Do not use boars for breeding until eight months of age. A recent survey indicated the biggest factor with boars failing to breed was that producers were using boars that were not sexually mature.

2. Do not expect boars under 10 months of age to breed more than two sows or gilts per day on two successive days followed by a day of rest.

3. Use two boars on a group of gilts, this usually encourages more aggressiveness on the part of each boar.

4. Alternate boars on a daily basis with a group of gilts. This has also increased conception rate.

5. Recommended breeding loads for boars:

Age	Pen or Pasture Mating	Hand Mating
8-9 months	2-4 per week	2-6 per week
10-12 months	10-12 in 3 weeks	15-20 in 3 weeks
12 months & over	10-15 in 3 weeks	20-30 in 3 weeks

How About the Use of Breeding Crates?

Breeding crates are extremely valuable if there is a size difference between sows and boars. Some breeders prefer to use crates for all matings. Designs for breeding crates can be found in the Swine Equipment Handbook at your local county agent's office.

Should Rings Be Used on Boars During the Breeding Period?

The use of rings on the nose during the breeding season may discourage a boar from breeding. Don't use them unless the boar is extremely hard to handle.

TERMS AND DEFINITIONS

1. Embryo - Fertilized egg before implantation.

2. Fetus - Fertilized egg after implantation.

3. Embryo survival - Fertilized eggs alive up to implantation.

4. Conception rate - Percentage of sows with pigs of those exposed to the boar for breeding.

5. Implantation - Attachment of fertilized egg to the uterine of the sow.

6. Ovary - Reproductive organ of the sow that produces eggs.

7. Ovum - One female egg.

8. Ova - More than one female egg.

9. Sperm - Male reproductive cell.

10. Semen - Fluid that is produced by male animal - Contains the reproductive cells, lubricating fluid, etc., of the accessory male glands.

11. Heat period - Time of sexual excitement for the female - time sow will accept the boar for breeding.

12. Gilt - Female pig that has not produced a litter.

13. Sow - Female pig that has produced one or more litters.

14. Hormone - Chemical substances produced by specialized cells that influences the behavior of other cells within the body.

15. Fertilization - The action of combining a male and female reproductive cell.

16. Ovulation - The act of releasing the mature egg into the reproductive tract for fertilization.

17. Ejaculation - The act of releasing sperm from the male.

18. Intersexes - An animal that has physical evidence of being both a male and female.

19. Hand Mating - The practice of bringing a male and female together in an enclosure (other than the one in which they are usually housed, for breeding).

20. Pen Mating - The practice of running a male and female together continuously in a pen or pasture for breeding.

21. Uterus - Site of implantation of fetus in the female - organ that accepts mature egg.

Table 1.
Suggested Rations For Pre-Gestation And Gestation Sows

Ingredients	Hand Fed Rations			Self-Feeding Rations			
	14% Protein	16% Protein	16% Protein	15% Protein	15% Protein	15% Protein	14% Protein
Ground Milo or Corn	1517	1432	1106	950	900	---	830
Corn and Cob Meal	----	----	----	---	---	1040	---
44% Soybean Meal	322	430	410	---	---	---	260
17% Dehydrated Alfalfa Meal	50	50	100	---	---	300	---
Alfalfa Hay (good quality)	----	----	----	500	400	---	400
40% Protein Supplement	----	----	----	250	300	360	---
Wheat Bran	----	----	100	300	---	300	150
Ground Oats	----	----	----	---	400	---	300
Ground Dried Beet Pulp	----	----	200	---	---	---	---
Dicalcium Phosphate	74	54	50	---	---	---	28
Mono-sodium Phosphate a	----	----	----	20	28	22	---
Salt (iodized) b	15	12	12	---	---	---	10
Trace Minerals b	2	2	2	---	---	---	2
Vitamin Premix c	20	20	20	---	---	---	20

a The amount of mono-sodium phosphate was calculated on the basis of the average composition of 40% protein supplements (calcium 3.75% - Phosphorus 1.60%).

b The trace mineral and/or iodized salt should supply 90 grams of zinc; 0.15-0.20 grams of iodine; 45 grams of iron and 10 pounds of salt per ton of feed.

c The Vitamin premix should supply the following amounts per ton of complete feed for 14% protein gestation, 16% protein gestation, 16% protein gestation-lactation and self-fed gestation rations respectively: Vitamin A 5,000,000; 5,000,000; 4,000,000; 4,000,000 I.U.,; Vitamin D 240,000, 240,000, 240,000, 240,000 I.U.; Riboflavin 2.5, 1.5, 1.5, 1.0 grams; Niacin 8.0, 8.0, 8.0, 8.0 grams; Pantothenic acid 9.0, 6.0, 6.0, 3.0 grams; Choline chloride 100, 100, 100, 50 grams; Vitamin B_{12} 20, 20, 20, 10 milligrams.