



# Farrowing and Lactation in the Sow and Gilt

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Farrowing and lactation are two of the most critical phases of pork production. A relatively high proportion of pig losses occur during these periods. A greater understanding of the events that take place leading up to and during the birthing process and lactation can lead to improved sow management and result in increased litter size and weight at weaning time.

## Farrowing or Parturition

### Initiation of Farrowing

Farrowing marks the end of the gestation period (average 112 to 115 days) during which embryos have developed into baby pigs. In individual sows or gilts, farrowing may occur outside the 112- to 115-day normal range without serious consequences. Shorter gestation lengths are associated with larger litter sizes (Figure 1). Before the delivery of pigs is possible, the sow's cervix must dilate or enlarge and the pigs must move through the uterus toward the cervical opening. These events are controlled by complex changes in the sow's hormone levels. Genetic and management factors may also influence the time of farrowing.

A sow preparing to farrow displays a number of outward signs, including nervous and restless behavior, and instinctive nesting behavior that occurs even in confinement facilities where nesting or bedding materials are

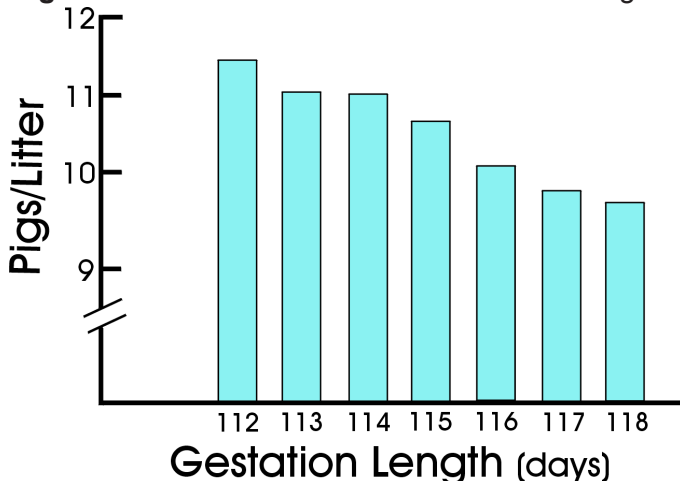
not readily available. Muscular contractions of the flank, belly and tail are generally noted to some degree before delivery begins. The sow's respiration or breathing rate may increase from a normal 25 to 30 breaths per minute to as high as 80 breaths per minute five to six hours before the initiation of farrowing. The rate then begins to fall and may approach normal rates by the time farrowing begins.

As farrowing nears, the sow's udder becomes firmer and more distended, and milk may be stripped from the teats. The consistency and abundance of milk, however, may vary greatly from one sow to another. With experience and skill, you may be able to detect that milk is available for the pigs six to eight hours prior to initiation of farrowing.

As the unborn pigs move toward the cervical opening, the powerful contractions of the uterine muscles tend to break open the placental membranes, which contain fluids and fetal feces or wastes (*meconium*). In many sows, the blood-stained fluids will be expelled from the vulva and serve as a sign that farrowing will follow shortly (generally within two hours). Likewise, the greenish-brown meconium will sometimes be expelled shortly before farrowing. Both of these signs are useful in predicting the onset of delivery, but many sows farrow without either sign.

Although you cannot rely solely on outward signs to predict farrowing, the experienced producer can certainly use these collective observations to plan attendance at most deliveries.

**Figure 1.** Effect of Litter Size on Gestation Length



## Hormonal Farrowing Controls

Proper knowledge of the hormonal controls of the farrowing process can improve farrowing results. It is currently believed that pigs developing in the uterus exert a hormonal control on the sow's uterine tissues, causing the release of *prostaglandin*. As illustrated in Figure 2, prostaglandin is carried from the uterus to the ovary where it stops the production of progesterone and stimulates the release of relaxin and results in dilation of the cervix. At the same time, prostaglandin is carried to the sow's pituitary glands and causes the release of oxytocin into the bloodstream. Oxytocin causes contractions of smooth muscles in the milk glands (milk letdown) and in the uterus (expulsion of pigs). Stimulation of the sow's udder by nursing pigs or through rubbing by hand can stimulate the release of oxytocin, causing further contractions for pig delivery.

If properly timed, injections of both prostaglandin and oxytocin can result in normal deliveries. Research has shown that a 10-mg injection of prostaglandin F2 $\alpha$ , or a similar synthetic compound, at day 110 of gestation (or later) will generally induce delivery of pigs about 27 to 30 hours later. Injections on day 109, or earlier, will likely cause loss of the litter. **Precise breeding-farrowing records are necessary to safely use this hormone.** Producers can use this drug as a management tool to concentrate most farrowing during normal working hours, which makes it easier to attend all farrowing and save more pigs.

Oxytocin injections can be used to supplement the effects of naturally occurring oxytocin. Avoid improper use by observing these guidelines:

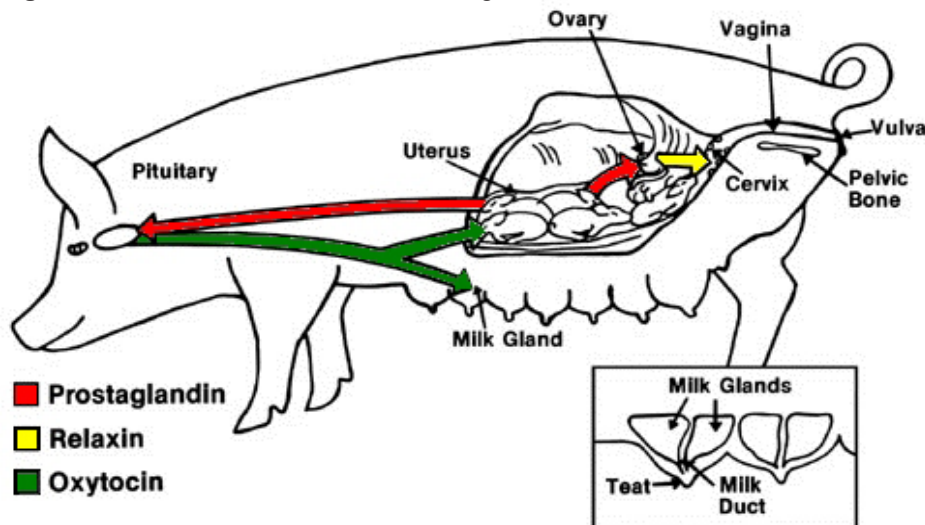
- Oxytocin will not induce farrowing and should never be given before the sow is physically prepared to give birth. Do not use until at least one pig has been born.
- Do not use oxytocin routinely. The stress of injecting a sow may interrupt a normal farrowing process. Use only in sows that appear to have stopped contractions before completing delivery.
- Always check the birth canal for a lodged pig before giving oxytocin. Failure to clear the passage could cause damage to the sow's uterus.
- If oxytocin use is determined to be necessary, 20 to 50 **units** given intramuscularly in the neck is prescribed. This generally translates to around 1 to 2.5 ml or cc of commonly available veterinary oxytocin (20 units per ml). Much smaller doses are necessary if given intravenously. Oxytocin acts rapidly, and then is quickly inactivated; therefore, excessively large doses are wasteful and potentially dangerous to the sow. If necessary, repeat the injection after 20 or 30 minutes.

## Pig Delivery

Muscular contractions cause the actual delivery of pigs. The contractions expel the pigs from the uterus, through the dilated cervix and out the vulva. A distinctive twitching of the sow's tail may signal the movement of a pig through the birth canal. Delivery of the pig is considered normal whether the nose or the hind legs exit the sow first.

In a mature sow, pigs may have to travel 5 to 6 feet from the farthest position near the oviduct to the birthing point. During this trip, the umbilical or navel cord usually remains connected with the placenta and continues

Figure 2. Hormonal Controls of Farrowing



to supply enough oxygen for survival. First-born pigs generally have a greater opportunity to suckle colostrum milk and have greater survival rates. Pigs located at the upper end of the uterus will usually be born last and have a greater chance of the umbilical cord becoming detached from the placenta during farrowing. This loss of oxygen supply may cause dead pigs at birth or weak pigs that may die later. The majority of fully developed pigs that are dead at birth (stillborns) actually die during – not before – the farrowing process. In some surveys, stillborn pigs account for about 40 percent of total baby pig losses. Any factor that will help in a speedy, uncomplicated delivery of the litter will likely reduce pig losses significantly.

The average time interval between pig births is about 15 minutes, with a normal range of zero to 30 minutes. Longer intervals are related to higher stillborn rates or reduced vigor and survival of pigs. It is possible, however, for a sow to begin farrowing, then stop due to exhaustion, and later finish farrowing normally. Total delivery time from first to last pig averages about 2½ hours. Farrowings that require 5 or more hours should definitely be considered a problem. Heritability or genetic origin of farrowing problems may be minimal, but sows with serious farrowing problems should be culled. Farrowing problems and slow farrowing are often related to over-fatness, severe constipation, heat and other physical stressors.

## Farrowing Assistance

Ideally, producers should select and manage sows for reduced farrowing problems so assistance is not necessary. In practice, however, assistance at farrowing is necessary in most swine operations if a high degree of piglet survival is expected. Assistance is needed to:

**Detect and act upon farrowing problems.** Dystocia (problem deliveries) occurs in less than 1 percent of farrowing, so detecting the occasional problem may

require experience. Try not to overreact or interfere unnecessarily with a normal farrowing. If the interval between pigs extends to 45 minutes or an hour, the attendant should be concerned enough to observe the sow closely.

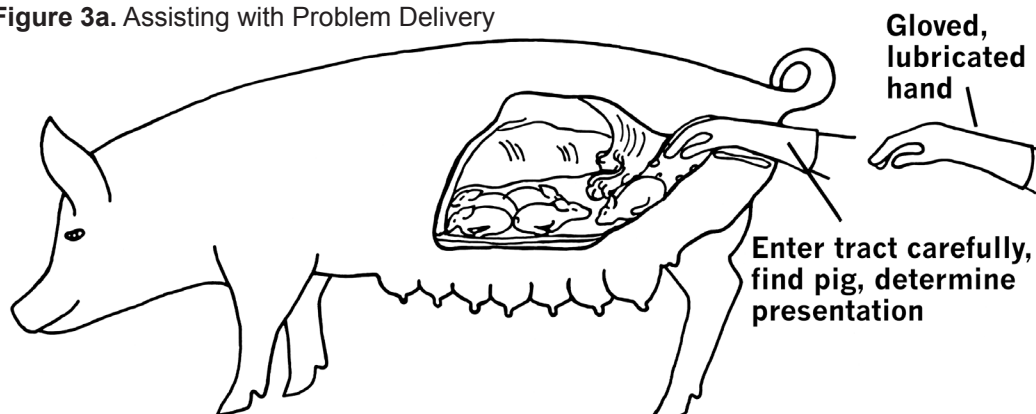
If the sow is having contractions without results, check the birth canal for possible blockage. With a well-lubricated, gloved hand, carefully enter and search the reproductive tract for improperly presented (tail first or broadside) or extremely large pigs. Make every effort to prevent damage to the sow. Clip your fingernails closely and use a non-irritating lubricant instead of common liquid soap. Clean the sow's external genitalia and enter the vulva with the fingers and thumb in a close, pointed formation. A slight rotating movement may assist entry. Some advantage may be gained by using the right hand if the sow is lying on her right side and vice versa (See Figure 3).

If a pig is in the tract, determine the orientation or position and apply pressure accordingly. Due to the limited space and slippery nature of the pig, it is often difficult to apply strong pressure for prolonged periods. Some pigs must be repositioned slightly to allow them to enter the birth canal. Time is important to prevent suffocation. Keep examinations of the sow's tract at a minimum to prevent edema and damage.

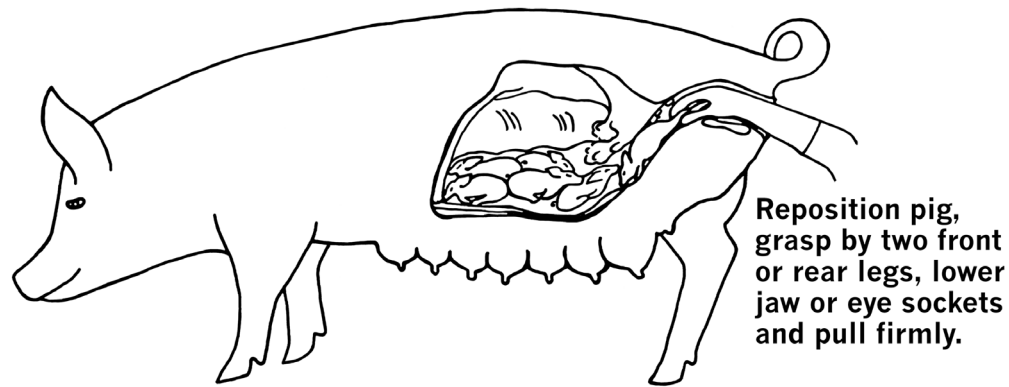
In many cases, an obstetrical tool may be necessary to pull large pigs. Special pig pullers or forceps can provide the advantage necessary to extract the pig. Avoid attaching tools to parts of the pig's body, which may be severely damaged. Use extreme care to prevent damage to the sow's tract.

If hardened feces in the sow's lower intestine crowd the pelvic opening, an enema may be necessary to gain space for easy passage of pigs in the adjacent tract. A full bladder may also interfere with normal delivery.

Figure 3a. Assisting with Problem Delivery



**Figure 3b.** Assisting with Problem Delivery



Occasionally, the uterus becomes blocked due to twisting or stretching, so pigs cannot reach the birth canal. If this problem is detected or suspected, make the sow stand up and walk around the farrowing house before allowing her to continue labor. If this does not yield positive results, get veterinary assistance.

If the sow stops straining and contracting before farrowing is completed, muscular exhaustion may be the problem. After a short rest, the sow may resume farrowing naturally or when aided by injected oxytocin. Keeping sows reasonably cool may help prevent exhaustion.

**Prevent losses of pigs at birth.** As much as 25 percent of the pigs that appear to be dead at birth (stillborns) may be saved with human assistance. First, clear the pig's mouth and nostrils with your fingers or a cloth. To clear fluids from and force air into the lungs, hold pigs by their rear legs and gently but forcefully sling them in a downward arc. A manual respirator or a small funnel may be used to cover the pig's nose and force in air. A vigorous rubbing or massaging action may be the stimulus needed to get the pig breathing on its own.

Assistance at farrowing also prevents some losses of pigs trapped in sections of the placenta, although most pigs alive at birth will escape the afterbirth surrounding them. The straddle-legged condition of newborn pigs may be due to slippery floors or poor footing and may be prevented with assistance at farrowing.

**Detect and prevent sow losses.** Loss of one or more pigs during farrowing is unfortunate, but loss of the sow is serious and places the survival of all her pigs in doubt. Sows may die during farrowing due to internal bleeding from hemorrhaging blood vessels in the uterus, although excessive bleeding may not be apparent before death. An extreme anemic appearance (pale skin, gums and eyelids) may warn of internal hemorrhages. Prevent sow mortality due to excessive heat by making certain that ventilation and/or cooling equipment is operating

correctly. Swab cool water along the jowl and udder of the sow, but never pour water on the head of an over-heated sow. A portable fan may be used to direct greater airflow to the over-heated sow.

### **Cleanup or Expulsion of the Placenta**

This final stage of the farrowing process generally passes without much notice. Failure to expel the placenta, however, causes severe complications, including infections, possible lactation failure, re-breeding problems and death of the sow.

Some placenta passed during delivery of the pigs is normal, but most will pass immediately after farrowing or within several hours. The placenta often slips through slatted floors into the pit area, making it difficult to tell if a sow has expelled or retained the placenta. Reduced appetite or elevated rectal temperatures may be the first clue of a retained placenta. If a sow is suspected of having a retained placenta, the producer should consult the local veterinarian.

## **Lactation and Post-Farrowing Problems**

### **Lactation**

Lactation or milk production is a function the sow must perform well to successfully rear the farrowed pigs. The sow's udder consists of mammary or milk-producing tissue (see Figure 2) and teats that serve as canals to give the pigs access to the milk. Ideally, these teats should be evenly spaced so the milk produced is divided equally among all teats. Front teats, however, are spaced more widely than hind teats. This possibly explains the greater milk production and faster growth of pigs suckling the front teats. Front teats are also usually presented more fully to the pigs when the sow lies down to be nursed.



The establishment of teat order occurs soon after birth, and there is a tendency for a pig to continue nursing a certain teat until weaned. Some fighting to establish teat order continues during the first week of life and the smaller, weaker pigs may be forced to nurse the less productive rear teats. This further reduces their chances for survival. Select replacement gilts with an ample number (12 to 14) of evenly spaced, functional teats. The presence of pin nipples, inverted nipples or nipples damaged by nipple necrosis will reduce the pigs' access to milk. Long, slender teats tend to provide a more secure nursing station, especially for small pigs.

Milk production or yield is affected by udder design as well as by nutrition, environmental temperature, genetics, mold toxins, diseases and other factors. Figure 4 illustrates a typical milk yield curve, with an increasing level up to approximately three weeks after farrowing and a decline thereafter.

Milk yield and composition are directly related to baby pig survival and growth. Weight of the litter at 21 days (the peak of lactation) is a reliable measure of the sow's milking ability when adjusted for the number of pigs nursed. Baby pigs can convert milk to body weight gain at an efficiency of approximately 4.5 pounds of milk to 1 pound of gain.

A peak daily milk yield of 15 pounds (about 2 to 2.5 gallons) is not unusual. Each milk "letdown" period lasts for 20 or 30 seconds and occurs at approximately hourly intervals. Nursing periods are slightly more frequent during the day (light periods) than at night (dark periods). Sows that are hungrily awaiting feeding may not allow pigs to nurse for extended periods of time. The length of the light period (photoperiod) may affect total milk production. Sows exposed to longer light periods (16 hours/day) may produce more milk than sows exposed to a more restricted light period (8 hours/day). Longer light periods with more milk production should result in greater pig survival and heavier weights.

The composition of sow's milk varies greatly due to stage of lactation, nutrition and genetics. Colostral milk contains a greater concentration of immunoglobulin proteins, increasing the percent of solids and total protein in the milk (Table 1). As lactation progresses, the fat and lactose (milk sugar) proportions increase and protein decreases.

	<b>Colostrum</b>	<b>Normal Milk</b>
Total Solids	30.0	20.0
Protein	17.0	5.4
Fat	7.5	8.3
Lactose	3.0	5.0
Ash	0.6	0.8

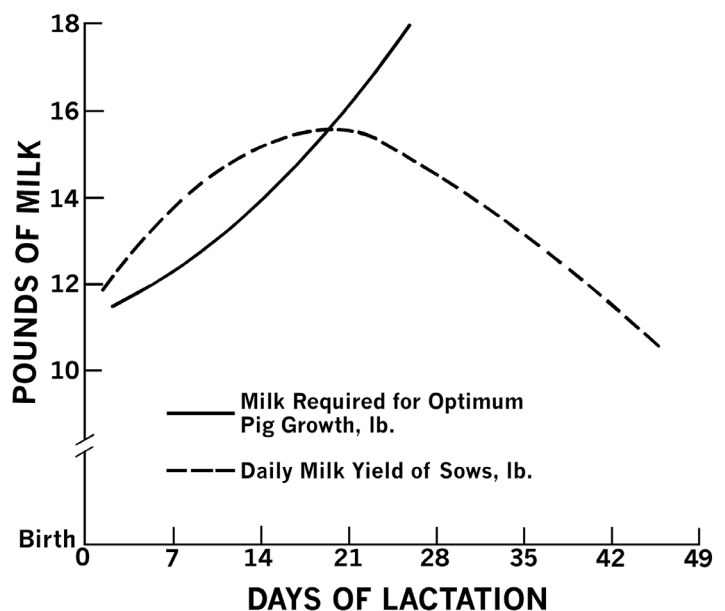
Complete lactation failure (agalactia) is not often found in sows. Lowered milk production (hypogalactia), however, is a common clinical sign or symptom caused by many different factors. Disease organisms, hormonal imbalances, poor nutrition, molds, toxins and temperature stresses frequently cause hypogalactia, although improper management is often the underlying cause.

Lowered milk production causes both direct pig losses due to starvation and indirect losses because undernourished pigs often scour or are killed when the sow lays on them.

Failure to produce adequate milk is found more frequently:

- in fat sows and gilts,
- during extremely hot temperatures,
- in sows fed diets without laxatives, and
- in concrete-floored farrowing houses using contaminated wood shavings for bedding.

**Figure 4. Milk Yield Curve**



Hypogalactia may or may not be accompanied by **mastitis** (hot, hardened or swollen udders) and **metritis** (infectious discharge from the vulva). Hypogalactia treatment varies somewhat with the suspected cause(s) of the problem, but it is always aimed at quickly re-establishing milk flow to prevent pig losses. The main objective is to reduce inflammation and excessive edema (fluid collection) in mammary tissues and to remove the milk from the teat cisterns. Treatments that cause additional stress on the sow may further reduce milk production and milk letdown. Since recognition of hypogalactia in the early stages is critical to pig survival, improving routine management practices is the only long-term solution. New methods of increasing herd immunity, however, have shown promise in reducing hypogalactia. Oral vaccines and re-feeding swine wastes to gestating sows have substantially solved lactation problems in some herds. Competent veterinary assistance is needed for these procedures.

## Post-Farrowing Problems

One problem encountered during or after farrowing involves savaging, or the attempts of the sows to bite or kill newborn pigs. This behavior problem may occur in both confinement- and pasture-farrowed sows, although the producer more readily observes confined sows. Occasionally a sow or gilt will bite and possibly kill first-born pigs when they come around her head searching for a teat to nurse. Savaging occurs more often in overly fat sows or gilts and in certain breeds and family lines. Savaging may be the result of nervous reaction to the pain of the farrowing process and possibly a result of the strange, new farrowing surroundings the sow or gilt is exposed to. Although tranquilizers may be needed for extreme cases, removal of newborn pigs to a warm box until farrowing is complete may solve the problem. If pigs are removed, occasional hand stimulation of the udder may help speed the completion of farrowing through oxytocin release. After farrowing, quietly return the litter to the sow and continue observation until the sow accepts nursing pigs. Savaging may account for some part of the early pig losses labeled as overlay by the sow. In severe cases, sows that continue to bite their pigs should be culled from the herd.

Lack of appetite, sickness, hypogalactia and constipation are frequently found at the same time in the farrowing house. It is difficult to establish cause and result relationships among these four factors, since each contributes to the severity of the others. Good management, however, can generally reduce the incidence of all four conditions.

Prevent constipation by using a laxative in the farrowing ration. Sows that fail to form a stool by two to three days after farrowing should receive a prescribed injectable or oral veterinary laxative, or the feed should be top-dressed with 2 tablespoons of epsom salts (magnesium sulfate) or potassium chloride once a day for one or two days.

Lack of appetite in the sow is a symptom of sickness and/or constipation. If the sow is sick, the rectal temperature will often be elevated from the normal 102 °F (38.9 °C) to 103 °F or 104 °F (39 °C or 40 °C) shortly after farrowing. If a temperature of more than 105 °F (41 °C) is observed, veterinary attention is advisable.

Improve appetite and feed intake by using more palatable rations, more frequent feedings or cooler environmental temperatures. Hypogalactia has been discussed separately but must be dealt with as part of interrelated post-farrowing problems.

Sow lameness is another post-farrowing problem caused by many different factors. Lameness generally causes poor lactation performance, reduced litter size and weight, and possibly culling of the affected sow. Rough flooring can damage foot pads or cause cuts and scrapes. Any of these injuries can be infection sites for lameness-causing bacteria. Slippery flooring causes injuries and may discourage sows from attempting to get up, eat and move about. “Downer sow” syndrome is caused by breaks in bones (especially in the pelvic area) weakened by poor mineral or vitamin nutrition. These breaks and lameness often occur after weaning but may also happen in the farrowing house. In rare cases, lameness or complete rear leg paralysis is caused by injuries received in delivering extremely large pigs. Although this lame condition may be short-term, sometimes the sow will not recover, or may not recover sufficiently to salvage any market value.

Observing the sow’s general activity level can indicate discomfort and the potential for poor performance. Excessively active sows may not allow adequate nursing and may be prone to stepping or laying on pigs. Mange, lice and the presence of stray voltage may contribute to excessive activity. Sows that rarely get up or eat and drink may be sick or lame and often do not produce adequate milk yields.

# General Management of the Sow and Gilt During Farrowing and Lactation

A workable farrowing house management plan must be developed for each swine operation. Due to differences in facilities, breeding programs, management abilities and disease conditions, a standard management plan will not work. Constant evaluation of new ideas, management techniques and new products and equipment is required to develop the best possible management plan. The key to making this plan work is scheduled farrowing through a well-organized production system.

The management plan in Table 2 summarizes recommended practices for good performance, health and comfort for the sow. These practices, along with good management of the litter, should result in increased litter size and weights at weaning as well as improved profitability.

<b>Table 2. Recommended Farrowing Management Plan*</b>	
<b>Time</b>	<b>Management Plan</b>
<b>Days after Breeding</b>	
100-109	Treat for external parasites (contact your county Extension office or local veterinarian for recommendations).  Deworm with broad-spectrum dewormer.
109-110	Move clean sow into farrowing crate, feed 4-6 lbs. of feed containing laxative.
112-116	Increase observation of sows, check for presence of milk and help, as needed, with farrowing.
<b>Days after Farrowing</b>	
1	Limit sow feed intake to 4-6 lbs.
1-2	Check udders for lactation failure and mastitis. Equalize litters by transferring pigs of the same age into smaller litters.
2-7	Gradually increase sow feed intake, up to 10-12 lbs., or more.  Check sows for appetite, rectal temperature, constipation and milk flow (observe nursing of pigs).  Treat for external parasites if needed.
<b>Weaning</b>	
	Reduce feed intake to 4-6 lbs a day, except for thin sows.  Treat for parasites (internal and external) as needed.
*The sow health-vaccination program must also fit into the management plan. Each producer should develop this program with veterinary assistance.	

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