

# **INTRODUCTION**

Welcome to the 2008 edition of PIC's *Fundamentals of Gilt and Sow Management*.

Based on scientific research and hands-on experience by PIC specialists, *Fundamentals of Gilt and Sow Management* is written for use by farm personnel, as well as managers, supervisors, production directors and herd veterinarians.

Although pig farms vary in design, layout and staffing, we believe this manual provides a solid foundation for all farms with PIC gilts and sows. The manual is organized in ten sections, representing the most accepted key drivers of optimum productivity. Every section has a review of the current best management practices. Many sections feature "PIC Tips," which serve as useful reminders and checklists for various tasks.

If you need product support, please contact your local PIC representative.

## **PIC USA RESOURCES**

**Juan Carlos Pinilla**, DVM, MS  
Technical Services  
[juancarlos.pinilla@pic.com](mailto:juancarlos.pinilla@pic.com)

**Jerome Geiger**, DVM, MS  
Health Assurance  
[jer.geiger@pic.com](mailto:jer.geiger@pic.com)

**Jose Piva**, DVM  
Technical Services  
[jose.piva@pic.com](mailto:jose.piva@pic.com)

**Rafael Kummer**, DVM, PhD  
Technical Services  
[rafael.kummer@pic.com](mailto:rafael.kummer@pic.com)

**Noel Williams**, MS, PhD  
Technical Services  
[noel.williams@pic.com](mailto:noel.williams@pic.com)

# **SOW FARMS BENCHMARKING – TARGETS**

Benchmark your operation against those systems well known as global industry leaders to establish realistic goals under commercial conditions. Knowing the benchmarking is possible to define strategies to achieve those goals in a reasonable time with the lowest possible cost.

Tables 1 and 2 summarize sow performance targets for the Camborough line, based on PIC research and field experience. These targets take into consideration advances in productivity, including feed, labor and utilization of facilities.

**Table 1: Key Indicators for Sow Units**

<b>Targets</b>	<b>Weaned Piglets</b>	<b>Weaned lbs</b>
Feed Usage ( <i>lbs of feed used to wean 1 piglet or 1 lb of piglet</i> )	<b>&lt; 80</b>	<b>&lt; 6</b>
Labor Utilization ( <i>piglets or lbs weaned/worker/yr</i> )	<b>&gt; 8,000</b>	<b>&gt; 110,000</b>
Farrowing Crate Utilization ( <i>weaned piglets or lb weaned per farrowing crate</i> )	<b>&gt;160</b>	<b>&gt; 2,200</b>
Sow Productivity ( <i>pigs per sow per year (PSY) or weaned lbs/s/y</i> )	<b>&gt; 27</b>	<b>&gt; 365</b>
Sow Lifetime Productivity ( <i>weaned piglets or lbs</i> )	<b>&gt; 55</b>	<b>&gt; 700</b>

**Table 2: Target Numbers for Sow-Retention Rates  
(figures from different moments in time)**

Gilts born		100				
Weaned	92%	92	100			
Going to selection	93%	86	93	100		
Selected	70%	60	65	70	100	
Breeding	95%	57	62	67	95	100
P1	91%	52	56	61	86	91
P2	89%	46	50	54	77	81
P3	88%	41	44	47	68	71
P4	87%	35	38	41	59	62
P5	85%	30	33	35	50	53
P6	80%	24	26	28	40	42
P7	80%	19	21	22	32	34

**Table 3** shows the most of the key performance indicators of reproductive success of a sow farm, current targets and the levels where an action plan to has to be implemented to make an improvement.

**Table 3: Sow Farm Achievement Targets**

<b>Key Performance Indicators</b>		<b>Targets</b>	<b>Suggested Intervention Level</b>
Litters/Sow/Year	>	<b>2.5</b>	< <b>2.3</b>
Farrowing Rate (%)	>	<b>88%</b>	< <b>83 %</b>
Avg. TB (piglets per farrowing)	>	<b>13.0</b>	< <b>12.0</b>
Stillborn Rate (%)	<	<b>5%</b>	> <b>5.5 %</b>
Mummified (%)	<	<b>3%</b>	> <b>3.5 %</b>
Avg. BA (piglets per farrowing)	>	<b>12.0</b>	< <b>11.0</b>
PWM (%)	<	<b>8%</b>	> <b>10 %</b>
Ratio of Weaned piglets/TB (%)	>	<b>85%</b>	< <b>80 %</b>
Avg. Weaned (piglets per farrowing)	>	<b>11.1</b>	< <b>10.5</b>
Avg. Piglet Weaning Weight (lbs)	>	<b>13.2</b>	< <b>12.0</b>
Pigs Weaned/Sow/Year	>	<b>27.6</b>	< <b>24</b>
Weaned Weight/Sow/Year (lbs)	>	<b>365</b>	< <b>290</b>
Annual Replacement Rate (%)	<b>approx.</b>	<b>50%</b>	< <b>40 %</b> , > <b>65 %</b>
Avg. Age at Removal (parity)	>	<b>5.0</b>	< <b>4.5</b>
Sow Lifetime Productivity (weaned piglets per lifetime)	>	<b>55</b>	< <b>47</b>
Avg. Sow Mortality (%)	<	<b>6%</b>	> <b>9 %</b>
Lactation Length (days)	>	<b>20</b>	< <b>18</b>

## **HEALTH STATUS**

The stocking of a new farm or the introduction of replacement animals, both represent a risk of introduction of diseases to the unit. Use the safest sources of replacements, isolate them, test them and acclimatize them before introduction to the farm.

## **ISOLATION**

The isolation facility should be all-in/all-out (AI/AO), preferably in a separate unit from the recipient herd. The biosecurity plan for the isolation unit should be the same as it is for the recipient herd.

### **PIC Tips:**

1. **Hold replacement gilts in isolation** for at least four weeks before introducing them to the sow unit.
2. **During isolation, monitor the gilts for clinical signs of disease** such as coughing, diarrhea and lethargy, which may warrant further diagnosis. Make daily observations and request post-mortem exams on all gilts that die.
3. **Ask your herd veterinarian to perform serological testing** to ensure there is a low epidemiological risk of introducing new pathogens to the farm. For instance, it's a good idea to request serologic testing for PRRSV three weeks after gilts arrive in isolation. Your veterinarian can provide additional testing recommendations based on your herd's history and the history of disease in your area.

## **ACCLIMATIZATION**

Your replacement gilts require a period of acclimatization after isolation. This lets them build immunity to pathogens in the recipient herd before joining the sows.

### **PIC Tips:**

4. **Implement acclimatization through a combination of natural exposure to pathogens and vaccination.** Natural exposure can be accomplished through nose-to-nose contact or by sharing a pen with culled females or nursery pigs. Feedback also can be used, but it requires orally inoculating replacement gilts with manure and/or serum and/or tissue homogenates from the recipient herd.
5. **Vaccinate replacement gilts against parvovirus, leptospirosis and erysipelas.** When acclimating "Isowean(R)" gilts, two doses of erysipelas vaccine should be administered about 8 and 10 weeks of age or 5 and 8 weeks post-weaning. A third dose at selection is advised. Before breeding, all gilts should receive the parvo, lepto and erysipelas vaccines *twice*, 3 weeks apart.

6. **Make sure the acclimatization process is well defined**, disciplined and supervised by a swine veterinarian because exposure can sometimes be difficult to achieve, or may be too excessive if not carefully planned.
7. **Give replacement gilts time to recover and build immunity after natural exposure and vaccination.** You don't want them to be shedding pathogens when they enter the recipient herd. Adequate recovery time varies based on specific health status, production flow and management of your acclimatization unit, but a minimum of 3 to 4 weeks is advised. **Acclimatization plan for PRRSV-negative replacements will depend on the PRRSV status of your recipient herd.** Replacement gilts entering PRRSV-positive herds must be exposed to the recipient herd's strain(s) and then have sufficient time for recovery. In some cases, the total process may require 4 to 6 months. Consult your veterinarian for details specific to your herd.
8. **Talk with your herd veterinarian about vaccinating for other diseases.** Although the basic vaccination program should include vaccines that protect against parvovirus, leptospirosis and erysipelas, your veterinarian may recommend additional vaccines to protect against diseases such as Ileitis or HPS. Vaccination against *Mycoplasma hyopneumoniae* (*Myco* or *M. hyo*) *should also be considered, particularly if Myco negative replacements are entering a Myco positive herd.*
9. **The final stage of acclimatization should be the last 3 weeks before gilts are bred.** During this time, gilts should be inside the breeding barn.

# HIGH STANDARDS IN GILT MANAGEMENT

Gilt development must provide gilts with minimum 300 lbs and 30 weeks of age, thoroughly selected (70-80% selection rate), acclimatized (do not mate gilts before 3 weeks from the last vaccine) and having at least one heat-no service. To achieve proper replacement rates, avoiding retention of marginal sows, the multiplication herd should represent 10-12% of the total sow inventory. Further, proper management near the time of breeding should not restrict ovulation. Three weeks prior to first breeding. Move the replacements to individual stalls. The move may impact feed intake – feed them at least twice a daily (3-4 pounds per feeding) up to breeding.

## GILT REQUIREMENTS

The gilt pool presents opportunities for improvements both short-term and long-term. A well-managed, carefully selected gilt with good immunity will perform well at P1 and continue to perform well throughout her lifetime on the farm. If gilts are not selected and managed well during P1, they may perform poorly during subsequent parities. Remember, you want an average removal age  $\geq$ P5.

### PIC Tips:

10. **Produce enough eligible gilts.** The objective of gilt management is to produce enough eligible gilts to reach your breeding target and enable those gilts to stay on the farm for at least six farrowings. To be considered eligible, gilts must have all of the characteristics shown in **Table 4**.

**Table 4: Conditions to Consider a Gilt as Eligible for Breeding**

Weight ( <i>lbs of live weight</i> )	300
Age ( <i>weeks</i> )	30
Heat-no-service ( <i>number of services before breeding</i> )	1 recorded
Properly selected ( <i>selection rate</i> )	70% to 80 %
Functional teats ( <i>minimum</i> )	12
Time since the last vaccine ( <i>weeks</i> )	3

11. **Provide the proper multiplication size.** To have the required number of eligible gilts, you must have the proper multiplication size. This is usually around 10% to 12% of the commercial sow herd inventory and will let you achieve an annual replacement rate of 40% to 60%. Compromising on gilt-selection standards will result in higher sow culling rates and sow death loss.

12. **Watch their weight.** Weight is the most important single indicator of eligibility. It reflects growth and body maturity, but should be considered along with the other targets. The recommended live weight range at first service is 300 to 340 pounds (136 to 154 kg). Both lower and excessive weight may compromise longevity and performance of gilts during their productive life. The body weight is correlated with age and physiologic age: the minimum body weight (300+ pounds or 136+ kg) is associated with more than 30 weeks of age and more than one “heat-no service”.

## GENERAL GILT MANAGEMENT

To have a clear vision of the general management, the **Table 5** contains the main recommendations to manage gilts up to 20 weeks of age and after that.

**Table 5: General Recommendations**

Gilt Age	Up to 20 weeks of age	From 20 weeks of age
Housing	House in pens during the nursery, grower, developer and finisher stages.	House in pens until the final 3 weeks before the first service, at which time they should be placed in individual crates.
Flooring	Slatted openings are 1 inch (2.5 cm) or less. The slat surface should be flat with a straight edge <sup>1</sup> . If solid floors are used, they should be sloping to avoid manure and liquid build-up.	Slatted openings are 1 inch (2.5 cm) or less. The slat surface should be flat with a straight edge <sup>1</sup> . If solid floors are used, they should be sloping to avoid manure and liquid build-up
Space	Up to 45 lbs: 0.5 ft <sup>2</sup> (or up to 20 kgs: 0.35 m <sup>2</sup> ). Up to 240 lbs: 7.5 ft <sup>2</sup> up (or 110 kgs: 0.69 m <sup>2</sup> ).	Provide a minimum of 12 ft <sup>2</sup> (1.1 m <sup>2</sup> ) per gilt.
Water	One nipple drinker/15 gilts or one bowl/20 gilts to ensure adequate water access. Provide fresh and clean water.	One nipple drinker/15 gilts or one bowl/20 gilts to ensure adequate water access. Provide fresh and clean water.
Humidity <sup>2</sup>	< 70%	< 70%
Environmental temperature	The thermo-neutral zone for gilts is 64°F to 74°F (17°C to 22°C). Make sure the ventilation works well <sup>3</sup> .	The thermo-neutral zone for gilts is 64°F to 74°F (17°C to 22°C). Make sure the ventilation works well <sup>3</sup> .
Feeding/Nutrition	Feed <i>ad libitum</i> (free feed). Provide gilts with nutrition that optimizes growth. Ideally, gilts should gain 1.40 to 1.45 lbs (0.6 to 0.65 kg) per day up to this age.	Feed gilts <i>ad libitum</i> (free choice). In general, the recommendation is to use dry feed. Nutritional recommendations for gilt development are designed to meet nutrient demands for adequate protein growth and maximize the productive life of the gilt; they are not designed to maximize average daily gain (ADG), in contrast to a commercial feeding program. Provide feeders with a safe design and provide enough feeders: unsafe feeders may limit feed intake or

		<p>cause injuries. There should be no more than 12 gilts per feeder space. Move replacement gilts to individual stalls 3 weeks before the first service to overcome the effect of feed disruption produced by the move. After placing them in the stall, feed them at least 3 to 4 lbs (1.36 to 1.81 kg) twice daily. Any type of feed restriction or feed supply disruption may result in gastric ulcers. A restriction or disruption during the last 3 weeks before the breeding can be detrimental to the ovulation rate. The minimum time to move gilts to crates before breeding is two weeks. Provide levels of vitamins and trace mineral levels that are higher than commercial recommendations to prepare the gilt for reproduction.</p>
Boar contact	No contact.	Daily boar exposure starts from 22-25 weeks of age
Light	Not available	12 to 16 hours of light per day, with an intensity of 220 to 250 lux.

1. Slats with jagged edges should be replaced since they cause foot injuries leading to reduced selection rates and fewer litters per sow lifetime.
2. Avoid water and cooling systems that result in wet floor surfaces, because wet, slippery floors lead to lameness and musculoskeletal damage.
3. For tips about ventilation, check [www.extension.iastate.edu/Publications/PM1780.pdf](http://www.extension.iastate.edu/Publications/PM1780.pdf).

## BOAR EXPOSURE

Daily boar exposure is the best way to stimulate puberty in a group of gilts. Data indicates that gilts showing an early first estrus will have larger litters and increased longevity.

### PIC Tips:

1. **Initiate boar exposure between 22 and 25 weeks of age.** Gilts younger than 22 weeks will be refractory to the boar stimulus. Within a system, the most appropriate age is a function of the facilities, flow and labor availability. Some evidence suggests starting boar exposure at 25 weeks of age will accomplish weight, age and HNS targets with effective use of labor. Starting exposure at 25 weeks, >80% of the gilts will have one HNS after 3 weeks and >95% of gilts will have at least one HNS after 6 weeks.
2. **Make sure the teaser boar is older than 12 months of age** with a high libido, indicated by salivation when working as a teaser and intense boar odor. If the teaser boar is from a Meishan cross, he can be considered an “adult” at 6 months. The teaser boar should not work more than one continuous hour in heat detection because he will lose interest and effectiveness. In other words, each teaser boar should not be exposed to more than 80 to 100 gilts daily.
3. **Put gilts in the mood.** Inside the pen, boar exposure should last 10-15 minutes per pen, so plan ahead to get the job done. Effectively, pheromones in the saliva and nose-

to-nose contact are the most important mechanisms for stimulating estrus. Allow one hour of exposure if the boar is left outside the gilt pen for nose-to-nose contact.

4. **Mark each in-heat gilt** and then record each as HNS on the group identification card.
5. **Mark gilts that show swollen vulva but are not in solid heat**; record them on the card as “possible heat” and focus on those gilts in the next exposure episode. After 20-22 weeks of age, some gilts will exhibit estrus after mixing or transport, but they should still be exposed to mature boars.
6. **Watch for these signs** of intense estrus in gilts:
  - Standing heat due to back pressure.
  - Red and swollen vulva.
  - The gilt seeks contact with the boar, standing rigid when the boar or other gilts mount her or when the worker applies back pressure.
  - Nosing flanks of other gilts or the boar.
7. **Conduct boar exposure carefully** to avoid accidental mating as well as injuries to workers and gilts.
8. **Design or modify gilt flow** so that gilts are transferred from group pens to individual crates at least 2 weeks before the actual first service. This minimizes the impact of feed disruption on the ovulation rate and litter size. When in crates, feed gilts 3 to 4 lbs (1.3 to 1.8 kg) twice daily and make sure there is fresh and clean water.
9. **Additional Considerations:**
  - On successful farms, each day **3 to 4% of gilts  $\geq$ 25 weeks will show estrus.**
  - Considering the gilt population from  $\geq$ 25 weeks of age, the gilt pool represents 5-12 % of the total sow inventory.
  - When stocking a new population, **plan to have 3 weeks (ideally 4 weeks) of gilts at the beginning of the breeding project in order to meet the breeding target.** This will enable you to accommodate for normal variations in estrus cycle among the gilt population. Example: if the breeding target is 140 matings per week, plan to have 420 + gilts achieving the weight/age eligible to be bred in the first week of breeding.

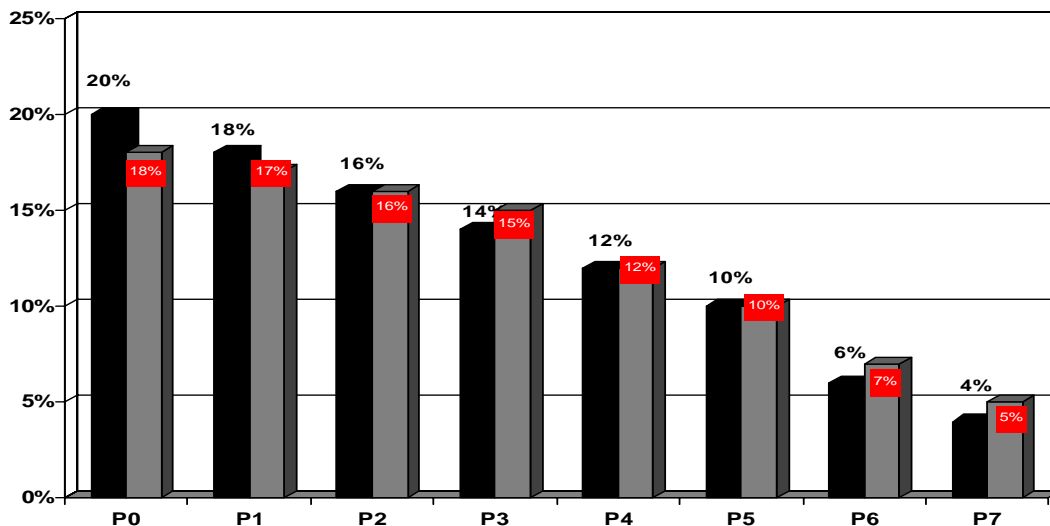
# BREEDING GROUPS STRUCTURE

To consistently achieve your breeding target and maintain high production levels, a periodic introduction of gilts is a must. The replacement rate target should be based on the annual culling rate and annual sow mortality to keep the sow herd in the productive ages. This stabilizes the parity structure by keeping the majority of the sow inventory in the most productive age (P2 to P5). The annual replacement rate should be 30-60% per year.

Figure 1 represents the typical composition of the breeding groups in a farm with 55-60% of annual replacement rate (black columns)

**Figure 1: Targeted Breeding Group Structure**

55-60% replacement rate: black bars – Avg age: 2.9-3.0  
45-50% replacement rate: red bars – Avg age: 3.2 – 3.3



## CULLING POLICIES

Every time the breeding staff or manager retains a marginal sow, there is a risk she will reduce the farrowing rate and litter size. Clearly defined and implemented culling policies are important for that reason

Reasons for culling include:

- Legs/feet issues that make sows unable to maintain pregnancy.
- Gilts with no recorded heat after 6 weeks of boar exposure.

- Old age (P6 and older).
- Second return to heat (first return in old parity sows).
- Late return to heat after weaning (> 5 weeks).
- Abortion.
- Vaginal discharge.
- NIP (not-in-pig) in old sows.
- Old sows weaned early.
- Low average of born alive (BA) piglets after P3.
- Any other condition that makes the sow unable to conceive and/or maintain pregnancy.
- Low number of functional teats and/or severe mastitis.
- Poor body condition.

## **HEAT DETECTION**

**Proper heat detection should identify all estrus females (gilts, weaned sows and recycles) early in their estrus. This will ensure proper timing of mating and minimize non-productive days.**

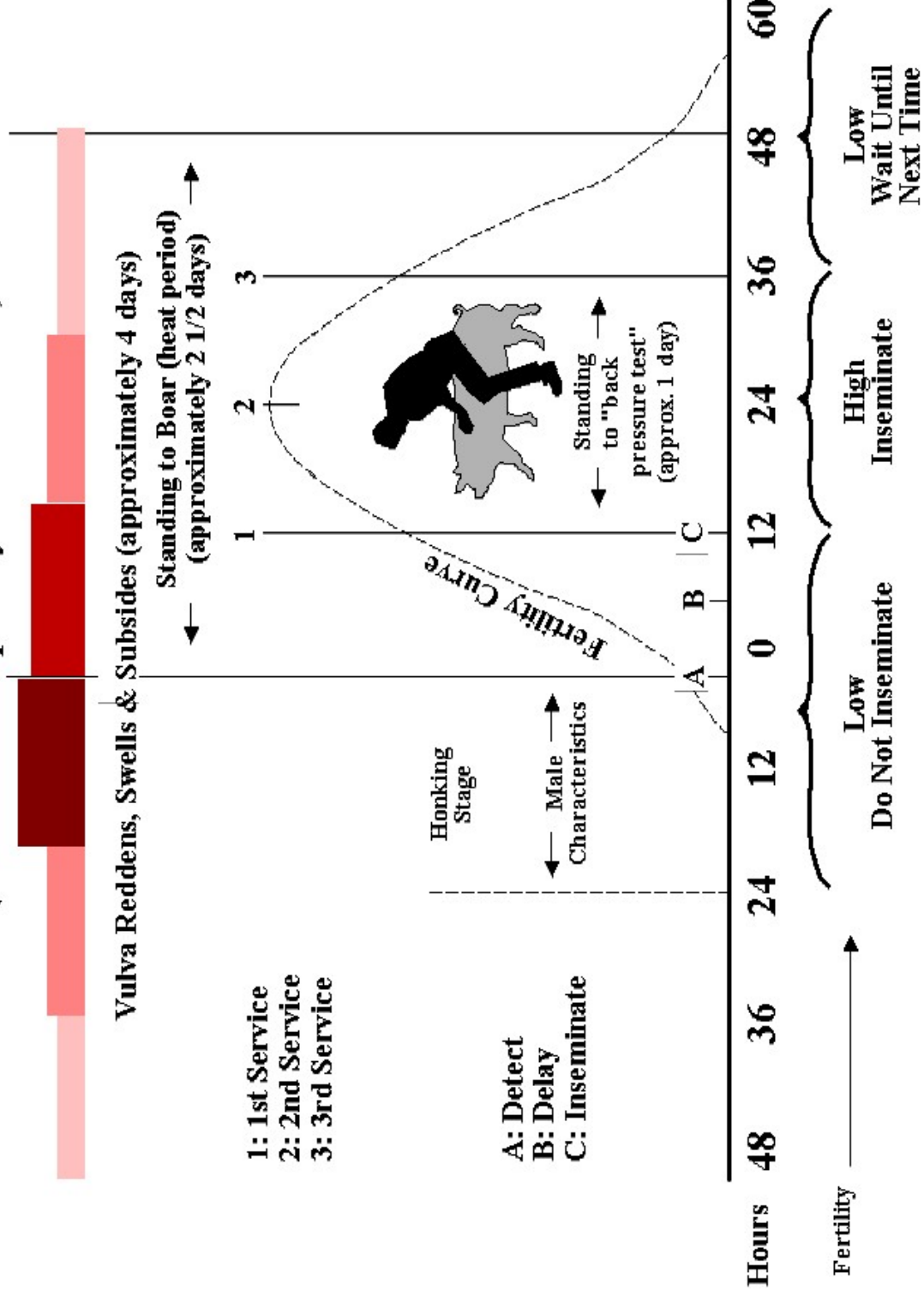
### **PIC Tips:**

10. In order of priority, heat checks start with gilts first because they have shorter estrus. The second group is weaned sows and the third one is the critical areas (gestating sows around 21 days post-service).
11. **Make your mark.** Successful heat detection requires a boar in the alley and a worker with a marker behind the females. The worker applies backpressure. If the female responds by standing immobile (or solid heat) she is ready to be inseminated. Mark her according to the farm protocol, then go on to the next female. Crate broke gilts 2-3 weeks before the actual breeding. Weaned sows can be left in the same crate to be bred later or they can be moved to a breeding area.
12. **If the signs of heat are not pronounced, rub the rear part of the udder and vulva** and look for the presence of fluid in the vulva. Repeat this procedure once, if needed. If there is no standing reflex, the female is not in heat.
13. **Use well-trained employees** to check or heat.
14. **Do not overlook the value of a boar in front of the females** to make a definite diagnosis.
15. **Know the signs of estrus:**
  - Stands rigid in response to back pressure and/or to the boar's presence.
  - Erect ears in Large White-like females.
  - May flick the tail up and down.
  - Swollen and red vulva.
  - Clear fluid discharge from the vulva.
  - Biting bars on crates.
16. **Heat detection timing and frequency is a matter of labor availability and qualification.** Once you choose a method to heat check it has to be consistently implemented and make sure the breeding timing is defined taking that in consideration (see below the Pointers for Successful Heat Detection. A Spanish version is also included).

- Once a day, in the morning. This is the most common system utilized in North American farms.
- Twice a day, one in the morning and a second one in the afternoon. It requires more labor and does not necessarily correlate with better results.

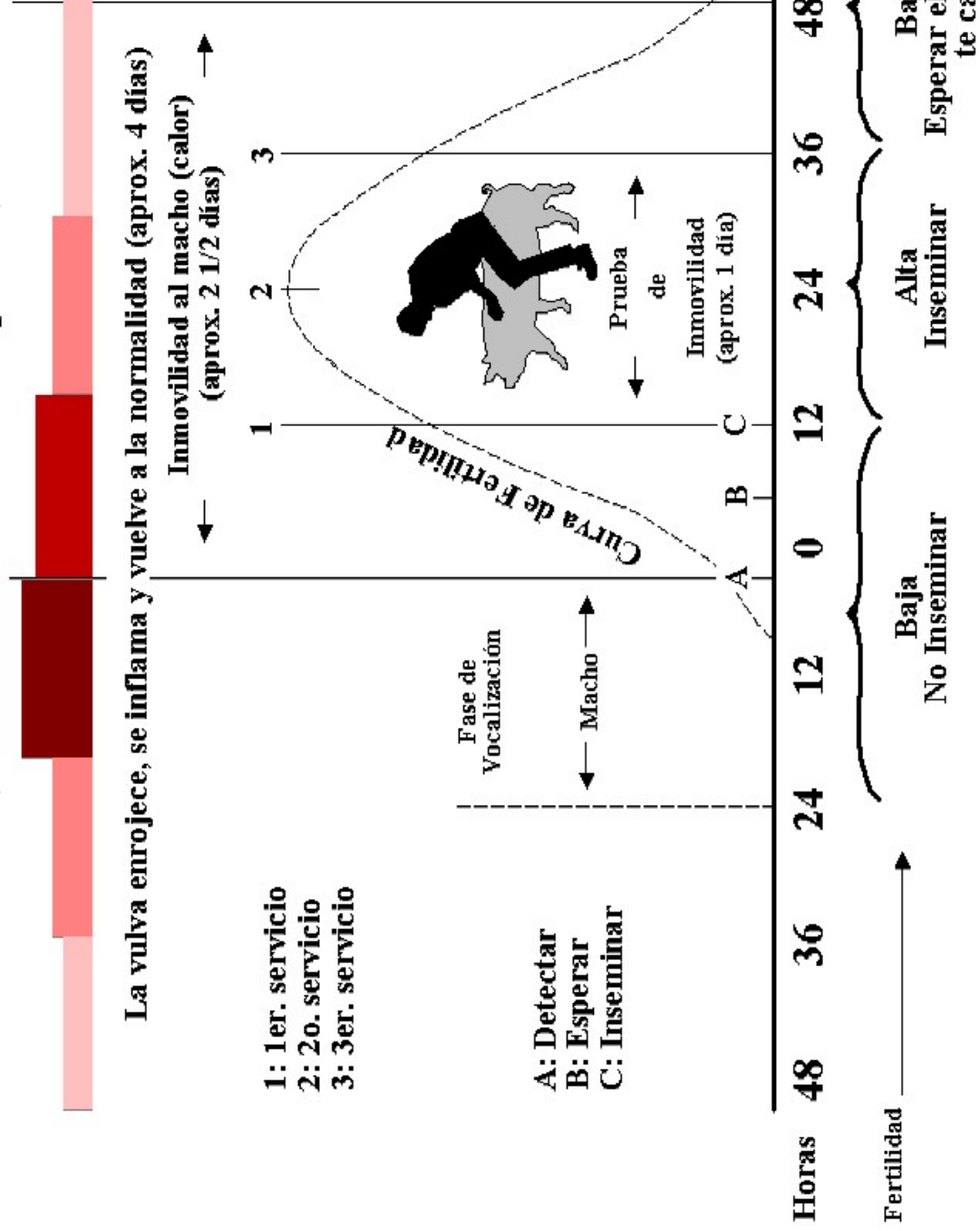
# Pointers for Successful Heat Detection

*(based on twice per day heat detection)*



# Claves para una Detección de Calores Exitosa

(basado en doble detección por día)



## **BREEDING**

Proper mating technique places high quality semen in the right location at the right time to produce  $\geq 90\%$  farrowing rate and  $\geq 13$  total piglets born. This is directly related to the percentage of multiple matings, which in turn are function of the heat checking protocol. The target for multiple matings and average number of services per sow in estrus is  $>90\%$  and 2.0-2.3 services, respectively.

## **SEMEN CARE**

### **PIC Tips:**

17. High temperatures are more detrimental to semen viability than lower temperatures so **keep the semen doses between 59°F and 64°F (15°C to 18°C)**.
18. **Make sure the refrigerator is working well** by using a high/low thermometer to evaluate the actual internal temperature. Do an annual service, checking the refrigerator before summer to prevent problems during the hot weather.
19. **Keep the refrigerator clean.**
20. **Do not open the refrigerator door unnecessarily.**
21. **Leave some room inside the refrigerator** to keep the air circulating.
22. The fresher the semen, the better. **Avoid the use of semen older than 4 days from the collection date, regardless** of the motility rate. As the semen dose gets older, the number of viable sperm cells declines. Even if a long term semen extender is used, fertility could be reduced due to lower activity of acrosin, an enzyme in sperm involved in penetration of the egg.
23. **Rotate the semen twice daily**; keep a written record of the high and low temperature.
24. **Do not put more doses in one cooler than the number required to inseminate during the next 60 minutes.**

## **PREPARATION**

### **PIC Tips:**

25. **Leave marked females alone** for 1-2 hours before breeding. This gives them time to calm down and overcome the transitory refractory period.
26. **Return with one or two boars in tandem** to stimulate the females during insemination. Bring the appropriate number of semen doses in a properly conditioned cooler, as well as catheters.
27. **Protect semen doses from light** and, as mentioned earlier, put no more than the doses required in the next 60 minutes in one container. If you need more than that, use more than one cooler. Place refrigerated gel packs underneath and on top of the semen doses and after removing doses, close the lid on the cooler.

## SERVICE

### PIC Tips:

28. **Do not inseminate a gilt/sow unless** she is in solid heat.
29. **Ensure proper hygiene** before, during and after insemination is essential for good results.
  - **Wipe the vulva lips** with a clean disposable paper towel to remove any dirt. Use one towel per sow. Wiping can also act as a stimulus to the female.
  - **Do not use water or disinfectant** to wash the sow before the insemination because it could carry skin contamination into the genital tract and also can kill sperm cells.
  - **Use a new, disposable catheter for each mating.** Discard the catheter if it looks dirty and/or if it accidentally touches the floor, the sow or the crate.
30. **Apply obstetric non-spermicidal gel to the catheter tip** (if your SOP calls for it), but take care not to get the gel into the opening of the catheter.
31. **Gently separate the vulva lips** using the thumb and forefinger and insert the catheter in an upward, 45° angle into the vagina. Look for the lock into the cervix.
32. **When using a catheter with spiral tip, rotate the catheter counterclockwise** until a firm resistance is felt and the rod springs back. This indicates that the lock has been achieved. A plug catheter is different and does not need to be inserted by rotation; just push it firmly towards the cervix, then pull back gently. If a plug catheter is placed correctly, you will feel resistance when you pull back. If it is not placed correctly, there is no resistance and you need to try again.

33. **Remove the semen dose from the cooler.** Re-suspend the dose by rotating the bottle/tube/bag with your hand. Open the semen container and connect it to the catheter. Allow the semen to flow from the container.
34. **Maximize uterine contractions during insemination. Keep the boar(s) in front of females** using a gate, door, tether, mobile cage or Boar Bot. One boar should cover a maximum of 5 crates. Also, stimulate the female with back pressure, rubbing the shoulders, flanks and underline. “Be the boar” and mimic the process of natural service.
- **Do not try to accelerate insemination** by squeezing the bottle/tube/bag and do not perforate the semen container.
  - **Bend the catheter to prevent the backflow** of semen after insemination and leave it in the sow for a couple minutes to encourage the transportation of semen through uterine contractions. **Continue to physically stimulate** the female. The female’s own uterine contractions are the main method of conveying sperm to the point of conception. (The boar should be present during this entire process and beyond.)
35. **If the sow lies down during insemination:**
- **Continue with the procedure** as she lies down.
  - **Do not slap her to get her up;** it will inhibit uterine contractions.

## TIMING OF INSEMINATION

Sperm cells live 16 to 24 hours in the sow’s genital tract and need 6 to 8 hours inside the female for a period of “capacitation”. This is the final sperm maturation stage. Capacitacion should be complete prior to ovulation so sperm cells are “ready and waiting” when the eggs are released. Ovulation occurs during the second half of the estrus, but in the field, it is not possible to predict the exact time of ovulation. Multiple matings are used to ensure viable semen is deposited 8 to 24 hours prior the ovulation.

### PIC Tips:

36. **Pick the best time and frequency for insemination.** Choose the simplest and most effective schedule based on the qualifications of your personnel, your personnel turnover and staffing. It is important to repeat inseminations as long as the female is in standing heat. Use a minimum of two and no more than three inseminations.
37. **If heat detection is conducted once daily**
- If you detect females in **heat in the morning, service them that same morning** and then every morning thereafter as long as they are in solid heat. (AM/AM/am). Do not wait until the next morning after detection to initiate

service. This timing is simple to explain, simple to implement, labor-efficient and able to produce excellent results.

- If you conduct **heat detection in the afternoon and detect females in heat, service these females that afternoon** and every afternoon thereafter as long as they are in solid heat (PM/PM/pm). Do not wait until the next afternoon to initiate service.

### **38. If heat detection is conducted twice daily**

- **Females in heat during the morning (when expression is better) can be inseminated during the afternoon**, and then every 24 hours as long as they are in standing heat.
- **Sows detected in the afternoon can be serviced the next morning** and then inseminated every 24 hours as long as they are in standing heat.

39. Generally speaking, gilts and returns can be inseminated following the same schedule used for adults, but some systems use a different schedule: AM/PM/AM.

## **GESTATION, FEED USAGE AND BODY CONDITION**

The management during gestation involves basically pregnancy checks and proper use of feed to controlled body weight gain. Excessive feed offered to the gestating sow has been one of the most detrimental mistakes in the pig industry globally. It is associated with high cost of production of the weaned piglet, extensive catabolism in lactation and sow mortality. An average of 1,500 pounds of gestation diet per sow per year is consistent with high levels of production and good longevity. Gilts should gain no more than 80 pounds during their first gestation.

### **EARLY GESTATION**

Early gestation is defined as the first 5 weeks after breeding or the time from breeding to the first pregnancy check. Too often, the importance of this period is not fully appreciated, so sows are moved at critical times or they are handled with less care. This results in decreased litter size and/or lighter birth weights.

After insemination, the embryos are free-floating for 12-14 days before implantation to the uterine wall. Any interference, stress or aggressive management during the first two weeks of gestation may result in a regular return to heat (18 to 23 days after breeding) if there are less than 5 embryos when attachment begins. Additionally, sows in poor body condition needs to receive extra feed to during this time.

#### **PIC Tips:**

40. **Do not move gestating females** from day 7 to day 28 post-breeding.
41. **Do not use electric prods on gestating females** at any time or under any circumstance.
42. **If a move is necessary, make sure it is within 3 to 4 days** of last service or after 5 weeks of gestation.
43. **During hot summer months, make the move early in the day** to avoid heat stress.
44. **Do not vaccinate females** during the first 3 weeks of gestation.
45. **Target for body condition in early gestation is to have >85% of the females in proper body condition** (condition score 2.5 to 3.0) by week 5 of gestation (Picture 1).
  - **Avoid overfeeding.** Overfeeding young females during the first 3 days after insemination can reduce the embryo-survivability rate by reducing the progesterone level in blood. The general recommendation for feeding pregnant gilts is to offer them only 4.0 to 4.5 lbs (1.81 to 2.04 kg)/day up to

the first body condition evaluation and feed box adjustment (typically week 4 or 5 of gestation).

- **Adult sows have to be fed according to their body condition.** Thin or skinny sows should receive the maximum amount of feed recommended, typically 6 or 7 pounds per day. The goal is to have them fully recovered by week 4 or 5 of gestation.

### Picture 1: Body Condition Score

Optimum range: 2.5 to 3.0



## FEEDING GUIDELINES & BODY CONDITION

### PIC Tips:

46. **Body conditioning should be started the day after the last service, by adjusting the feed drops. Do not delay this management.**
47. In general, **for diets based in corn/soybean and 1,450 kcal/lb of metabolic energy, use the following amounts:**
- 4.5 lbs (about 2 kg) for fat sows with a body condition of  $\geq 3.5$  and gilts.
  - 5.0 lbs (2.2 kg) for normal sows
  - 6.0 lbs (2.7 kg) for thin sows with a body condition  $\leq 2.5$
48. At farms that manage body condition well, gestation diet usage is about 1,500 lbs (680 kg) per sow per year, assuming that a sow will eat the gestation diet as long as she is not in the farrowing house (**Table 5**)

**Table 6: Annual Feed Usage per Sow (lbs/sow/year)**

Lactation length (days)	14	16	18	20	22
Total days in Farrowing	16	18	20	22	24
Annual Days in Lactation Diet	40	45	50	55	60
Avg Feed Intake (lbs/day)	9	10	11	12	13
<b>Annual Lactation Diet Usage (lbs/year)</b>	<b>360</b>	<b>450</b>	<b>550</b>	<b>660</b>	<b>780</b>
Annual Days in Gestation	325	320	315	310	305
<b>Annual Gestation Diet Usage (lbs/year)</b>	<b>1,560</b>	<b>1,536</b>	<b>1,512</b>	<b>1,488</b>	<b>1,464</b>
<b>Total Annual Feed Usage (lbs/sow/year)</b>	<b>1,920</b>	<b>1,986</b>	<b>2,062</b>	<b>2,148</b>	<b>2,244</b>
Days before due date when farrowings room are loaded up	2				
LSY	2.5				
Avg Daily Gestation Usage (lbs/day)	4.8				

Feed usage in boars and replacement gilts are not included in the calculations.

49. During their first pregnancy (P0), gilts should gain no more than 80 to 100 lbs (36 to 45 kg). In general, they should receive ½ lb of feed less per day than normal adult gestating sows.
50. P0 females should weigh about 400 lbs (180 kg) when they farrow. During subsequent gestations, weight gain should be limited to 45-50 lbs (20 to 25 kg) per gestation.

51. Limiting gestational weight gain helps control the stillborn rate and also prevents excessive weight loss in lactation (more than 9-10% of the initial body weight).
52. Bump up the feed during the last two weeks of gestation just in sows in normal body condition: 1 or maximum 2 pounds per day over the base. Do not do that in fat sows.

## REPRODUCTIVE MANAGERMENTS IN GESTATION

### PIC Tips:

53. Basically, the **objective of the reproductive management in gestation is to quickly identify females that are not gestating.**
54. **Table 7** shows a basic scheme of pregnancy checks but you can use ultrasound devices for pregnancy testing as early as day 19-24 and/or conduct a second check with a boar at week 6 of gestation.

**Table 7: Pregnancy Checking**

Week of Gestation	Range of Days	Method of Choice			Reasons
		Boar	Ultrasound	Visual	
3	17 to 25	Yes			Regular returns
5	30 to 40		Yes		Regular returns not previously detected Irregular returns Early abortions
8 to 10	56 to 77			Yes	Mid-term abortions Regular returns not previously detected Irregular returns Not-in-pig sows

## **FARROWING MANAGEMENT**

The target is  $\leq 8\%$  of stillborns and mummified piglets to wean 11.0 piglets per farrowing (equals to 85 % of the total born) of 13.0+ pounds average per weaned piglet.

Make sure the farrowing induction is in place to have two thirds of the farrowings when the staff in the farm to assist the sows when needed. Challenge the P1 female with 12 strong piglets to properly develop all mammary glands. Feed all the sows ad libitum since day 3-4 after farrowing.

### **PRE-FARROWING**

#### **PIC Tips:**

55. Use all in-all out in farrowing rooms.
56. Clean and disinfect rooms between each use. Allow sufficient time for disinfectants to work and dry.
57. Wash and disinfect mats carefully. If you have had scours on your farm, leave the mats overnight in a bleach solution.
58. Make sure all fans, heat lamps, nipple drinkers and feeders are functioning well before the restocking.
59. Sows before farrowing should receive 3 lbs (1.3 kg) of feed twice daily, once in the morning and again in the evening.

### **FARROWING INDUCTION**

#### **PIC Tips:**

60. In general do not induce:
  - **When the farrowing process is already started** (check sow behavior, milk ejection and contractions).
  - **Before 115 days of gestation.** Induction results in lower birth weight, higher pre-weaning mortality and lower weaning weight compared to non-induced piglets.
  - **When there will not be people to assist sows and litters.**

61. Induction has to be seen as a tool to increase the percentage of assisted farrowings. The target is to have two-thirds of sows induced farrowing during the working hours.

## **FARROWING ASSISTANCE**

### **PIC Tips:**

62. **Monitor** older parity (P5 and older), lame, and over-conditioned sows every 20 minutes. Young and normal sows should be monitored every 40 minutes.
63. **Scrape floor** before performing any manipulation and sleeving.
64. **Wear a lubricated plastic glove.**
65. **Introduce hands in a cone-shape.**
66. **Be patient.** Sometimes, a piglet is close to being expelled and there is no need to reach deep into the genital tract. If there is no piglet low in the genital tract, wait 10 to 20 seconds to stimulate a contraction, which will sometimes expulse a piglet. If nothing happens, proceed with sleeving.
67. **Limit the use of oxytocin to sows that really need it** to support uterine contractions. The drug can be properly used in exhausted sows, after eliminating the possibility that a piglet is blocking the birth canal. In general, it is unlikely you will need to use oxytocin in sows P5 and younger.
68. **When oxytocin is required**, limit its use to no more than 2 injections per farrowing, at least 2 hours apart and no more than 10 IU each injection.
69. **Oxytocin injections are much safer** when applied after the first half of the litter is born (thus, not before the sixth piglet is born).

## **NEWBORN PIGLET MANAGEMENT**

The micro-environment under the heat lap or on the heat pad should be 90 to 95°F (32°C to 35°C). Piglet behavior should indicate that they are comfortable lying away from their dam in the micro-environment but they should not be in a pile.

### **PIC Tips:**

- **Dry off piglets as soon as they are born** using cloth, paper towels, drying powder, a heated box or some combination. This will minimize the occurrence of lethargic piglets.
- **Implement management strategies to ensure an appropriate colostrum intake** and nursing.

- **Split-nursing.**
  - To initiate split-nursing, split the litter into two halves, put the heavier ones in a heated box and leave the teats available for the lighter half.
  - Keep the two halves separated for at least 2 hours and then put all the piglets with their dam.
- **Create “light litters.”**
  - As soon as all the piglets get colostrum and before the social order is established, create “light litters.” This means that **light litters should be created in the first 24 hours of piglet’s life.**
  - **Put together 12 to 16 lightweight piglets on one P2 or P3 sow.** Do not put them on a young female — unless you have a start-up farm or a parity segregation system using just P1.
  - Determine which sows should nurse light litters by counting and recording on the ID card the number of functional teats.
- **Optimize sow teats.**
  - For the remainder of litters, **load sows with no fewer piglets than the number of functional teats they have.**
  - Depending on the litter size of the farm, it may be useful to put the fall-behind piglets together at about day 3 to 5 after farrowing.
  - Be prepared to work with 5% of fall-behinds at that time.

## FEEDING MANAGEMENT IN LACTATING SOWS

Depressed feed intake will often be the first sign of a problem. Some of the most common issues related to that are:

- ✚ Illness in sow or litter.
- ✚ Room temperature (macro-environment) is too warm.
- ✚ Fresh water is not available.
- ✚ Feed inaccessible or not palatable (feed is moldy).
- ✚ Feet lesions.

To control what is causing the problem, monitor sows and litters closely, particularly in the first 2-3 day. Ensure every sow gets up, eats and has access to fresh and clean water every day. And implement treatments in sows and/or litters when needed.

## PIC Tips:

### 70. Feeding management guidelines:

- **Do not feed sows on their due date** or having signs and symptoms of farrowing. However, if farrowing has not started by that afternoon, feed 3 pounds as usual and continue with twice-daily feedings until farrowing begins. Stop feeding as soon as signs of farrowing appear.
- **Day 2** (or one day after farrowing) feed sows 3 to 4 lbs (1.3 to 1.8 kg) daily, divided in two feedings.
- On **day 3**, increase feed to 6 lbs total (2.7 kg), divided in two feedings.
- **Day 4**, give 8 lbs (3.6 kg) divided in two feedings.
- Starting on **day 5 after farrowing, feed ad libitum.**

### 71. Maximize sow feed intake as soon as possible after farrowing:

- **Target an average feed usage of 13-14 lbs (5.9-6.3 kg)** daily.
- **Identify and treat ill sows** as soon as possible. Uterine infections, gastric disorders and lameness will reduce the feed intake, so be sure to implement the treatment prescribed by your herd veterinarian. Ill sows result in decreased milk production and poor quality piglets.
- **Watch body temperature.** Increased body temperature the first 2 days post-farrowing is another indicator of infection. A body temperature of 103 °F (39.3°C) should trigger antibiotic treatment.
- Keep sow macro-environment in 70 to 72°F (21°C to 23° C) during first 3 days (day 1 to day 4) and at 66°F (18°C) after that.
- Set fans to 1° to 1.5° per each stage.
- **Make sure that nipple drinkers provide 0.5 gal (2 L) of water/minute.**
- **To make sure that sows will not be hungry during the night**, you can be aggressive with the final feeding of the day. By the next morning, less than 50% of the feeders should be totally empty. As a rule of thumb, if your farm feeds the farrowing room three times daily, add 8 lbs (3.6 kg) every time the feeder has no feed left. In the best-case scenario, that means that sows eat 24 lbs (10 kg) daily. This is not a limitation with self-feeders.
- **Self-feeders or Ad-lib feeders are a recent technology**, which allow to have better feed intakes (> 7 to 10%), mostly due to the fact that the feed stay fresh up to the moment the sow wants to eat. An additional advantage is you can save labor, which can be redirected to different chores.

## MILK PRODUCTION

### PIC Tips:

72. Ensure the final mammary gland development by loading younger females, preferably with 14 good piglets and no less than 12. Punt the runts on P2 or P3 sows.
73. At least two-thirds of litters should stay with their own mothers.
74. Minimize fostering after 24 hours of age.
75. Use cross-fostering in a limited way. Frequent disruptions have a negative effect by making the sows nervous, which interrupts milk let-down.

## **WEANING AGE**

During lactation, the hormones and uterus “re-set” from pregnancy before a new cycle begins. Uterine involution takes place, which means the uterus returns to its pre-pregnancy size and weight and recovers its internal wall (endometrium) integrity.

Increased lactation length has been associated with improved performance during subsequent farrowings. In general, every additional day in lactation correlates with approximately 0.2-0.3 additional piglets per sow per year (PSY).

Weaning older and heavier piglets also impacts piglet performance after weaning. Heavier piglets at weaning have a higher average daily gain, less mortality and lower production costs in nursery and finisher phases.

Current PIC recommendations for lactation length are shown in **Table 8**.

**Table8: Weaning Age Recommendations<sup>\*,1</sup>**

<b>Product</b>	<b>Minimum (days)</b>	<b>Optimal range (days)</b>
Line 003	20	20 to 26
Line 1050	20	20 to 24
C23	20	20 to 24
1070/29	20	20 to 24

\*: Actual age at weaning may vary, dependent on a number of management factors such as number of weaning/week and farrowing crate capacity. Thus, an optimal range for weaning age is recommended

1: N. Williams and J. C. Pinilla. Optimum weaning age recommendations for PIC maternal lines. AASV Proceedings 2006: 77-81.

## **WEANED SOWS**

Every suckled teat sends a hormonal signal to the brain to release low levels of cycle-inhibiting hormones. When the sows are weaned, this inhibition is removed and the brain releases increased levels of follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which stimulates follicle growth, estrus and ovulation.

### **PIC Tips:**

76. **Move weaned sows to the weaning row as early as possible in the morning** to avoid heat during warm months. This strategy also allows the staff to wash and disinfect the room and give it maximum time to dry before reloading.
77. **Try to minimize/contain the weight loss.** Weaned sows should receive 8 lbs (3.6 kg) of feed daily, usually given in two feedings. **Make sure sows are fed on weaning day.**
78. **Provide fresh, clean water** to weaned sows.
79. **Start boar exposure** (with an active, adult boar) the day after weaning by allowing a boar in front of sows for at least 1 hour daily. Expect to have more than 90% of the sows bred by 7 days after weaning. Sows showing estrus the same day of weaning usually have a low farrowing rate and should be skipped to the subsequent heat.