Management of gestational losses of non-infectious origin

The causes of reproductive failure can usually be divided into infectious and non-infectious. The latter includes a wide variety of causes, most of which are usually associated with poor management.

José Manuel Pinto Carrasco
Agricultural Engineer, SAT Hnos. Chico

Among reproductive efficiency indicators, the following are the most important:

If levels are below what might be considered normal, no measures need to be taken given that they are usually inefficient and do not positively affect these indicators.

1. Wean-to-estrus interval

This is an indicator for the management of teasing and feeding during maternity. If more than 5 % of weaned sows have a wean-to-estrus interval exceeding 7 days, we should check our teasing protocol and how the sows are fed during the maternity phase.

2. Wean-to-fertile mating interval

This indicator includes days lost because of returns to estrus and so is a more comprehensive indicator than the farrowing rate when measuring reproductive efficiency.

3. Return to estrus percentage

This represents the number of sows that had to be mated again after an unsuccessful mating, with respect to the total number of sows mated in that batch.

4. Farrowing rate

This is the percentage of sows that have farrowed in relation to the number of sows mated. It is the indicator *par excellence* because it includes not only sows returning to estrus, but also non-fertile culled sows, gestational mortality and abortions.

A series of action limits should be established (*figure 1*). This means that a value is assigned to each possible type of gestational loss so we can act in real-time if these limits are surpassed. Thus, we must establish metrics and change our procedures if any indicator variations occur that require us to take action.

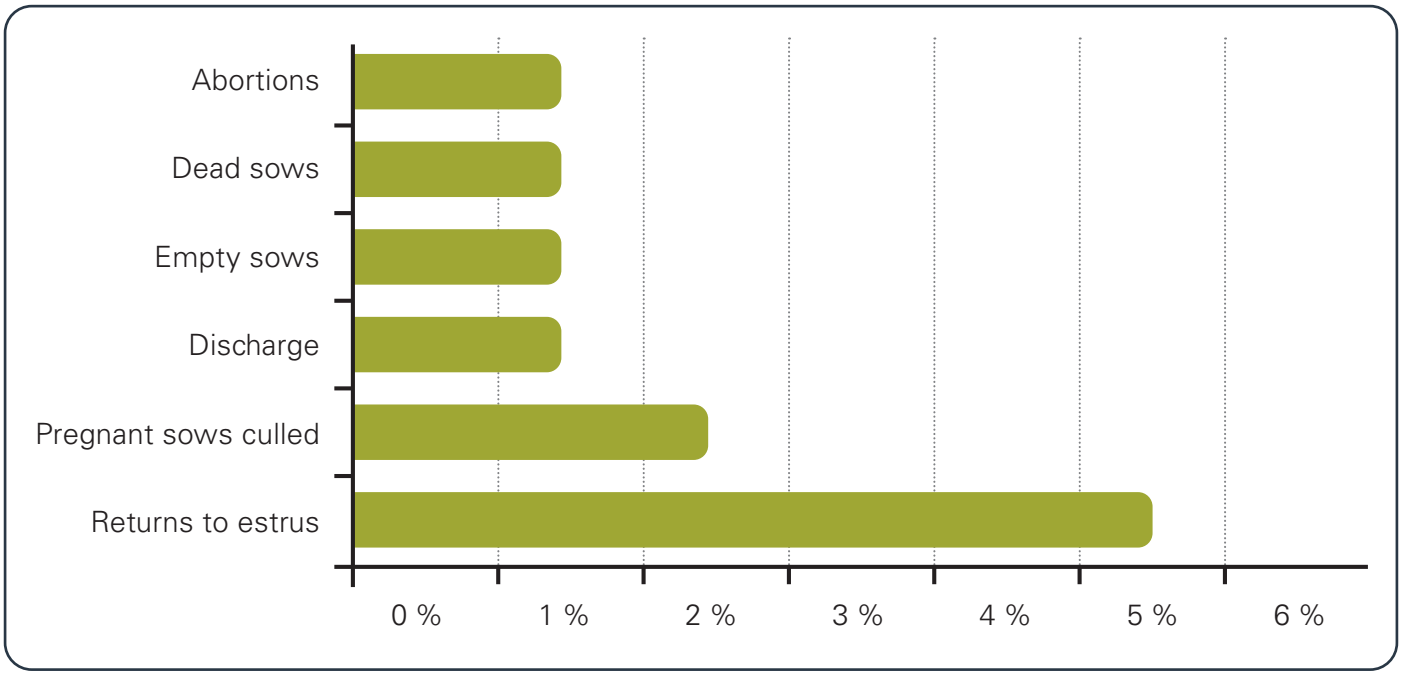

Figure 1. Action levels for the various reproductive efficiency indicators.

Gestational losses

When production targets are not met, both for the farrowing rate and the quantity of live piglets born, we need to know where productivity is failing. The causes of gestational losses can be divided into three main groups (table 1):

1. Semen quality

As a general rule, semen doses come from an artificial insemination center that should be providing the highest possible quality of semen. If the semen is of low-quality or the supply is insufficient, the center itself should alert farms. However, having a basic semen quality control and monitoring system in place for the doses received by the farm is highly recommended to avoid future problems.

	Frequency of the problem	Farrowing rate	Live births (piglets)
Semen quality	33 %	–12 %	–0.9
Insemination	57 %	–13 %	–0.4
Post-insemination management	10 %	–5 %	–1.1

Table 1. Decrease in the reproduction parameters in inseminated sows.

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2. Insemination protocol

This includes not only how teasing and insemination protocols are managed on the farm, but also the manner and hygiene with which they are carried out. Both the mating and farrowing areas should be mopped and disinfected before the sows enter them, because the neck of the uterus is open on both these occasions. A lack of hygiene here could manifest as a future vulval discharge problem. If an inseminated sow fails to farrow, or the farrowing is poor, the most likely reason is suboptimal teasing or insemination. Experience tells us that when inseminations are performed incorrectly, neither the prolificacy nor the farrowing rate will be good.

3. Post-insemination management

The most influential factor in post-insemination management is the way sows are fed during the first phase of gestation. This phase can be divided into three parts:

- Starting five days post-farrowing, a high level of feeding should be established to improve the quality of the placenta and its blood flow. A more efficient placenta will yield piglets with a higher birth weight.
- A week after the ultrasound, the feed level is decreased and established according to the individual sow's body condition.
- Reducing feed intake in the first third of gestation is a mistake made in modern sows, as they will not experience a drop in progesterone levels.

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The importance of semen quality

Of the parameters that influence semen quality, from the management of the boar at the insemination center to the moment of insemination on the farm, only two factors that significantly affect farrowing results can be controlled (*table 2*).

1. Preservation of semen doses

In other words, the storage conditions on the farm. The dose temperature must be monitored, not just using a minimum and maximum thermometer, which should

Problem	Frequency of the problem	Farrowing rate	Live births (piglets)
Semen age	27 %	–12 %	–1.0
Storage	15 %	–9 %	–0.7
Water quality	12 %	–8 %	–0.7
Diluent	12 %	–15 %	–1.1
Dilution ratio	10 %	–11 %	–1.0
Morphological anomalies	9 %	–11 %	–1.0

Table 2. Semen quality parameters and their impact on production parameters.

Communication between the farm and the insemination center must be very fluid, given that any incident that occurs at the insemination center greatly influences the farm; and vice versa, any failure on the farm may be due to an error at the center.

be checked daily, but also with temperature probes that should be evaluated weekly to detect temperature variation problems in a timely manner. The temperature of the storage area should never go below 13 °C because this usually causes coagulation problems in the sperm plasma membranes. In addition, the temperature should not exceed 18 °C because this induces metabolic changes in the sperm, thereby reducing their longevity.

2. Semen age

Sows should never be inseminated with semen older than 72 hours, and this should be established as protocol. Mating sows using doses older than this has a strong negative influence on both sow fertility and prolificacy as a result of reduced sperm mobility and motility. This is one of the reasons why the use of fresh semen is always recommended.

The other sperm quality parameters should be evaluated by the laboratory providing the semen doses.

Factors influencing the farrowing rate

1. Feeding

Feeding during the lactation phase is not just important for milk production, it is also important for reproductive development in the following phases.

Figure 2 shows how the farrowing rate decreases when feed is reduced during the lactation period. Feeding during this period has a significant influence on the quality and quantity of the oocytes generated for the next cycle. It also influences embryo survival.

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2. Returns to estrus

Returns to estrus and their causes are usually one of the most important factors in reproductive efficiency (*figure 3*). To understand the origin of the failure when there is an increase in returns to estrus, we must analyze several factors:

Maximizing consumption during lactation is a priority to achieve adequate reproductive efficiency in the next cycle.

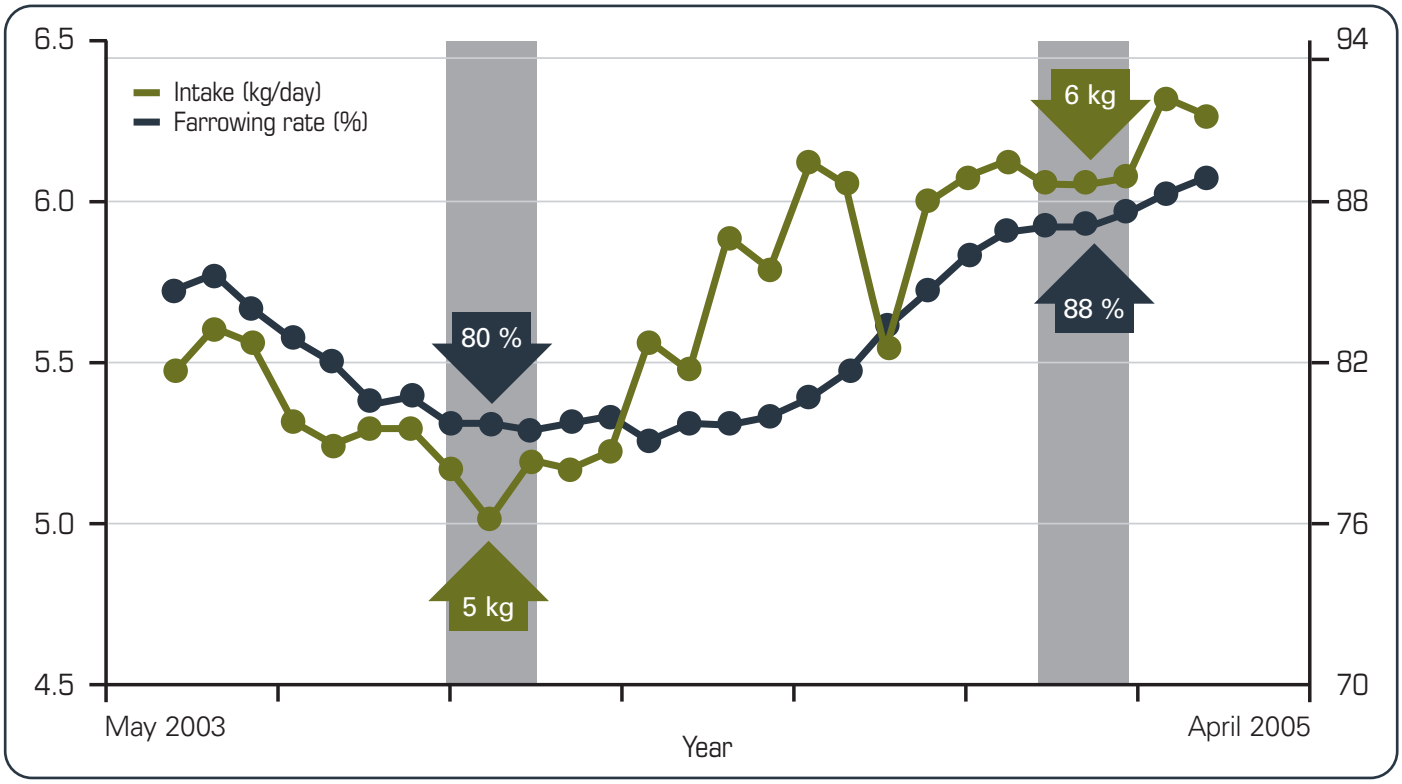

Figure 2. Relationship between feed intake during lactation and the farrowing rate.

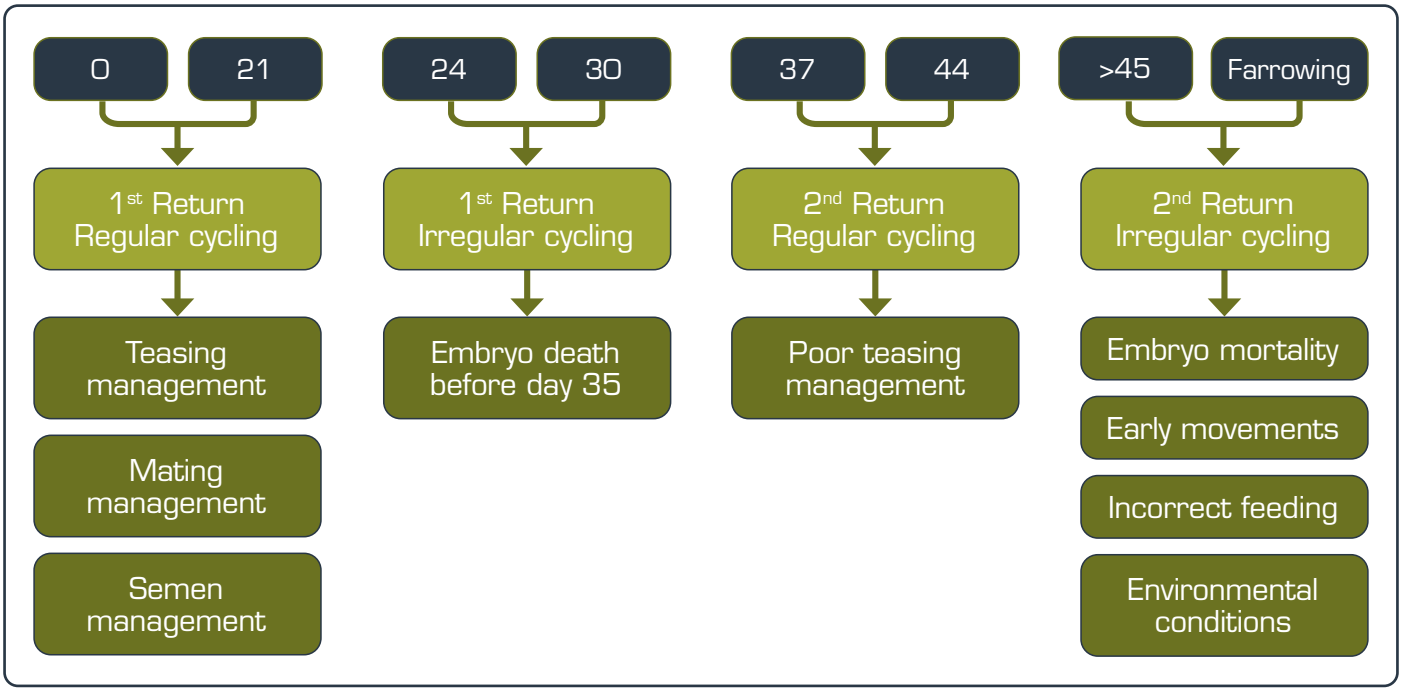

Figure 3. Analysis of returns to estrus over time.

1 A mating and teasing protocol defining the frequency and manner in which teasing is performed, in addition to establishing the mating protocol so that insemination occurs at the moment of ovulation, are critical to the success of insemination. Insemination should occur between 0 and 24 hours before ovulation occurs.

2 With only slight variations, ovulation occurs during the last third of the estrus cycle. We must remember that the wean-to-estrus interval should be 4 days or less. Estrus usually lasts longer than 72 hours. Thus, for practical purposes we must carry out three inseminations at 24-hour intervals to ensure that live semen is present in the sow's uterine tract at the moment of ovulation. When the wean-to-estrus interval increases to 7 days or more, estrus is much shorter and, in this case, it may only last 24 hours.

3 We must also distinguish between regular and irregular returns to estrus. Irregular returns to estrus occur 18 to 22 days after mating. These irregular returns to estrus often have a pathological component, while the regular ones are usually the result of improper management.

4 These lost days are also very important because they are costly to the farm. In addition, they lead to a deficit of piglets in the batches in which the returns to estrus occurred.

Moving animals and stress during the early gestation period also increases the abortion rate.

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For example, in the case of a farm with 100 matings per week, with a farrowing rate of 90 % and weaning 11 piglets per sow, 990 piglets are produced per week. If the farrowing rate is reduced to 81 %, production will decrease to 891 piglets. In other words, there will be a loss in production of nearly 100 piglets.

Although it may seem fairly obvious, this is like having 10 fewer sows farrowing or 100 fewer piglets being born per week. If this were the case, every alarm would have already been triggered. However, when considering an increase in returns to estrus, time is often allowed to pass before control measures are established.

3. Abortions

The cause of abortions may be infectious or non-infectious in nature. Regarding the latter, the most important factor is associated with seasonality: autumn abortion syndrome.

It is important to be careful with sudden changes in temperature and drafts, which have an increasing effect on the sow's susceptibility. Both low temperatures (which can be quickly overcome by administering more feed) and high temperatures are important. In the latter case, cooling must occur before and after sows are mated. The most efficient way to achieve this is by installing a system that combines both air conditioning and forced air.

Autumn abortion syndrome

Autumn abortions can be minimized by increasing feed consumption during lactation prior to the summer season and with the use of artificial lighting.

Ensuring a minimum of 200 lux at the height of the sows improves not only the wean-to-estrus interval, but also yields an improvement in the percentage of abortions.

Any disease process involving a fever and related to the reproductive tract will cause the release of prostaglandins and, thus, cause an abortion. In these cases, administering anti-inflammatory agents to the sows' drinking water is usually effective. This interferes with the prostaglandin production cascade.

4. Discharge

This is usually the result of poor hygiene in the mating area or performing mating when estrogens are predominant during estrus. In the first case, the uterine defenses can eliminate any contamination that enters the sow's uterus. In the second case, this happens because sows are often mated after estrus is already over, when the dominant hormone is progesterone. At this time, the defensive capacity of the endometrium is minimal, which can lead to infection.

As a result, the problem is twofold, since the sow returns to estrus and, at the same time, treatment must be administered to clean the endometrium with prostaglandins, while allowing the estrus to pass. Nonetheless, discharge is normally present a few days before the sow returns to estrus because the uterine neck opens at this time. The presence of abnormal discharge should be treated because endometrial infections are an important cause of sow culling due to reproductive failure.

After mating, and as a consequence of the elimination of semen debris, some physiological discharge occurs that has no clinical significance (*figure 4*).

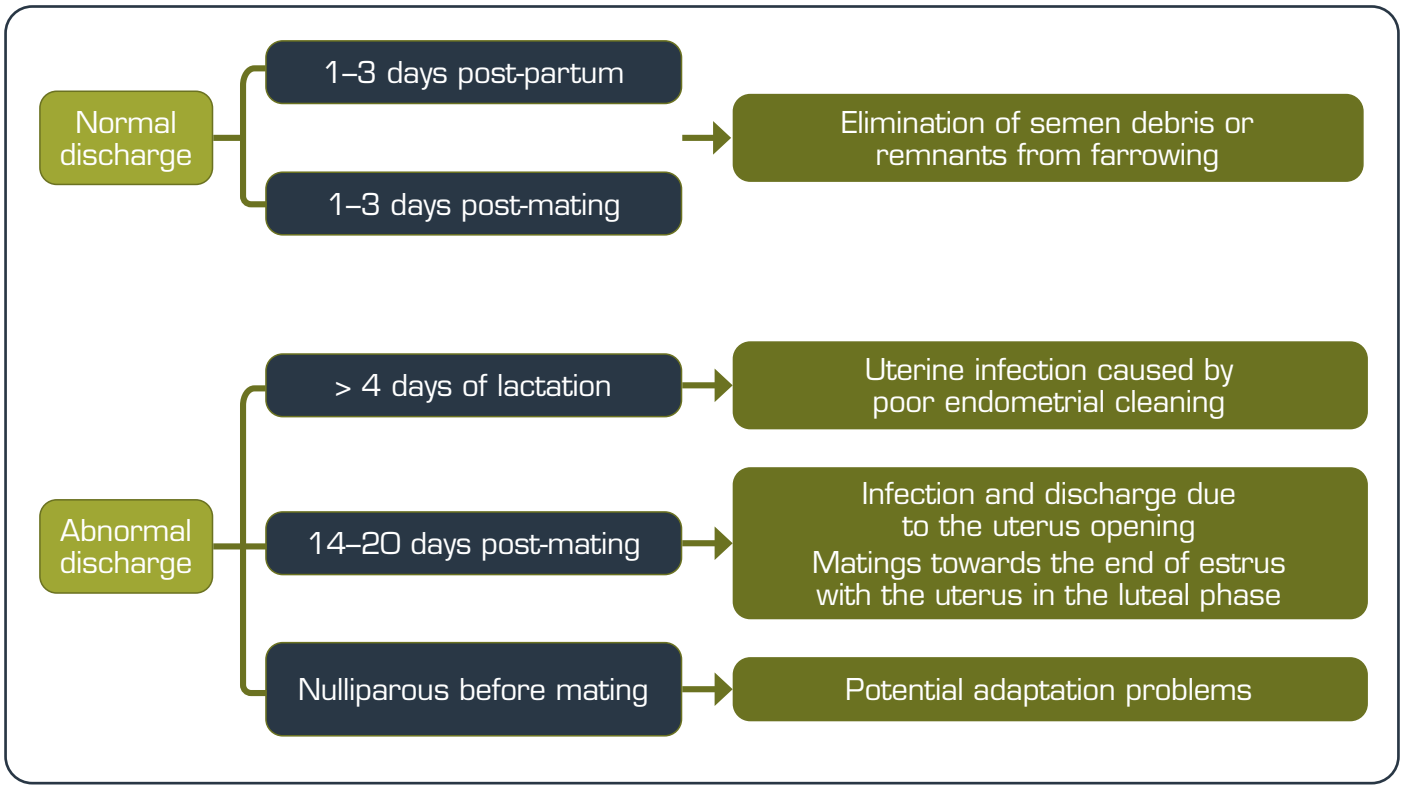

Figure 4. Analyzing discharge and its causes.

5. Farm staff

Staff training is important in every area of pig production, but it is the most complex in both the estrus and maternity phases. Additional training is necessary. Indeed, one older research study examined the influence of the operator on mating results. In this work, the only thing that varied was the person responsible for mating the sows. Very mixed results were observed, not only in the farrowing rate but also in prolificacy (*table 3*). The data reflected variations in the farrowing rate of more than 10 %, equating to more than 1.7 piglets per litter.

6. Mortality

Mortality during gestation is another major cause of sow loss and reduced farrowing rate. This problem has increased with the advent of hyperprolific sows. These animals are more susceptible to any environmental changes, both in terms of facilities and climate, and their lack of hardiness requires very careful management.

When visiting a farm with a mortality problem, before proceeding to study the causes, we must first have monitored the specific cause of the mortality problem (*table 4*). A series of differential factors, ones that are

Operator	Farrowing rate (%)	Live births (piglets)
1	75.0 ± 5.3	9.7 ± 0.4
2	88.5 ± 6.1	11.1 ± 0.3
3	75.3 ± 5.3	9.9 ± 0.3
4	84.7 ± 4.2	11.7 ± 0.4
5	67.1 ± 5.4	9.1 ± 0.3

Table 3. The importance of farm staff in the farrowing and live birth rate.

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No. of farrowings	0	1	2	3	4	5-6	7-8
Reproduction (%)	36	19.3	11.5	9.8	8	10.7	3
Musculoskeletal problems (%)	20.4	19.8	15.8	13.5	10.2	14	5
Death (%)	14.2	14.1	16.1	14.4	13.6	17.5	7
Peripartum disease (%)	13	15.3	13.7	10.8	14.9	22	6.7

Table 4. Percentage according to the reason for culling and cycle number.

relatively simple to record on the farm, must be established to provide sufficient information to understand the origin of the mortality problem.

The treatment will differ in the following cases (*figure 5*):

- Sows that, for one reason or another, have been culled for musculoskeletal problems or prolapses. These sows are normally culled on the farm.
- Sows that have a disease and stop eating. These sows have been treated without success, resulting in the death of the animals.
- Sudden deaths before which the animals showed no symptoms; sows that are found dead without warning.

Some studies show that staff training plays a tremendously important role in the production and economic results of farms.

7. Environmental conditions on the farm

The importance of environmental conditions has already been mentioned, but the elements of greatest risk must be identified in order to evaluate possible solutions:

- **Temperature:** especially high temperatures are a risk factor as they have a great influence on fertility, farrowing rate and prolificacy. Thus, we need to ensure that the temperature does not exceed 28 °C in the mating area. The 15 days following mating are the most critical.
- **Illumination:** the mating area must be equipped with lights emitting 200 lux. This improves the wean-to-mating interval and the fertility rate.
- **Flooring:** this is a very important aspect that is often overlooked. Depending on the condition of the floor, the animals can suffer injuries to their hooves that can lead to lameness. We must not forget that lameness is one of the most important causes not only of sow culling on the farm, but also of reproductive failure.

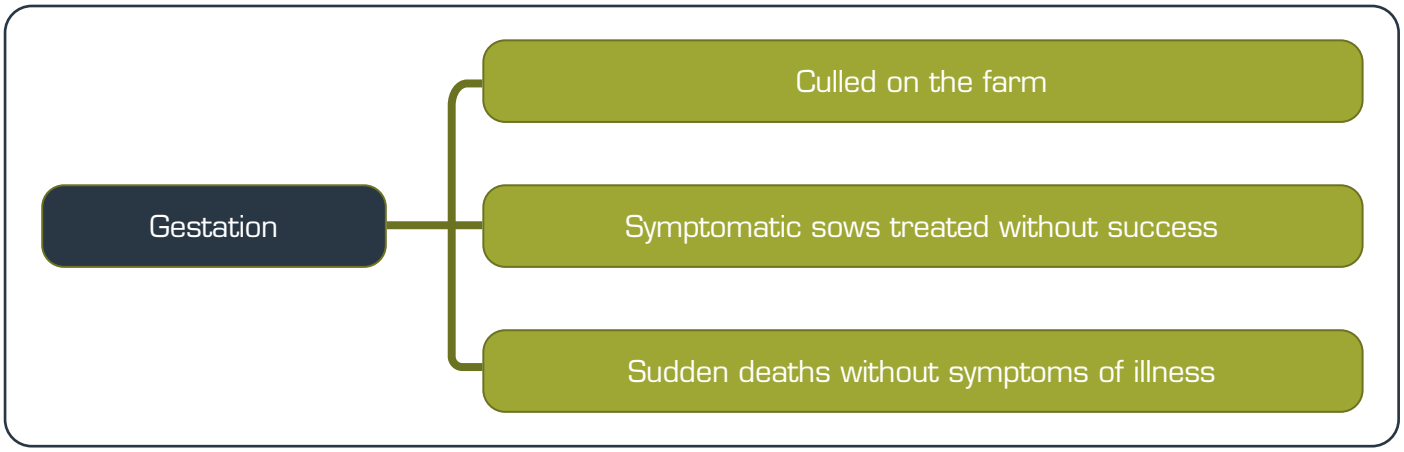

Figure 5. Types of mortality during gestation.

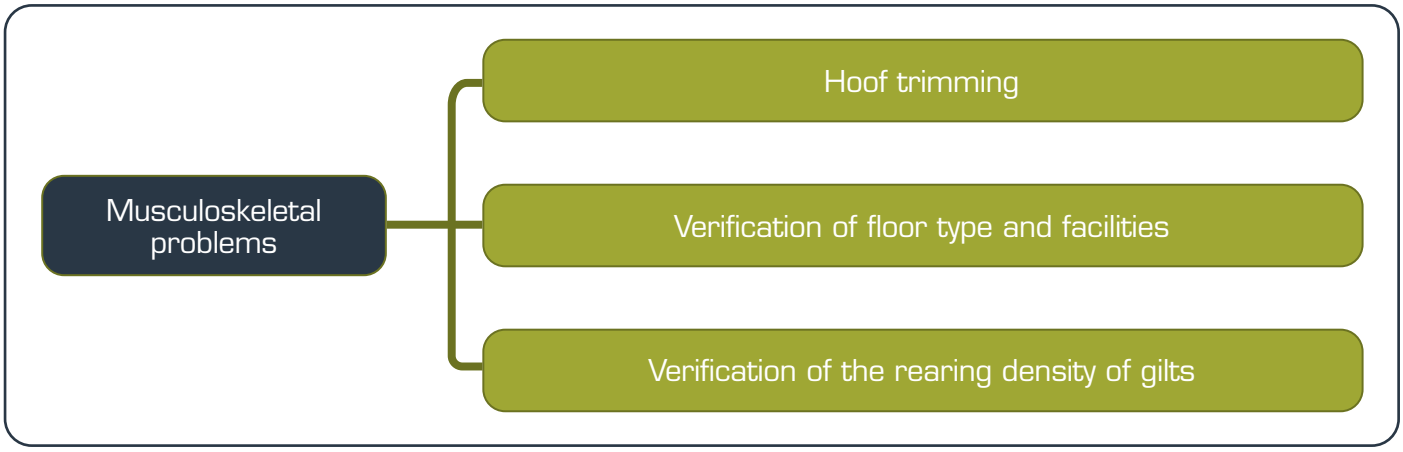

Figure 6. Musculoskeletal problems.

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