Key aspects of everyday life on a breeding farm

This article reviews each of the processes of everyday life on a breeding farm, and reflects upon the habits behind each one.

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Images provided by the author

Regularity, the primary objective

A breeding sow farm is structured such that a set of actions are repeated at a constant frequency over time. These phenomena define what we call a batch, and on farms, these will repeat themselves over time in a fixed way. The weekly frequency with which batches repeat themselves will determine how many of them there will be per year (52, 26, 17–18, or 13).

Each of these batches must be practically equal in size and must meet the objectives set for each of their defining characteristics. To achieve this, all of the disciplines that define the batch must be efficient.

As we will see, diet is very important both in pregnancy and during maternity.

Gestation, a race against the clock

This is the part of production where we should leave as little as possible to chance. In other words, practically 100% of our success depends on our management.

Mating objectives

To set our mating goal, we must base our calculations on our farrowing goal. All the parameters we will quantify here will be calculated based on a farm with 1,000 breeding sows in production, with weekly weaning.

If our farrowing objective for 1,000 sows in weekly batches is 2.4 farrowings per productive sow (ps) per year, we must carry out 46 farrowings per week (1,000 ps × 2.4 farrowings ps/year/52 weeks). Once we have clearly defined our objectives for farrowing, we will need to know the farm's fertility at farrowing. On my farms, I consider 88% to be a good fertility goal, which in our example would give us a weekly mating goal of 52–53 sows.

However, on a day-to-day basis, we do not know the fertility rate of the batch we plan to mate (we will know it four weeks later). In reality there is a variation which is mainly derived from the changes in fertility between the different groups of sows comprising the batches mated throughout the year (*figure 1*).

Gilts and weaned sows with a weaning-to-oestrus interval (WEI) < 7 have a fairly predictable fertility which should be consistent on most farms: their farrowing target should be 90%. Thus, a good strategy would be for the sum of the weaned sows and gilts in each batch used on our farm to always be equal to our farrowing objective, i.e., 46–47.

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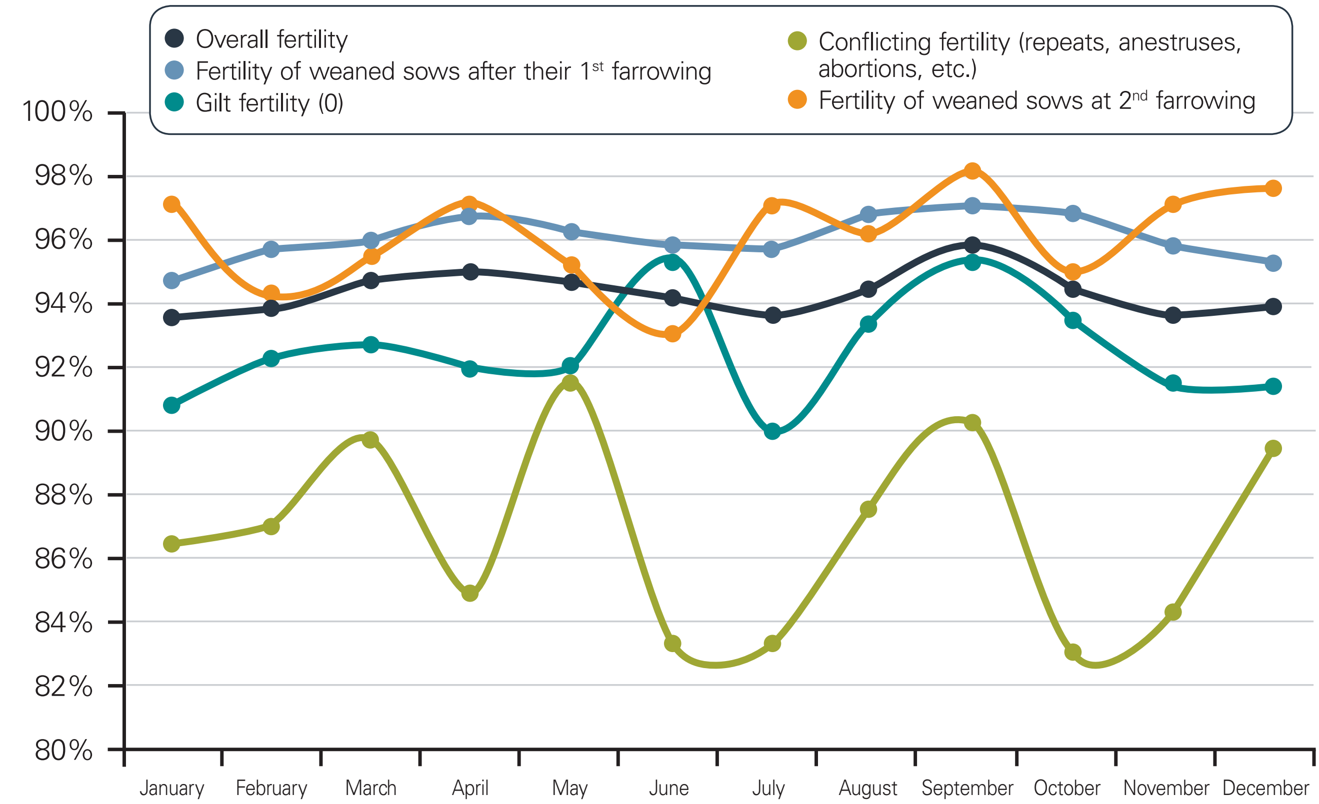

Source: Miquel Forcadell, SLV (2007).

Figure 1. Fertility by group.

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A champion must be good both at racing against the clock and in each stage of the race, without neglecting the easiest stages of the trial. On a farm, we must be good at managing gestation and maternity, without neglecting diet.

Structure of the mating batches

Three types of female comprise mating batches:

- Gilts. With a 45% restocking rate we should have 8–9 gilts in each batch (1,000 × 45/100/52 batches). As we will see later, we must keep the number of gilts we mate in each batch as constant as possible.
- Sows weaned with a WEI < 7 days. We should mate 38 of these per batch.
- Dubious sows (weaned with a WEI > 7 days, repeating sows, etc.). These should make up the rest of the matings in the group and both their numbers and their results will be the most irregular (green line, *figure 1*); therefore, we should aim to have as few of these as possible. We must mate as many sows as we have, which should be the optimal number if we have done our work correctly in the other two groups of sows.

Gilt management: a necessary evil

For a farm to function optimally, we must be able to manage gilts well. This is the true philosopher's stone of pig production.

The key is to make sure there is good health and reproductive adaptation.

Health adaptation

For health adaptation, there must be quarantine buildings that allow us to keep the replacement batches entering from outside the farm reasonably isolated from the rest of the farm. It is easier to achieve a good health adaptation on self-replenishing farms.

The key word in health adaptation is time; the lower the frequency of the introduction of external replacement gilts and the more time we have for them to adapt to the microbiological ecosystem of our farm, the better.

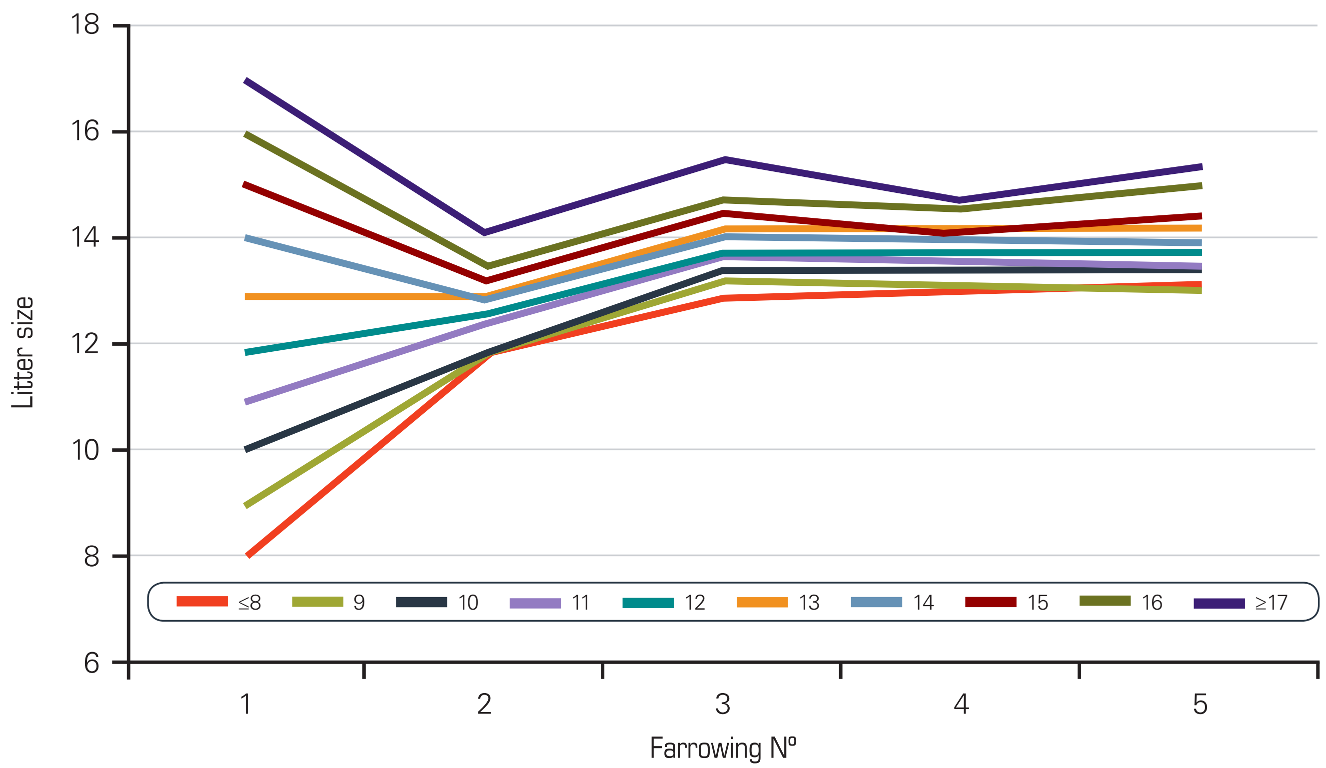
Objectives of a good reproductive adaptation

1. Optimisation of the sow's genetic potential

Sows whose production data are good in the first cycle achieve better results during the rest of their reproductive life (*figure 2*). This is achieved with good management of future breeding sows. Here, I have separated this management into three parts:

Jack

The gilt must be allowed to get used to the cage and the feeding hopper for at least 10 days before insemination. This prevents her from going into a catabolic state (because she does not know how to get the food) prior to mating and prevents stressful situations (because of the newness of her new housing) after mating that could affect embryo implantation.



Source: Pinilla and Canavate (2013).

Figure 2. Productive results according to the farrowing number.

King

We must have a heat record so that we can ensure mating of gilts who have had at least one heat (thus guaranteeing their insemination at the appropriate age and weight) and so that we know how many animals we must mate in each batch (*figure 3*).

This will allow us, when necessary, to use tools such as altrenogest in order to homogenise the number of gilts mated.

Figure 3. Adaptation to the cage and a record of heats recorded on the rumps of the animals.

Queen

The sow's level of ingestion must be increased in the 15 days prior to mating (*figure 4*), to ensure optimal follicular development and thus, maximise the number of eggs produced. This is known as the famous *flushing*. This increases the total number of births in the first cycle.

Figure 4. Sows given a *feeding ball* system to maximise their feed intake in the days prior to mating.

2. Homogenise the number of gilts mated per batch

By doing this we will achieve a farm population structure (parity) as close to our ideal production structure as possible because it will allow us to send older sows to the slaughterhouse and maximise the number of sows with more productive cycles that we are able to use (*figure 5*).

A farm that has to mate old sows (because they do not know whether gilts will be available for insemination or not) will be much less productive (*figure 6*), have more sows with low milk production, and a higher number of stillbirths (SBs; *figure 7*).

However, inseminating more gilts than necessary per batch can generate a larger subpopulation of animals with low immunity and this can lead to pathological problems during farrowings (increased incidence of neonatal diarrhoea) and even sometimes during the transition phase, especially if health adaptation was not achieved (*figure 8*).

The number of gilts inseminated per batch should always be 20% of the farrowing target. This is achieved by keeping good records of their heats which will allows us, if needed, to effectively use tools such as altrenogest.

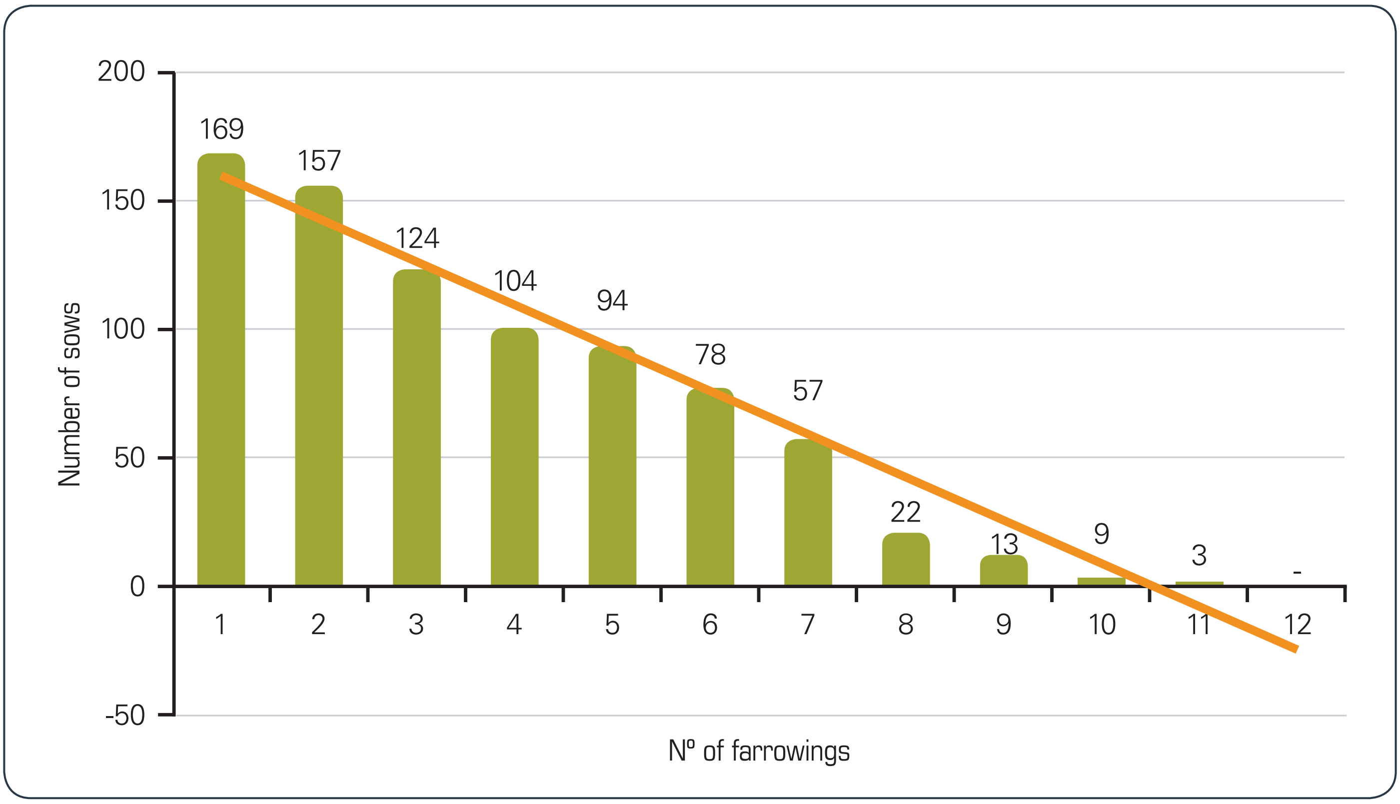


Figure 5. Replacement sow management.

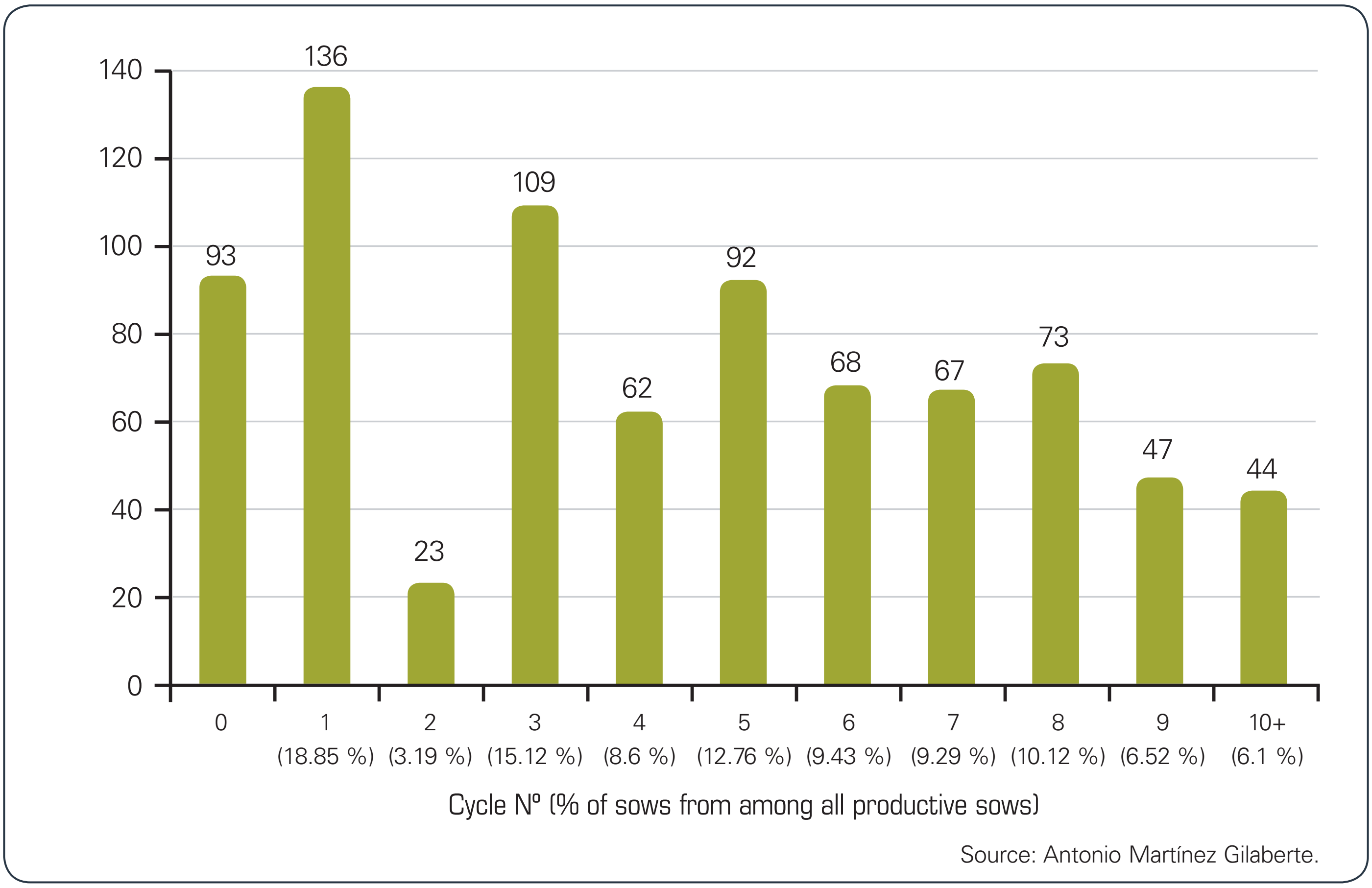
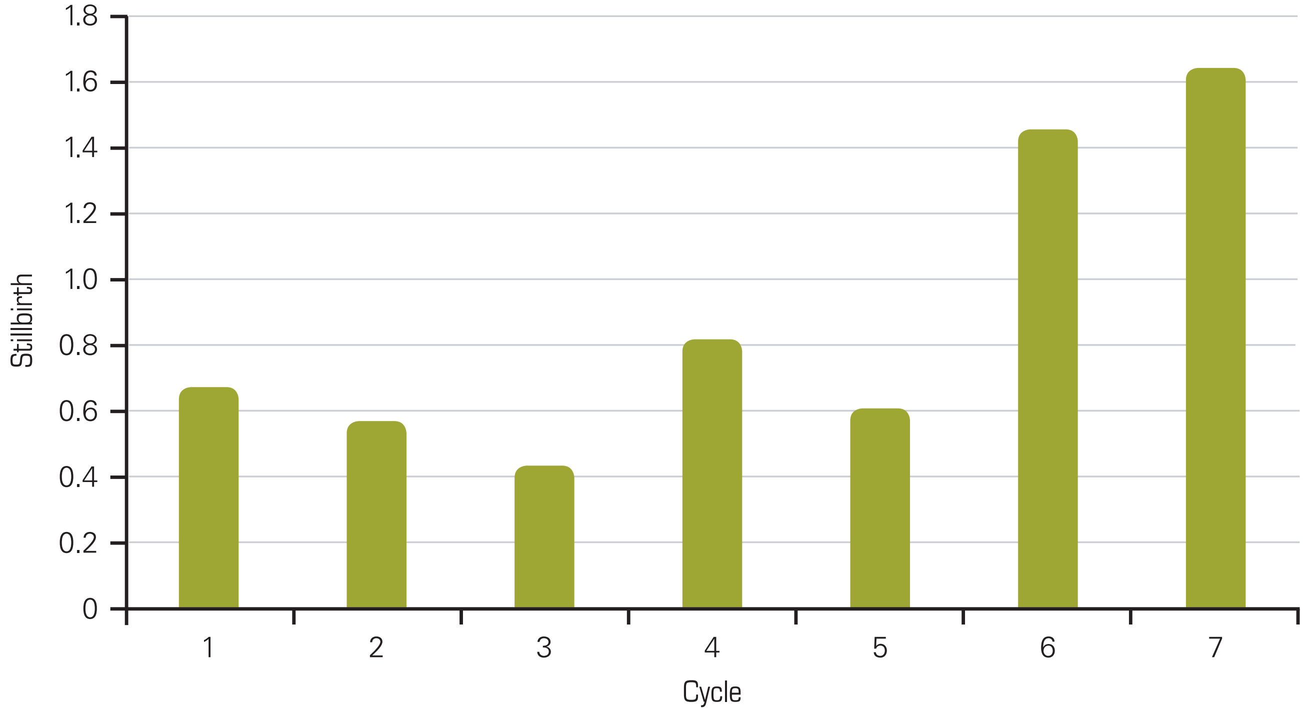


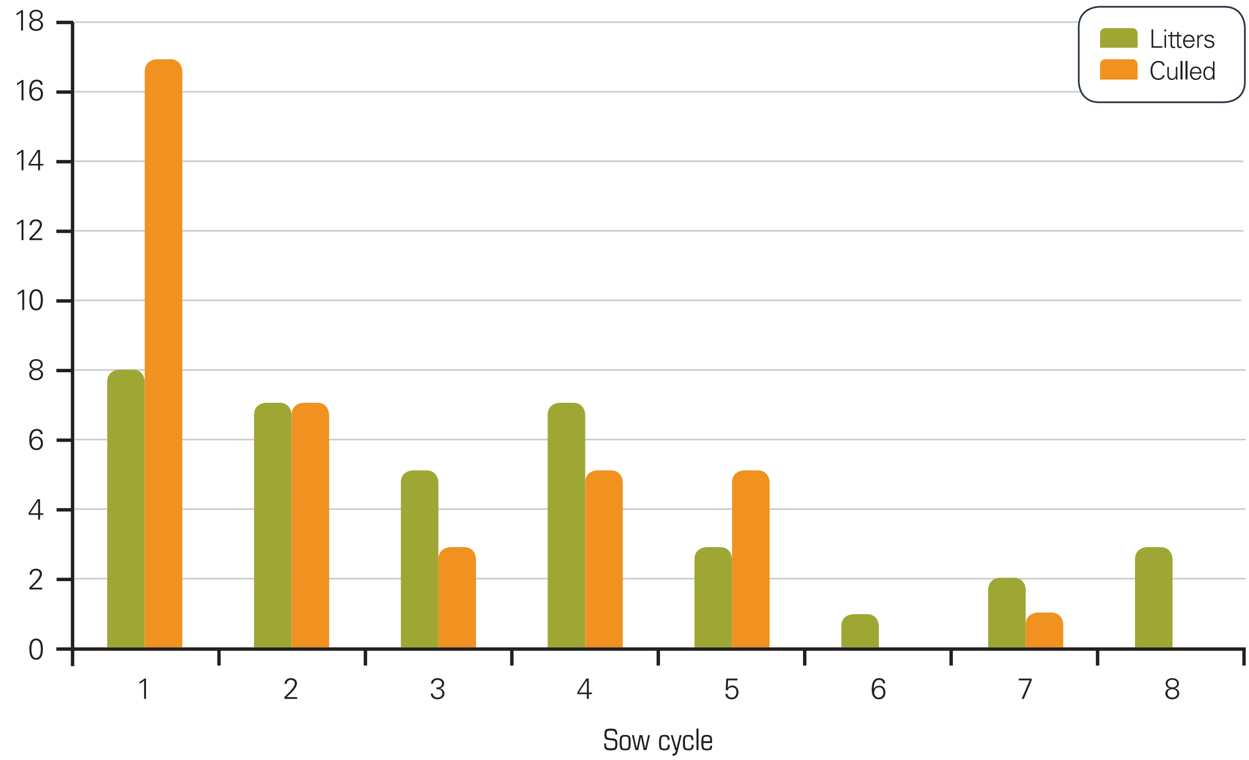
Figure 6. Altered population pyramid.



Sows with stillbirths (SB) in the previous farrowings usually repeat in the next farrowing. Sows have more SBs as they age.

Source: *Sus scrofa*, Barceló Foundation.

Figure 7. Relationship between the sow history and age and the number of stillbirths (SBs).



Source: Antonio Martínez Gilaberte, Anavepor 2012.

Figure 8. Cycle effect.

Maximise the fertility and percentage prolificacy of sows inseminated in each batch

Achieving high fertility percentages will give us a high birth rate per ps each year because it allows us to achieve farrowing goals with fewer ps; we will have fewer matings in the third group—the ones with an increase in non-productive days (NPDs).

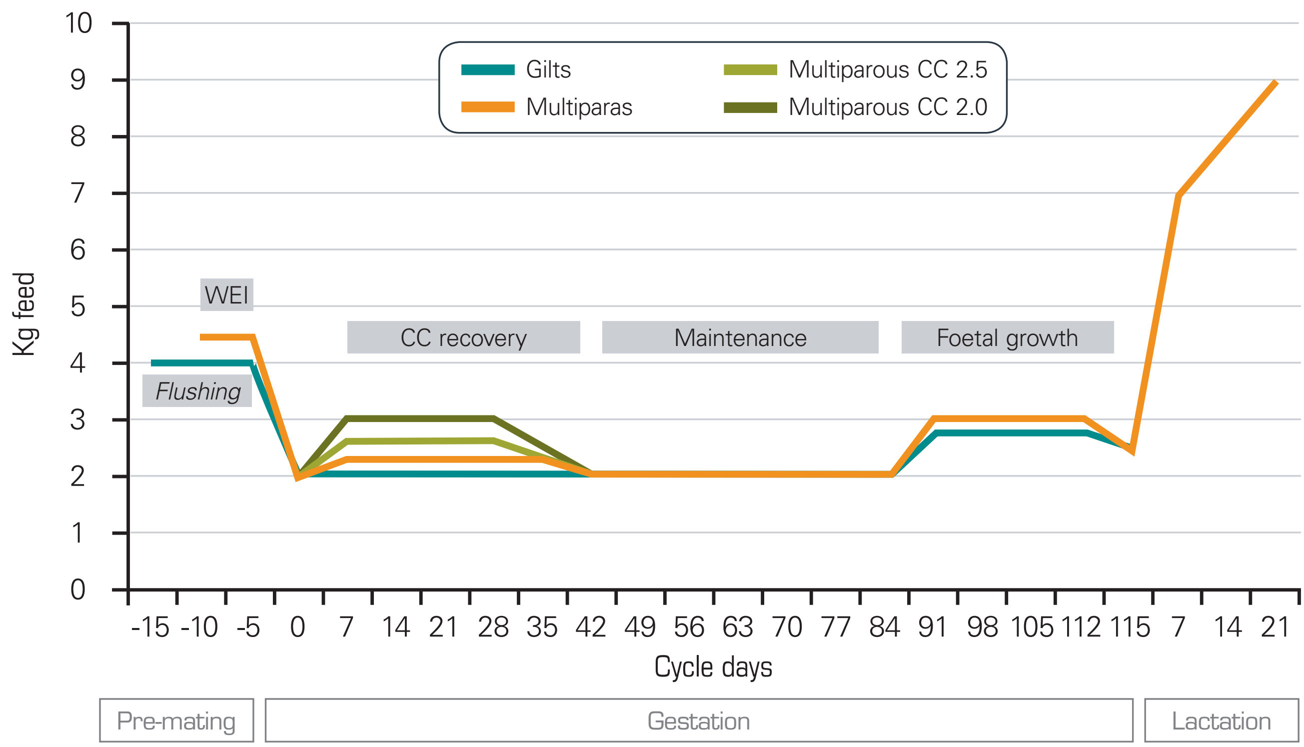
At the same time, we can afford to be more selective when deciding whether to continue working with a given breeder or to eliminate it, thus allowing the farm to enter into a very positive feedback loop.

Make sure that the animal that we will inseminate is prepared well

We have already analysed gilts in the previous section, so here we will focus on sows rejoining the group after completing lactation (*figure 9*).

The weaning-to-oestrus interval (WEI) can be reduced with a good maternity diet and a good *flushing* from the time of weaning until heat; therefore, this is another way to decrease NPDs. Furthermore, we can use gonadotropins to mitigate seasonal anestrus, which will also help us to reduce the WEI.

There are two fundamental aspects: prepare the animal well and inseminate them at the right time.



The lactating sow must eat enough feed to nourish her litter and, in turn, to meet her own needs. This implies a high consumption of feed from the first week of lactation to prevent her from entering a catabolic state which could compromise the sow's next post-weaning heat or make it difficult for her to become pregnant (thus increasing her NPDs).

This is achieved with a good feeding regimen (including both water and feed) during maternity, in combination with a good adaptation to the farrowing rooms, and by ensuring an optimal ambient temperature of 20–23°C.

Once we have weaned the sows and they are in good condition, we complete the process by performing a *flushing* (the same as for gilts). The goal of the *flushing* is to get the sows into an anabolic rather than a catabolic state as soon as possible in order to achieve high ovulation rates with higher quality eggs (Alberto García/Joan Wennberg/Miguel Ángel Sanz, 2007).

Figure 9. Feeding curve in breeding sows.

Inseminate at the right time

Everyone knows when an animal is in oestrus. But the key is knowing the time during oestrus when the sow should be inseminated; this depends on the number of hours that elapse between insemination and ovulation (*figure 10*). The best results are achieved by inseminating 10–12 hours before ovulation (*Figures 11–13*).

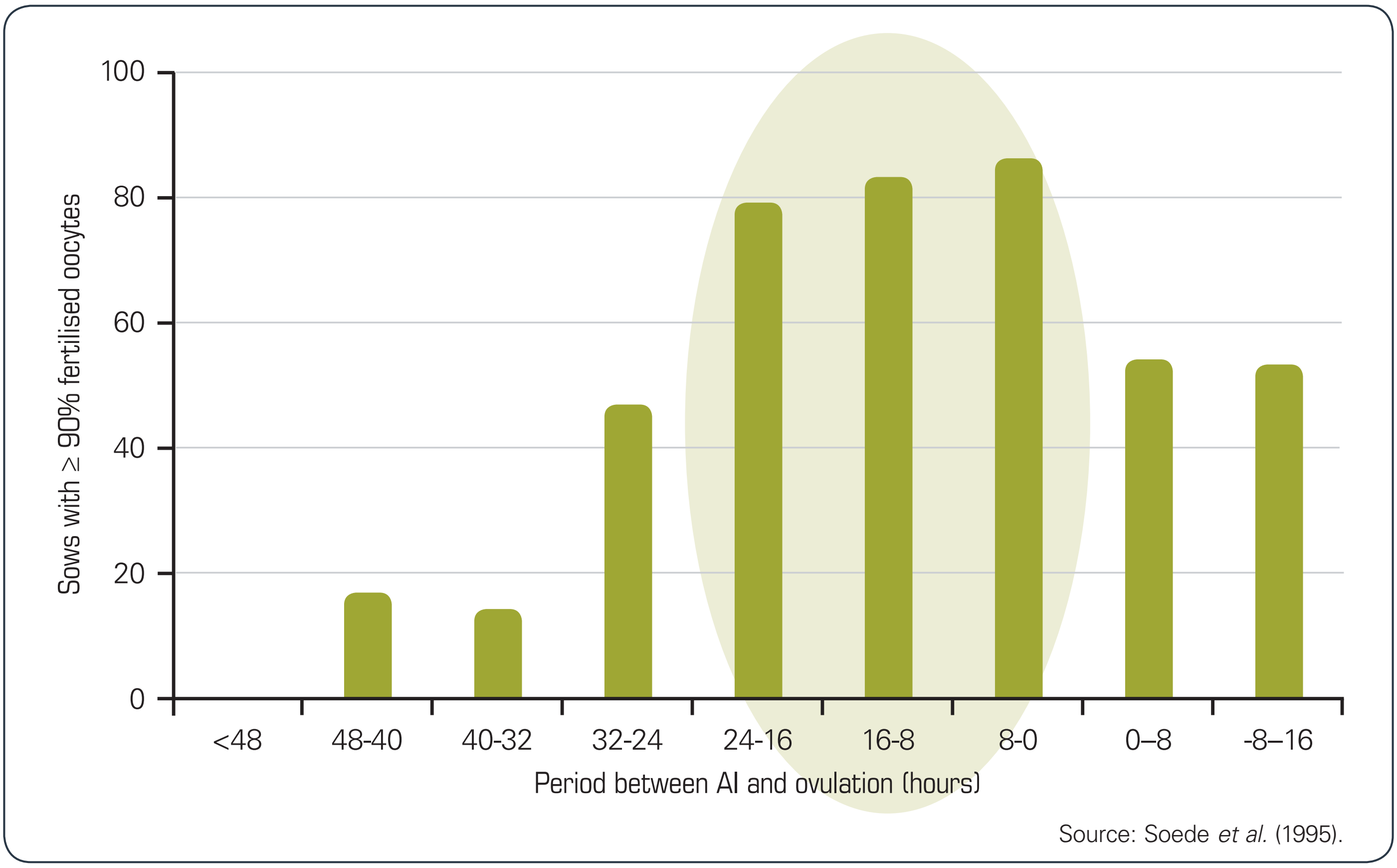


Figure 10. The best time to inseminate sows.

But the biggest handicap is that we do not know when ovulation is going to take place: there is a lot of variation, even within the same farm, between the appearance of the symptoms of heat and ovulation (*figure 14*).

So, in practice, we have three options:

- Inseminate every 24 hours from the time heat symptoms are detected until they cannot be detected anymore (thus, ensuring that at least one dose will have been administered at the ideal time).
- Delay the first insemination by 12 hours. To do this we must perform heat detections twice a day.
- Use buserelin. This substance allows us to carry out inseminations at a fixed time, thus saving labour and seminal doses.

This involves synchronising ovulation in the sows in order to be able to perform insemination at the optimal moment (10–12 hours before ovulation) in the entire group of sows.

Figures 11–13. When the best results are obtained and what happens when we inseminate outside the optimal times.

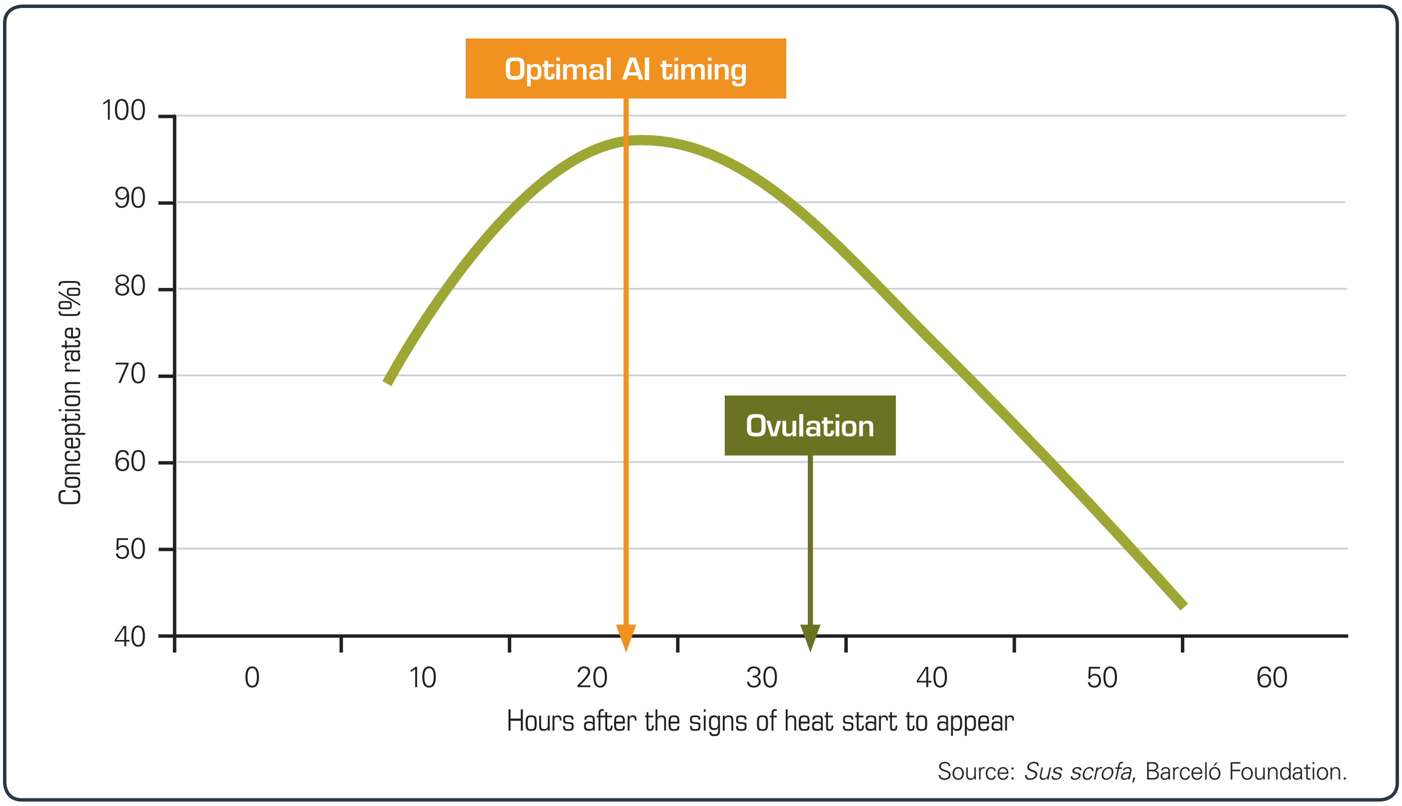


Figure 11. Primary objective: achieve an optimal result with a single insemination between 10 and 12 hours before ovulation.

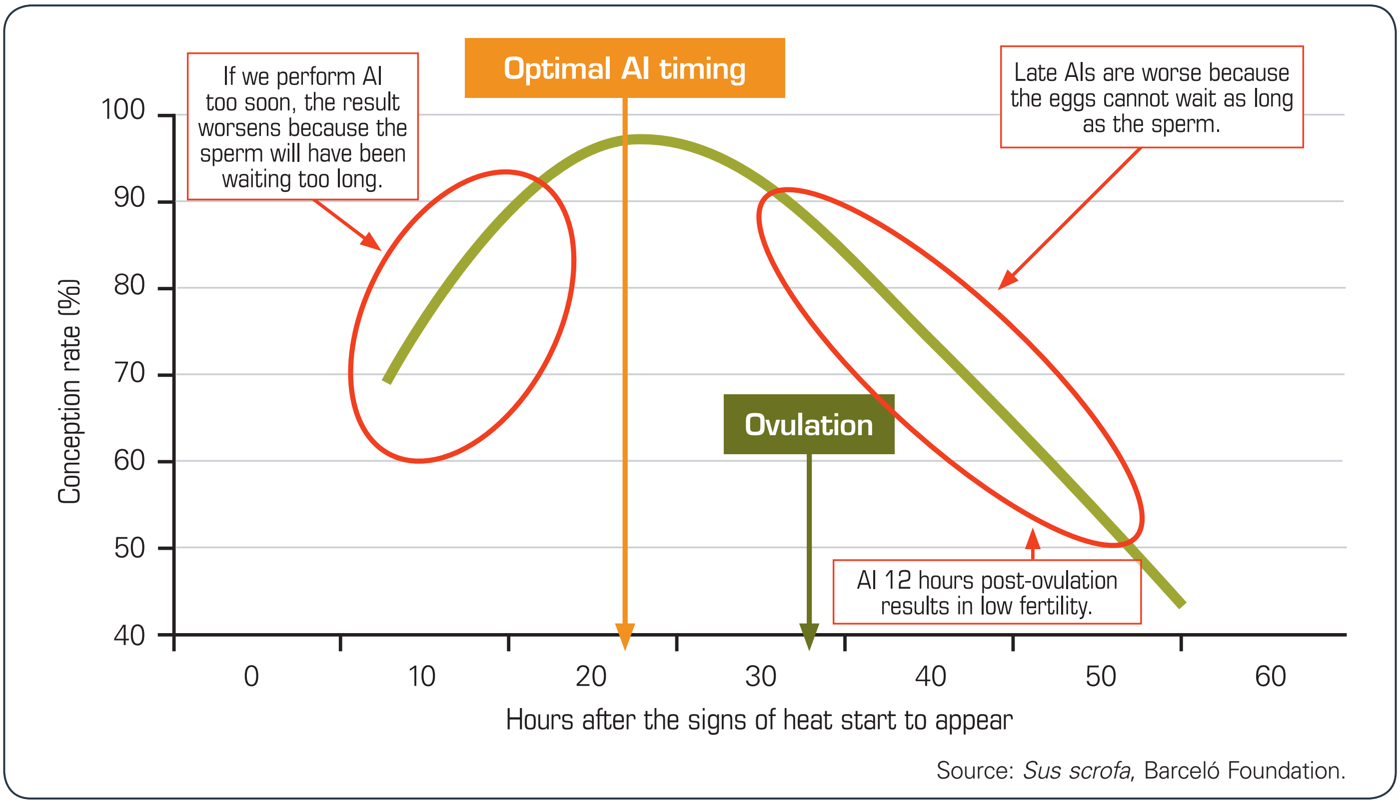
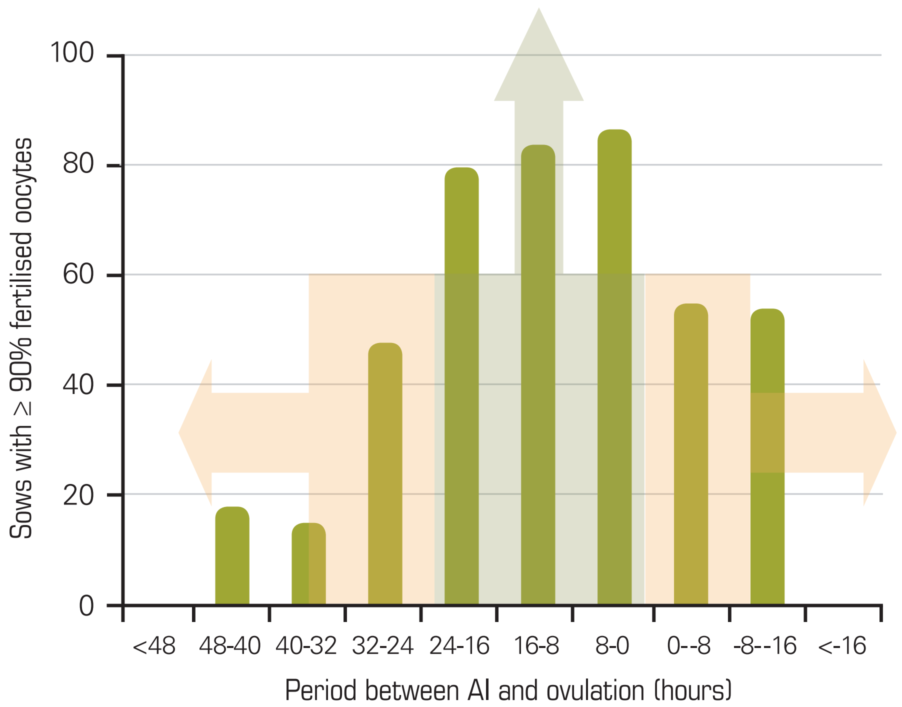


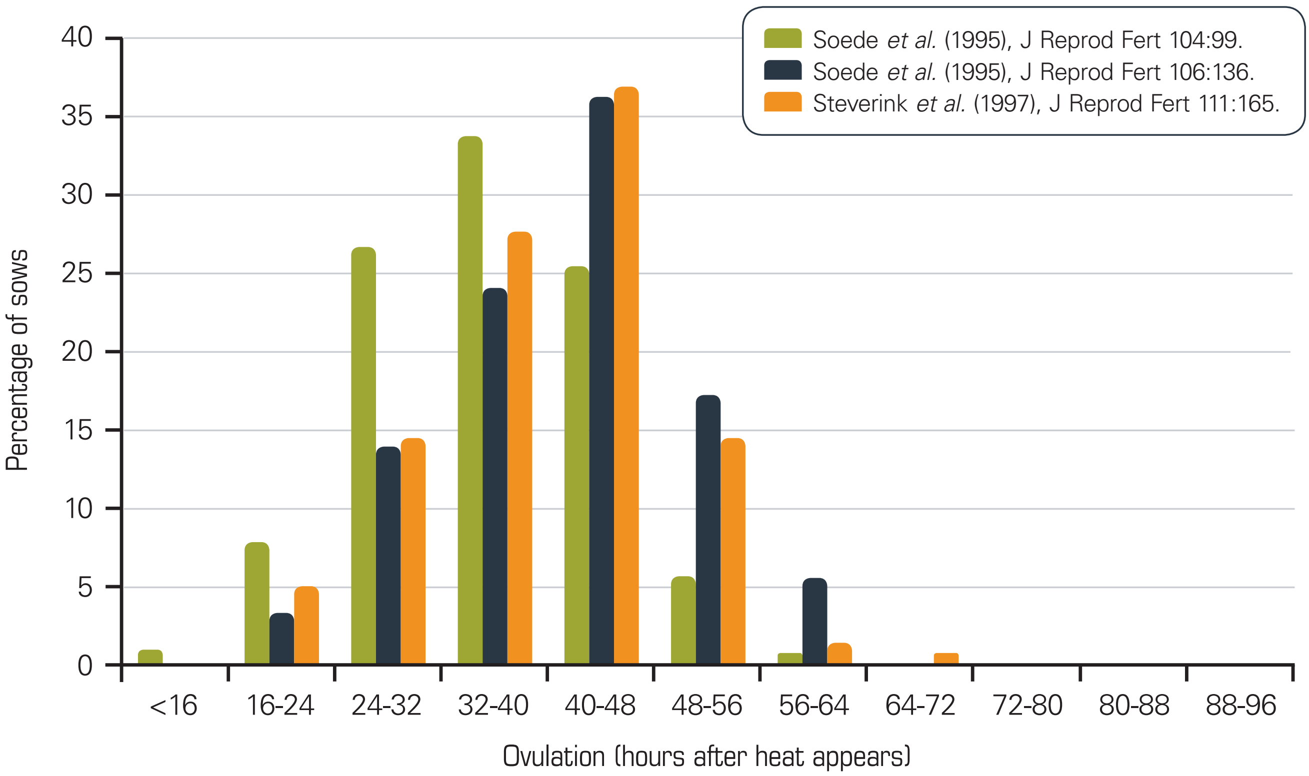
Figure 12. Biggest possible danger: the worst result would be achieved by performing early or late inseminations in relation to ovulation.



Time of AI Before ovulation	Farrowing rate	Litter size
24–36 hours	68%	11.8
0–24 hours	92%	13.2
Time of AI After ovulation	**Farrowing rate**	**Litter size**
0–12 hours	76%	12.3

Source: Soede *et al.* (1995) and Nissen *et al.* (1997).

Figure 13. When we inseminate too early or late for ovulation, we reduce the farrowing rate and the subsequent litter size.



Source: Soede *et al.* (1995) and Steverink *et al.* (1997).

Figure 14. Optimal insemination cannot normally be obtained with a single AI because there is a lot of variation (10–70 hours) between the onset of heat and ovulation.

Maternity: finishing the job

Now that we have achieved our desired number of births and we have the optimal total number of piglets born according to the genetics with which we are working, our aim should be to lose as few piglets as possible during this part of production.

Our primary objective is to reduce losses and to achieve this we must reduce the number of SBs and increase piglet survival.

Reduce the number of stillbirths

This is the main performance point in maternity that we should monitor: the percentage of SBs should not exceed 8% of the total number born.

The most efficient way to avoid SBs is to manage the parity of the farm well, because sows with more cycles are more likely to have SBs in subsequent farrowings (*figure 7*).

Thus, we must do a thorough follow-up during the farrowing and note the foetus expulsion rate to detect

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any problems early. Our goal should be to manually assist only sows with a period of more than 45 minutes between foetuses. The longer the deliveries take, the more risk of SB. Therefore, we must pay special attention to the following sows:

- Those that have completed 6 cycles or more.
- Hyperprolific sows (because they have longer farrowings).
- With SBs in their history.

SBs increase very significantly during the last quarter of the farrowing; therefore, we must be especially vigilant during this time (*figure 15*).

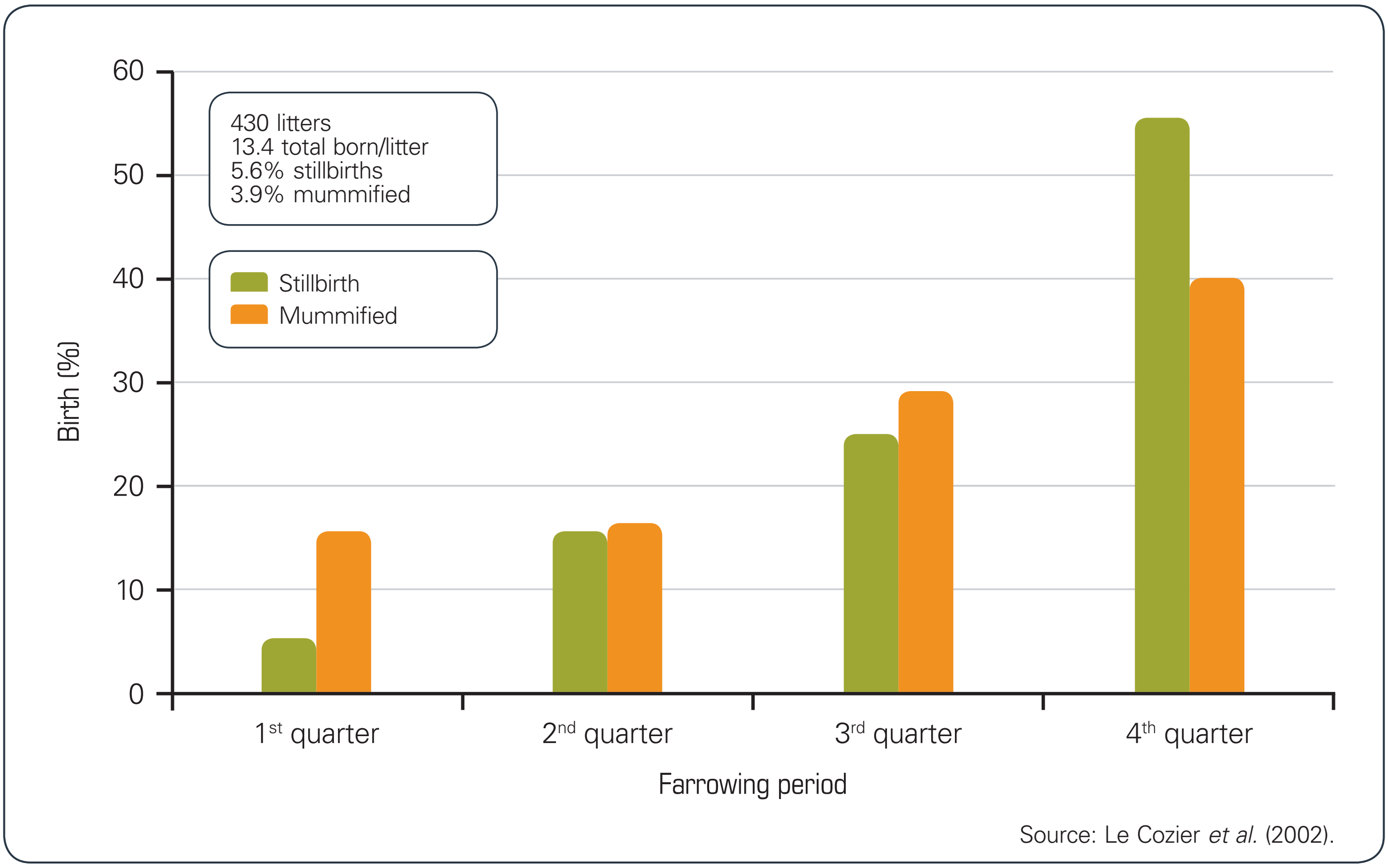

Figure 15. The relationship between stillbirths and the farrowing length.

Tools

We can use the following tools to help us manage this part of production:

- **Prostaglandins** allow us to group more farrowings together. We must be clearly aware of the duration of gestation on our farm so as not to generate farrowings with premature foetuses.
- **Oxytocin:** the use of this hormone is increasingly debated. It must be used with great care because it can harm the normal course of farrowing. If used, we must first perform a birth canal scan to ensure no foetuses are stuck there.
- **Buserelin:** if we used buserelin so that we could perform a single insemination at a fixed time, naturally, more farrowings will be grouped together because we will have previously synchronised conception.

Increase in piglet survival

To increase piglet survival during maternity, we must first understand when most of the piglet mortality occurs on our farm. As shown in *figure 16*, 75% of the piglet deaths during maternity occur during the first three days of life. *Figure 17* compares the farrowing mortality of two farms; the difference between them is manifested as piglet loss during the first few days of life.

To combat farrowing mortality, the most frequent causes must be identified: crushing, starvation, disease, etc. (*figure 18*).

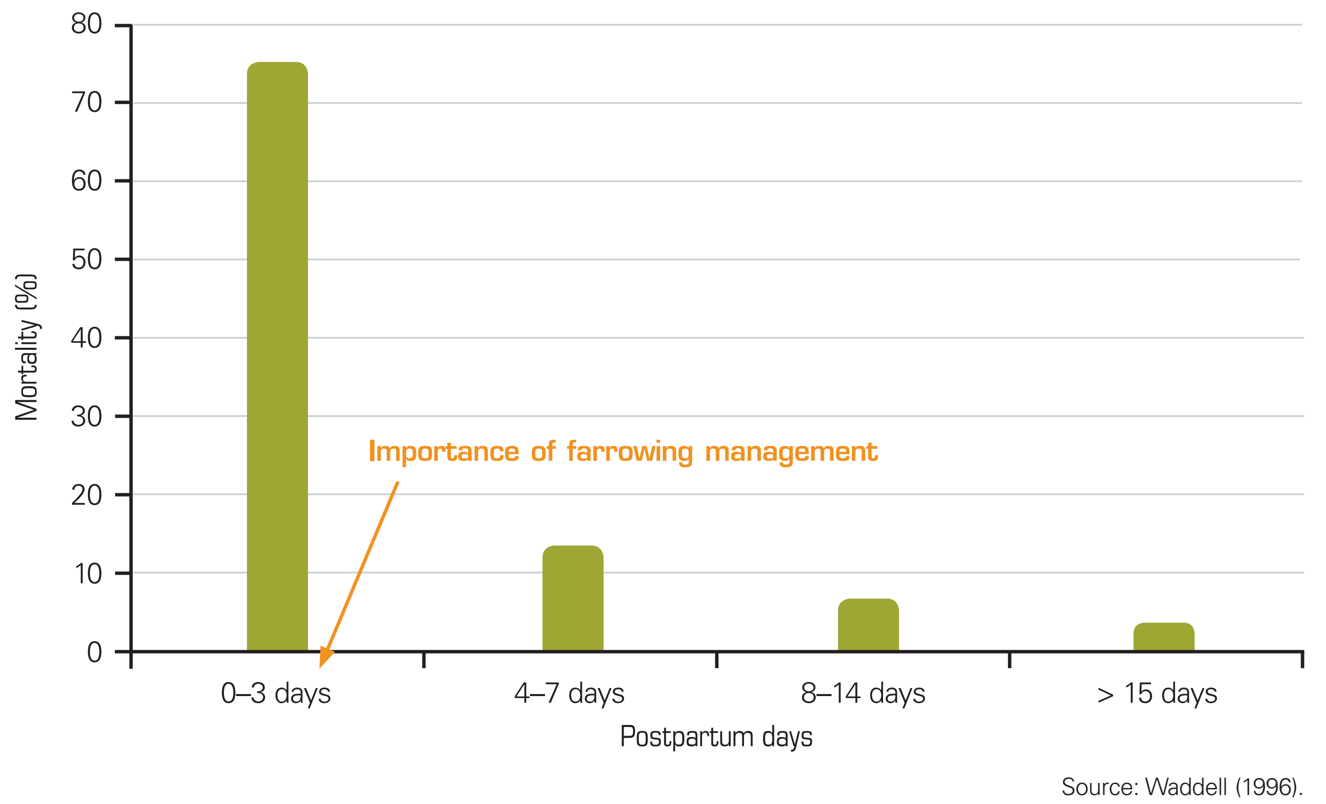

Figure 16. Percentage of post-farrowing mortality as a function of the number of days of life.

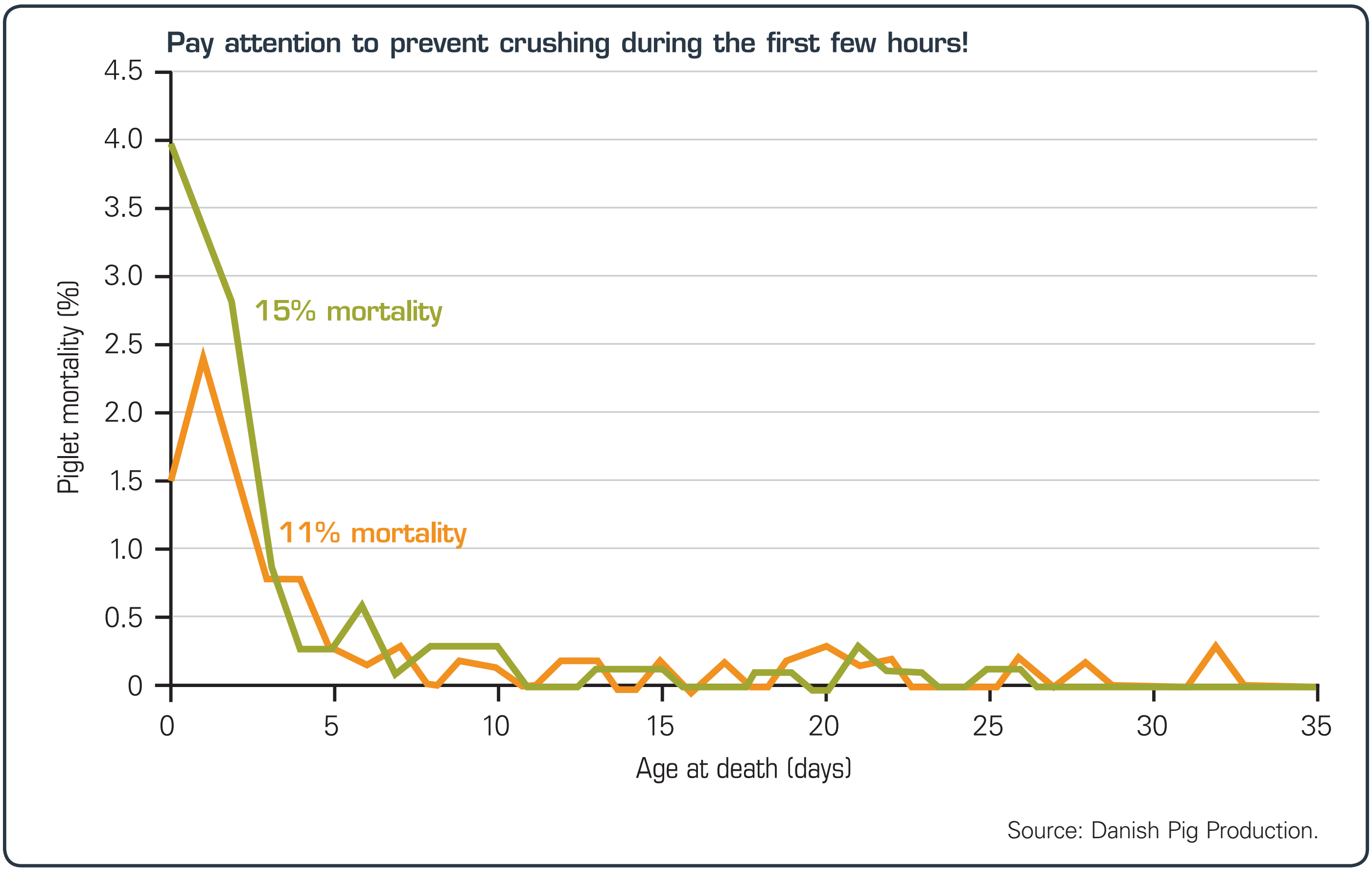

Figure 17. Postpartum mortality.

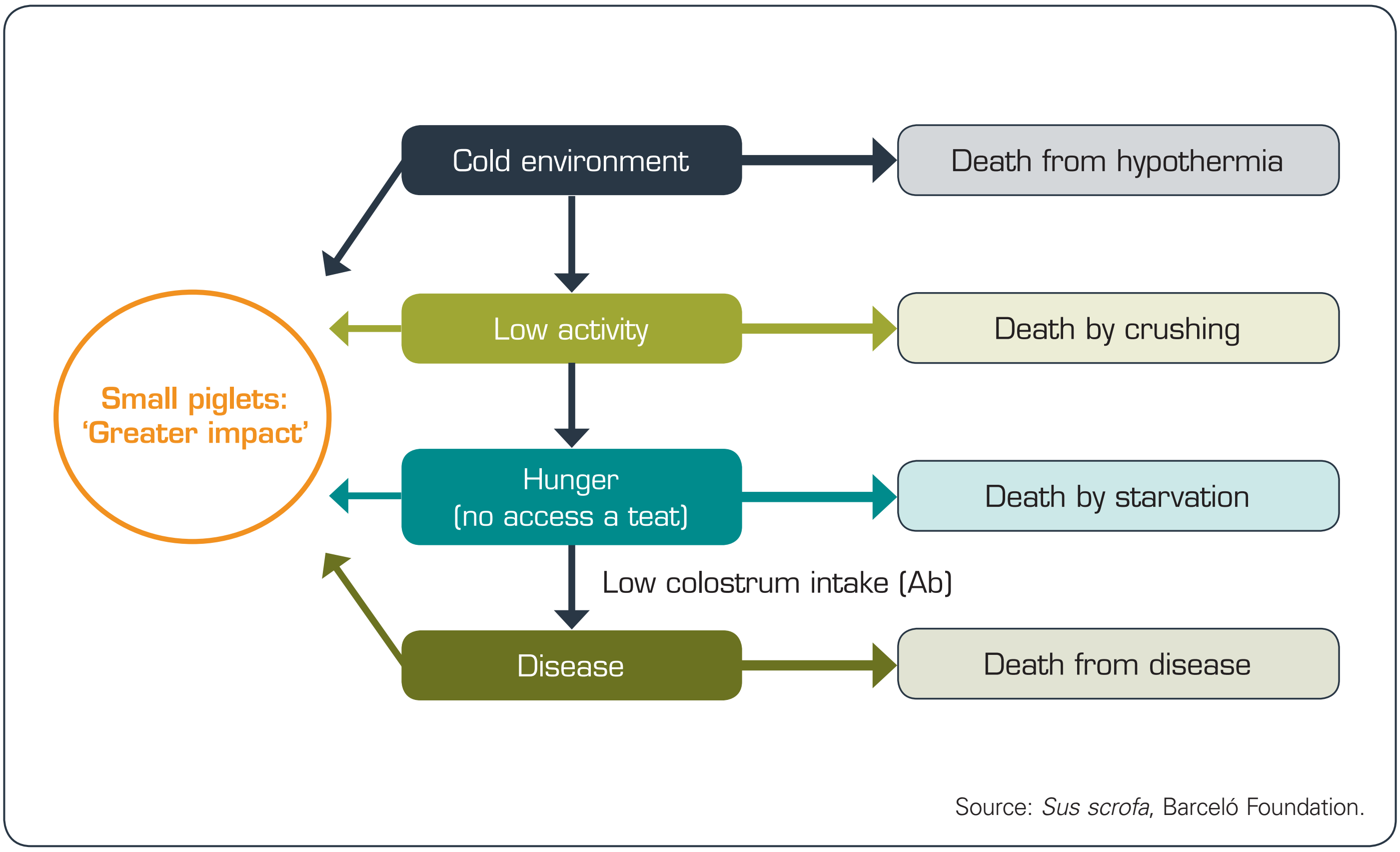

Figure 18. All causes of mortality have cold as a common link.

Piglet survival

The main factors that affect piglet survival in the first days of life are:

- Thermoregulation (*figure 19*). Newborn piglets suffer from a loss of body heat from the time of their birth until they reach a teat. The greater the loss of heat, the lower their chances of survival. This is because the piglet has reduced mobility at this time since it spends the few energy reserves with which it is born to compensate for this loss of body temperature. This makes them more susceptible to being crushed or can cause the late consumption of colostrum meaning that they will fare worse than their peers. Therefore, it is key to manage newly born piglets to minimise heat loss and favour immediate access to a teat.
- Colostrum (*figure 20*). Piglet survival is closely linked to the amount of colostrum they ingest. This is why the last piglets born have a higher mortality rate.
- Time of birth (*figure 21*). It has been shown that the last piglets to be born are those with the highest percentage of mortality.
- Weight at birth (*figure 22*). The weight at birth is another factor that affects mortality in farrowing pens; the lower the weight, the higher the mortality rate. To try to increase the weight at birth, practically every pregnant sow feeding curve recommends increasing the feed rations given during the last few days of gestation. However, there are some authors who argue that this has no effect (Mark Knauer/James Quick, *National Hog Farmer*, February 2019).

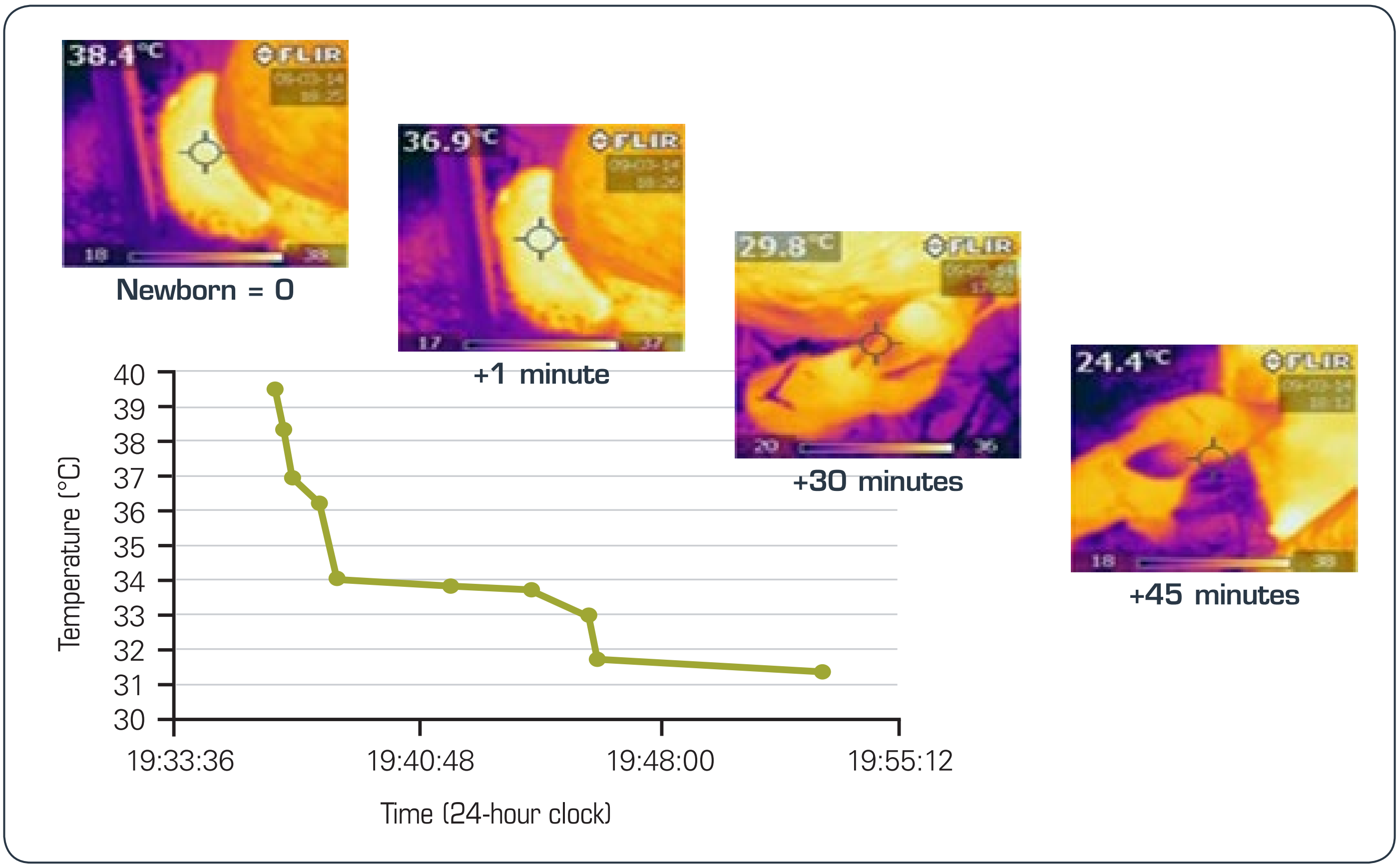

Figure 19. Thermoregulation in newborn piglets.

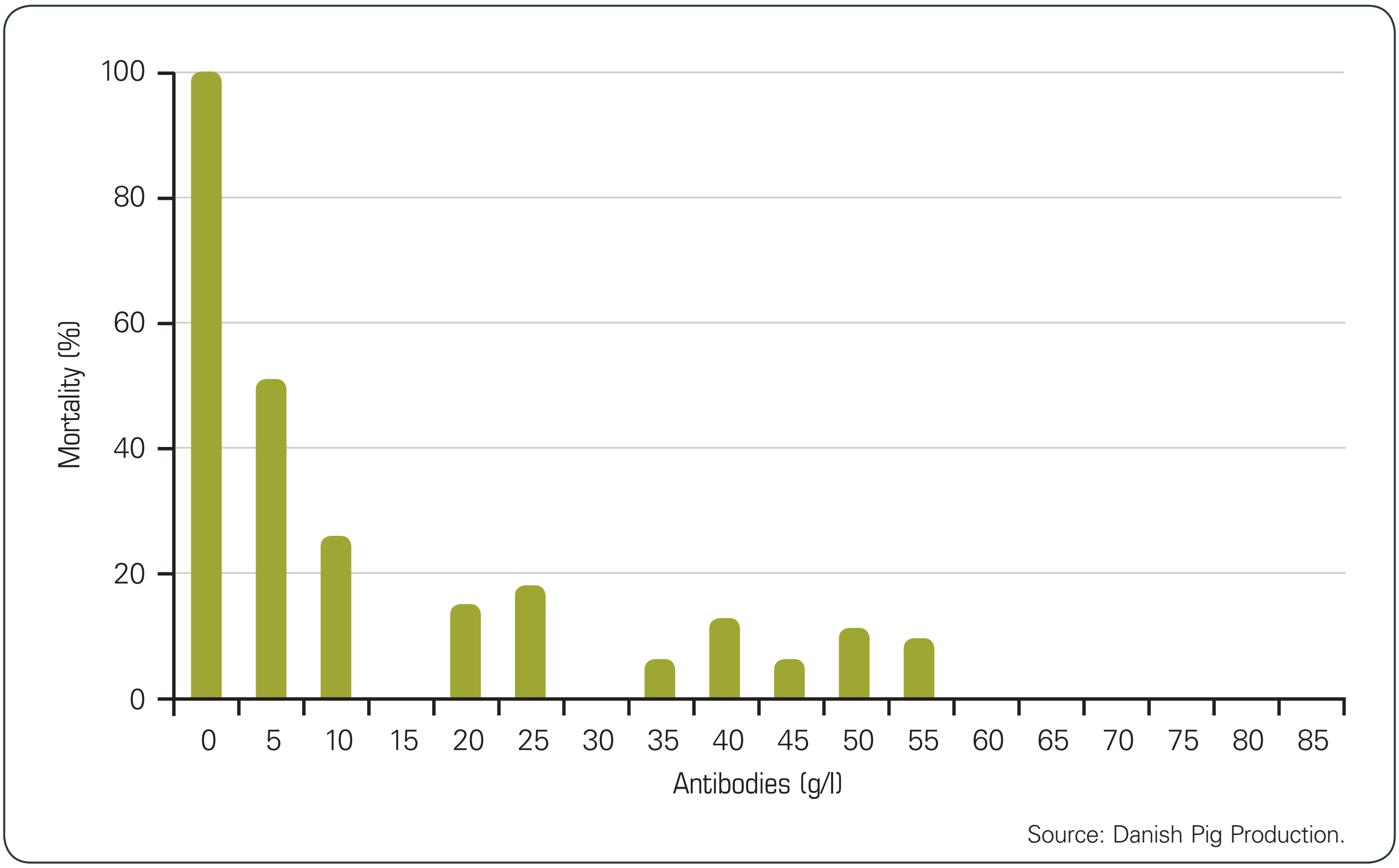

Figure 20. Piglet survival is closely linked to the amount of colostrum they ingest.

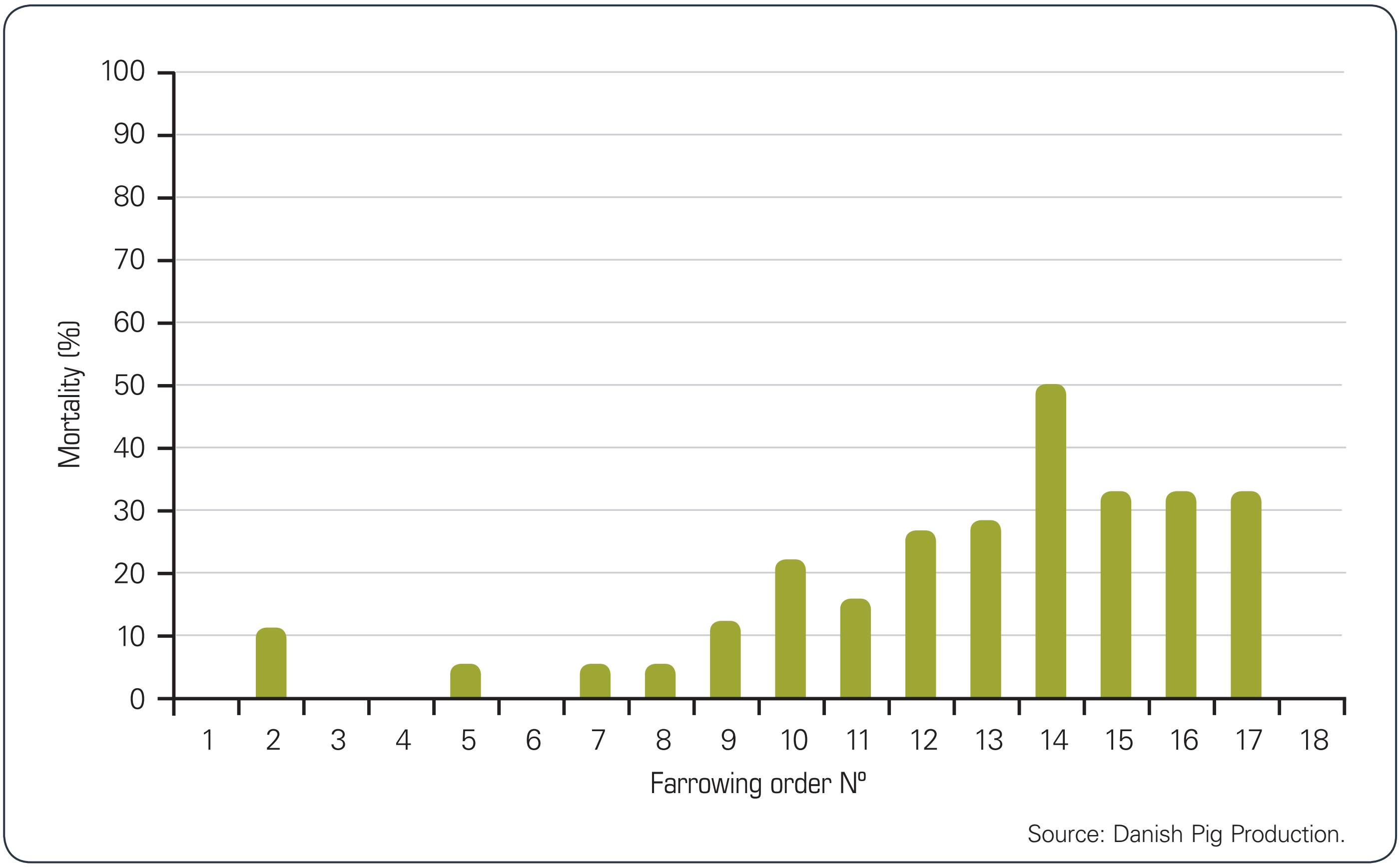

Figure 21. Relationship between the time of birth and the piglet mortality rate.

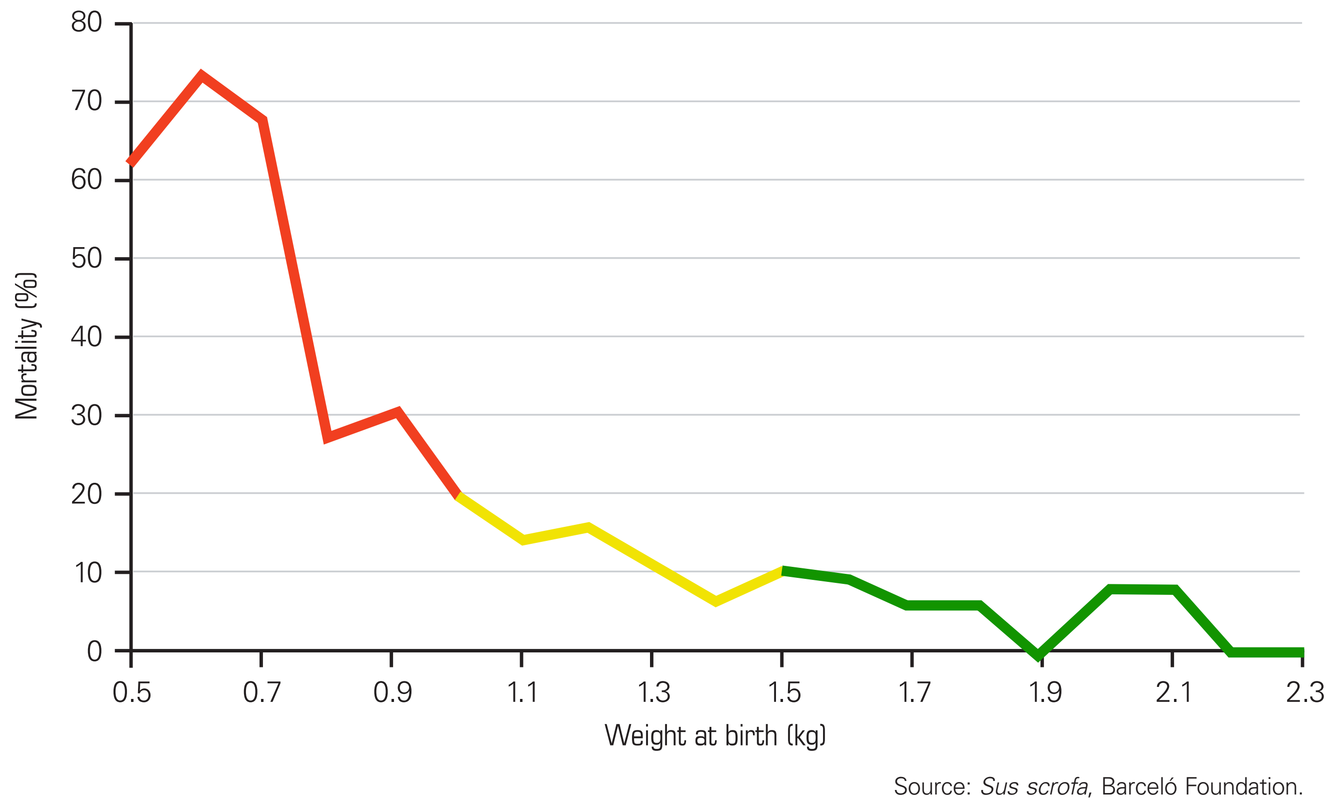

Figure 22. Relationship between birth weight and mortality.

In some experiences with buserelin, an increase in piglet size at birth has been observed (*figure 23*). In this sense, it is not clear if buserelin improves the quality of the ovules, thus favouring subsequent embryo development, or if it simply favours a better farrowing induction strategy as a result of more accurate knowledge about the conception date.

In any case, this is another avenue of investigation that deserves exploration.

All possible causes of mortality have a common link: cold.

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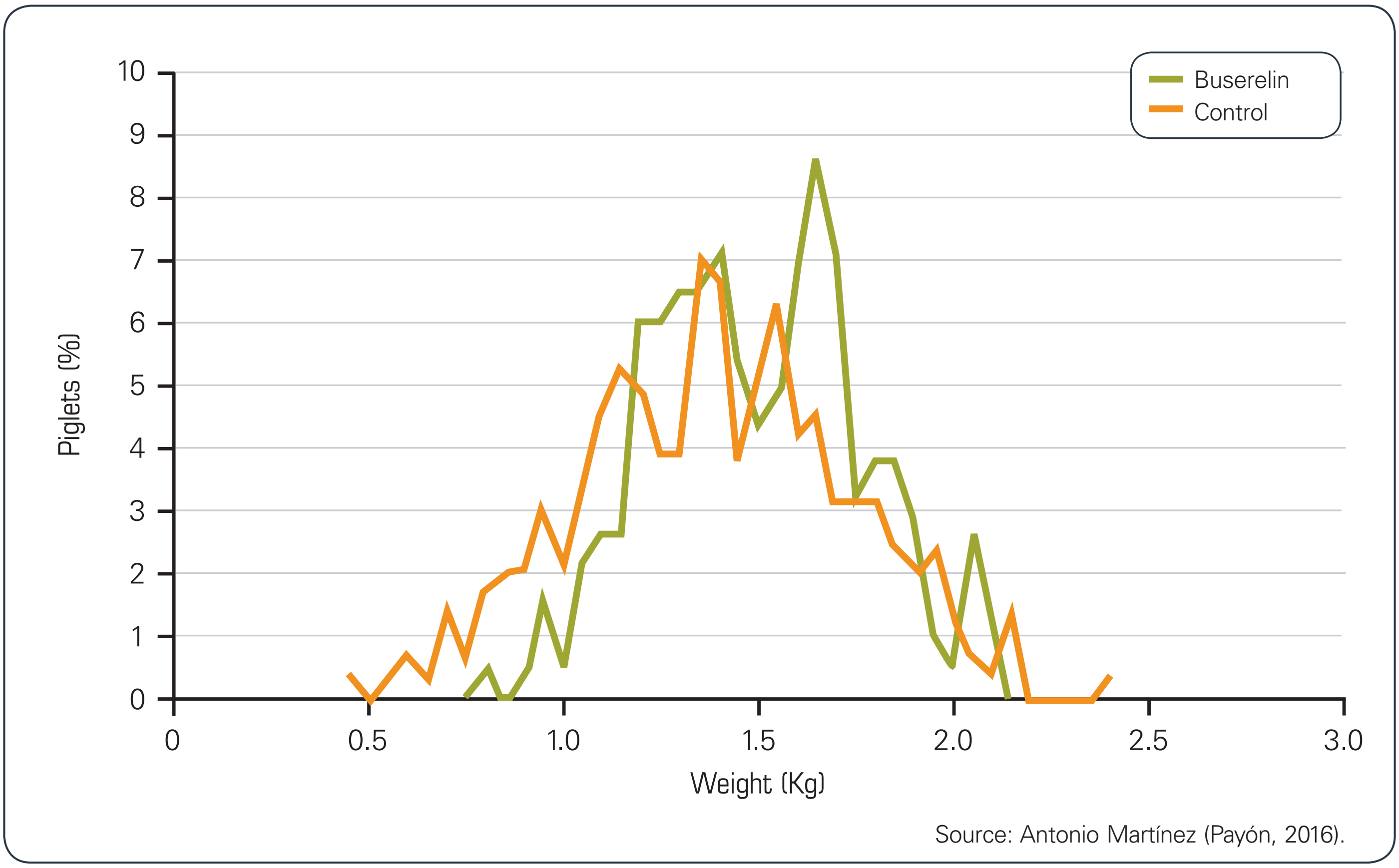

Figure 23. Experience of the effect of buserelin on piglet size at birth.