Reproductive failure in gilts

Gilts, representing 20–25% of overall farm populations, have certain peculiarities that must be considered when analysing any anomaly detected in this group.

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On a farm that...

- Maintains a stable population structure, that is, one that decreases with the cycle number.
- Replaces 40–50% of the population annually.

...the group corresponding to gilts (or sows in their first cycle) represents around 20–25% of the total productive sows.

This implies that gilts represent the largest group on the farm if analysed by cycle number.

One in every 4–5 productive sows are gilts; therefore, their reproductive efficiency plays an important role in the overall efficiency of farms.

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Special characteristics of gilts

Among the differences that characterise gilts, the following are the most notable:

- Only these animals will not have come from a previous lactation at the time of mating.
- They tend to have a shorter heat and the duration of these heats is usually more irregular.
- The signs of heat are not usually as obvious in gilts.
- Gilts have distinctive reproductive system features compared to multiparous sows.
- Gilts come from (and are sometimes still in) a process of adaptation to the disease pathologies present on the farm.
- Finally, in many cases, gilts are not yet adapted to the facilities they will encounter when they go into production (mating-control cages, gestation barns, etc.).

Compared to the other sows that make up the farm population, gilts have certain characteristics that must be considered during their management.

Previous lactations

Because these females have not yet weaned any piglets, they do not come from a previous step in the production process—which for most other sows will mean they come from a catabolic (weight loss) state such as lactation.

This can negatively affect processes such as:

- Them going into heat.
- Maintaining pregnancy.

Their reproductive system

In many cases, intrauterine insemination is not used in primiparous sows because there is often difficulty in introducing the soft part of the catheter.

In contrast, this insemination technique is much more widely used in multiparous sows.

Adaptation

This is a key point because a poorly managed adaptation will negatively affect the future performance of gilts, which may even affect the farm's global performance as the result of general pathological destabilisations.

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Analysis of production results in gilts

We will analyse the gestation results for gilts in by comparing various parameters in order to show the importance of recording these data. This will allow us to more fully analyse their performance and detect critical points of weakness and how these might be improved.

First, we analyse the final result of gestation, that is, the birth rate per cycle number (*figure 1*). Of note, gilts and second-cycle sows usually have the poorest gestation efficiency.

Table 1 shows the different types of reproductive failures that give rise to this reduced farrowing rate.

Data base

The 2018 mating data for white pigs from the PigCHAMP Pro Europa database was used. This database contains data for a total of 290,000 sows, 127,069 first gilt matings, and a total of 628,494 first matings.

Gilts

Theoretically, gilts should be mated under the best possible conditions and, therefore, be more efficient, however, the reality is just the opposite.

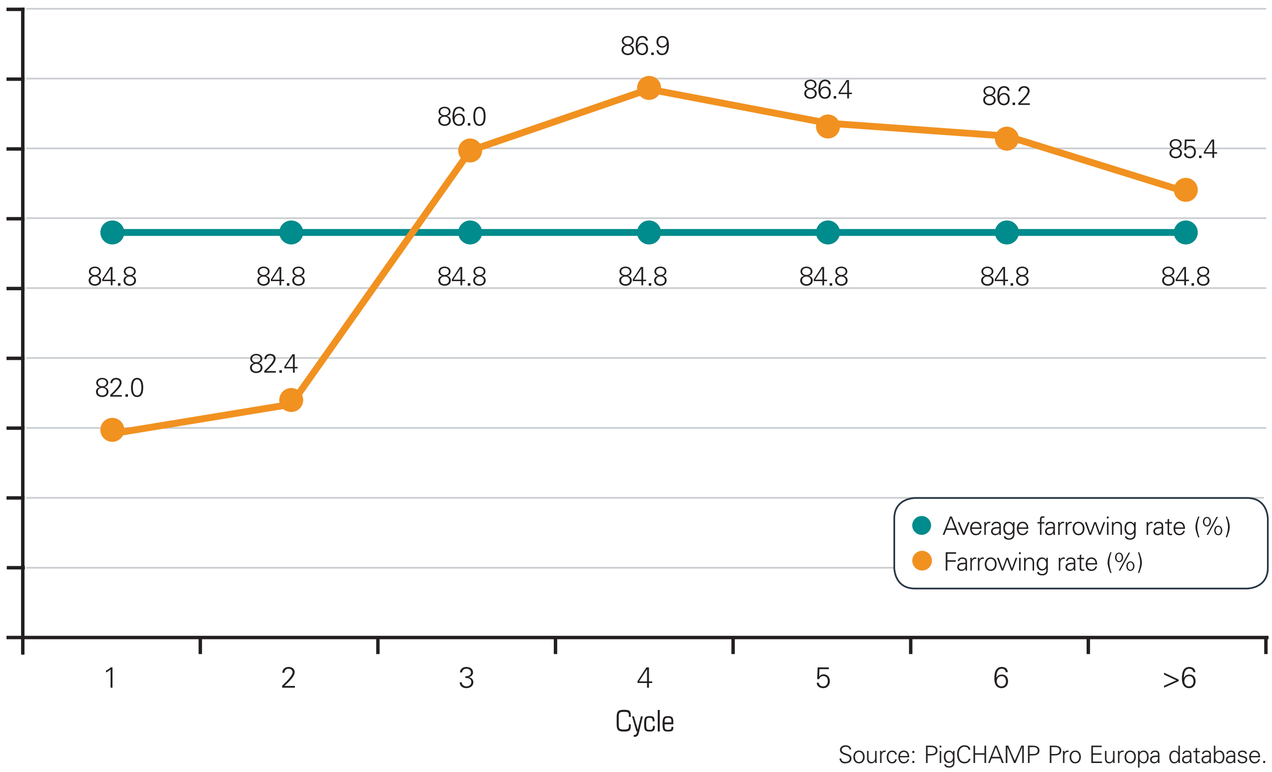


Figure 1. Farrowing rate according to the sow cycle number (2018 matings).

Second cycle

The data from the second cycle were expected because these sows would have come from their first lactation, likely with a significant loss of body condition, coinciding with:

- A high energy requirement as a result of the sow's growth.
- Milk production combined with a lower capacity to ingest feed.

Cycle (N°)	1	2	3	4	5	6	>6	Mean
Repeats (%)	7.9	9.3	6.7	6	5.7	5.2	4.4	6.8
Average repetition interval (days)	36.7	36.6	34.6	33	33.1	33.7	32.2	34.5
Negative diagnosis (%)	1.3	1.3	0.9	0.8	0.8	0.9	1.1	1.1
Empty sows at farrowing (%)	0.9	0.8	0.5	0.5	0.5	0.5	0.5	0.7
Abortions (%)	1.8	1.4	1.4	1.4	1.5	1.4	1.4	1.5
Deaths (%)	1.7	1.5	1.5	1.5	1.6	1.8	1.9	1.6
Sales (%)	1.9	1.8	1.6	1.9	2.1	2.6	4.0	2.2

Source: PigCHAMP Pro Europa database.

Table 1. Pregnancy losses according to the sow cycle number (2018 matings).

Repeats

Table 2 shows the distribution of repetitions according to different cycle intervals. Compared with the other sows, gilts have a higher percentage of repetitions:

- Second-cycle cycling sows (RC2).
- Late repeats (LRs). One of the possible causes of LRs are problems related to the adaptation of gilts to the facilities during the second half of gestation. It is important to take these into account because these repetitions accumulate the highest number of non-productive days (NPDs) and represent a significant extra cost.

In general, there is always an exception and the there is always a margin for improvement in the performance of gilts.

Gilts versus multiparas

- There was a higher than average number of both sows diagnosed negative by ultrasound and those that were empty at farrowing. In relation to this, it is worth noting and considering that many farms that do not register pregnancy diagnoses or sows that are empty at farrowing, and so the actual data for these parameters will be higher.
- The abortion rate was also higher which, together with sows that are empty at farrowing, indicated adaptation problems that were both pathological in nature and related to the facilities (pregnancies confirmed in the barn).
- In particular, the percentage of repetitions was greater than average, and their average interval was longer than that of multiparas.

Cycle	0	1	2	3	4	5	6	7	8	>8	Total
Repeated matings	0 (0.0 %)	12,626 (24.2 %)	12,249 (23.5 %)	7,761 (14.9 %)	6,132 (11.8 %)	5,039 (9.7 %)	4,054 (7.8 %)	2,631 (5.0 %)	1,152 (2.2 %)	498 (1.0 %)	52,142
Repetition interval (days)											
< 18 days (early)	0	451 (3.6 %)	320 (2.6 %)	262 (3.4 %)	298 (4.9 %)	245 (4.9 %)	220 (5.4 %)	141 (5.4 %)	64 (5.6 %)	13 (2.6 %)	2,014 (3.9 %)
18–25 days (cyclical 1st farrowing)	0	4,472 (35.4 %)	4,834 (39.5 %)	3,087 (39.8 %)	2,480 (40.4 %)	2,024 (40.2 %)	1.584 (39.1 %)	1.084 (41.2 %)	521 (45.2 %)	199 (40.0 %)	20,285 (38.9 %)
26–37 days (acyclical)	0	2,407 (19.1 %)	2,909 (23.7 %)	1.826 (23.5 %)	1,463 (23.9 %)	1,226 (24.3 %)	1.012 (25.0 %)	682 (25.9 %)	292 (25.3 %)	151 (30.3 %)	11,968 (23.0 %)
38–46 days (cyclical 2nd farrowing)	0	1,814 (14.4 %)	1,492 (12.2 %)	801 (10.3 %)	628 (10.2 %)	487 (9.7 %)	385 (9.5 %)	235 (8.9 %)	93 (8.1 %)	37 (7.4 %)	5,972 (11.5 %)
More than 46 days (late)	0	3,482 (27.6 %)	2,694 (22.0 %)	1,785 (23.0 %)	1,263 (20.6 %)	1,057 (21.0 %)	853 (21.0 %)	489 (18.6 %)	182 (15.8 %)	98 (19.7 %)	11,903 (22.8 %)
Mean		42.1	38.6	38.9	37.5	37.6	37.8	35.8	34.3	37.2	38.9
Ratios											
Cyclical to acyclical		2.61	2.17	2.13	2.12	2.05	1.95	1.93	2.10	1.56	2.19
Cyclical 1st farrowing to cyclical 2nd farrowing		2.47	3.24	3.85	3.95	4.16	4.11	4.61	5.60	5.38	3.40

Table 2. Distribution of repeats according to the repetition interval and sow cycle number (2018 repetitions).

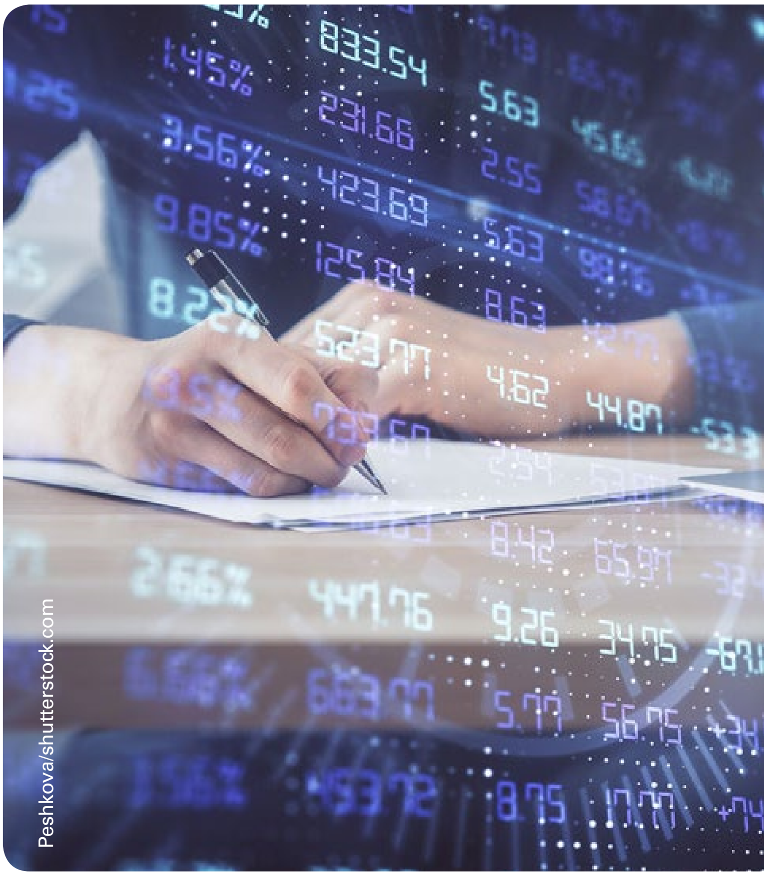
Parameter by parameter...

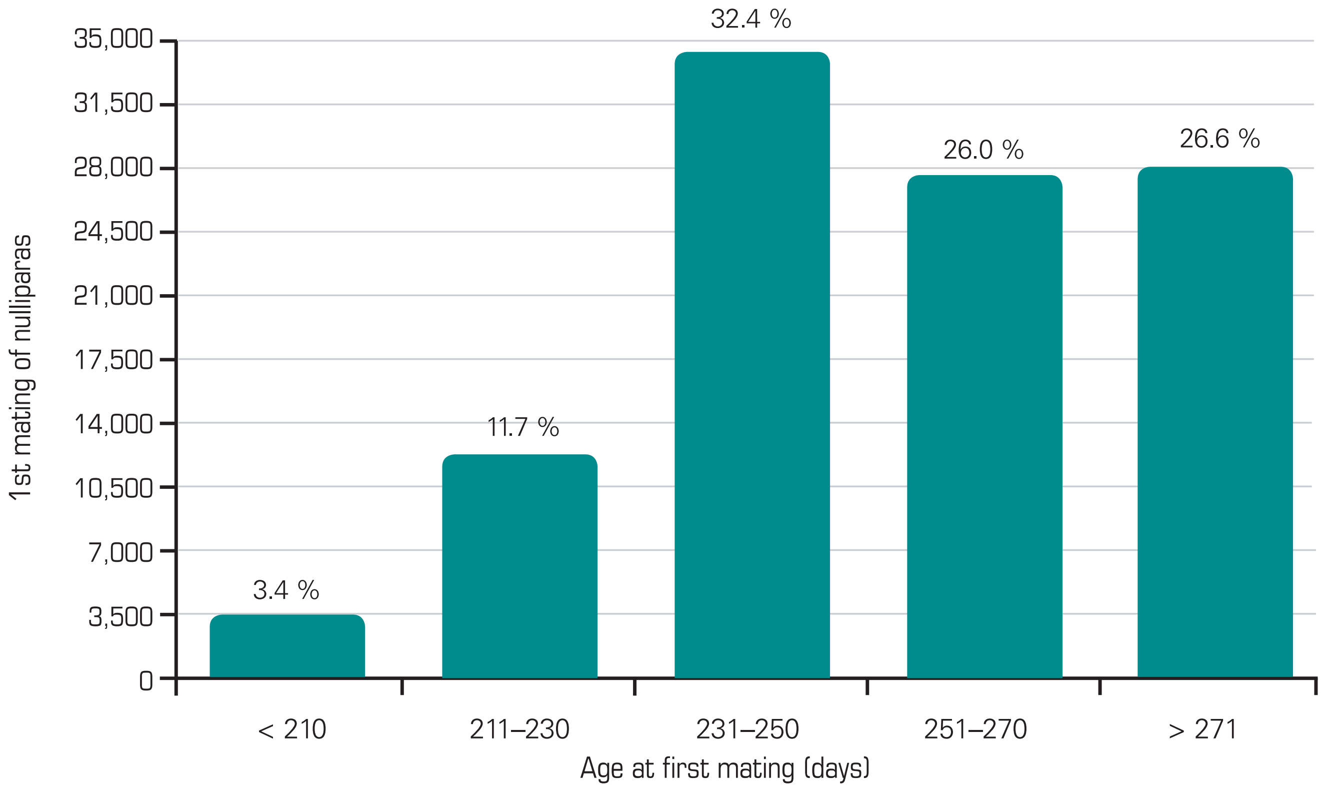
We will now break down the results from gilts according to several different parameters.

Age at first mating

Figure 2 shows the age distribution of gilts mated during 2018, at an average first mating age of 259.9 days. The results by age at the first mating are shown below in *figure 3*.

> **Ideal age**
>
> Logically, the ideal age at first mating depends on the swine genetics, management, and other variables.
>
> In general, an older age at first mating implies an increase in prolificacy until this factor plateaus and is maintained, and after which point, the birth rate reduces.
>
> Therefore, each specific case should be analysed based on these parameters to identify the ideal age at the first coverage.



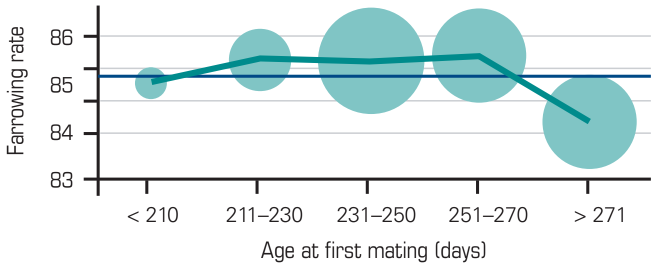


N° of sows	3,563	12,266	34,083	27,328	27,980

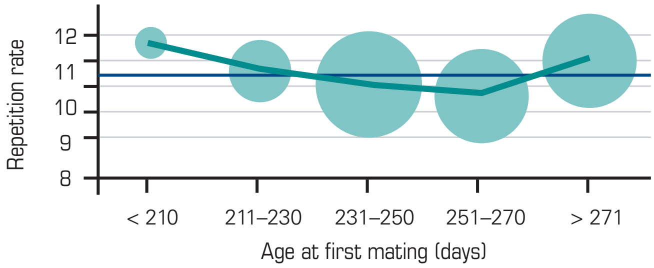
Source: PigCHAMP Pro Europa database.

Figure 2. Histogram of sow age at first mating (2018).

3A. Percentage of repetitions and farrowing rate
(10.4% repetitions, 84.8% farrowing rate).

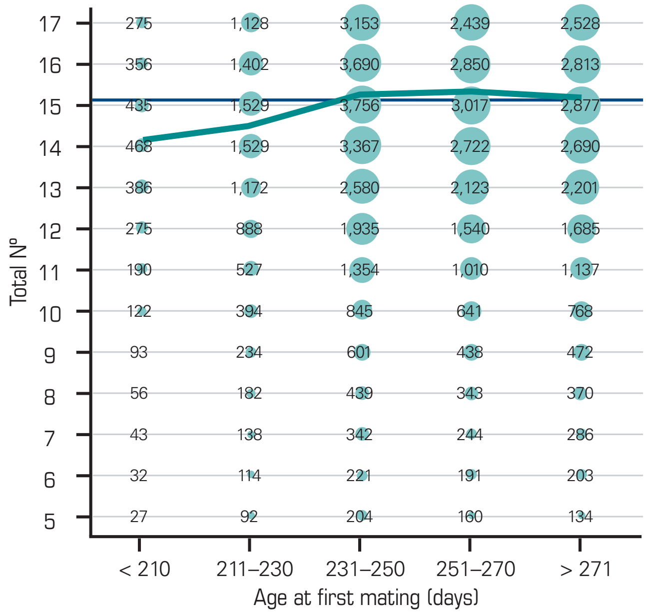


Nº of sows	3,563	12,266	34,083	27,328	27,980
Mean	84.6	85.3	85.2	85.4	83.3



Nº of sows	3,563	12,266	34,083	27,328	27,980
Mean	11.8	10.7	10.0	9.8	11.1

3B. Total number of births
(15.1 total born).



Nº of sows	3,284	11,418	31,363	24,978	25,116
Mean	14.2	14.5	15.3	15.3	15.2

Source: PigCHAMP Pro Europa database.

Figure 3. Performance by age at first mating (2018).

Weight at first mating

In relation to the age at the first mating, sow weight was also an important factor (*figure 4* and *figure 5*). In this case, far fewer farms record this parameter because it is difficult to measure. Thus, considerably less data related to these parameters is available.

In view of the data that was available, we can conclude that weight at first mating:

- Does not have an obvious effect on the birth rate.
- Prolificity increases with sow weight at first mating.

Up to a certain point, an older sow age at the time of first mating implies an increase in prolificacy.

Nº of inseminations per heat

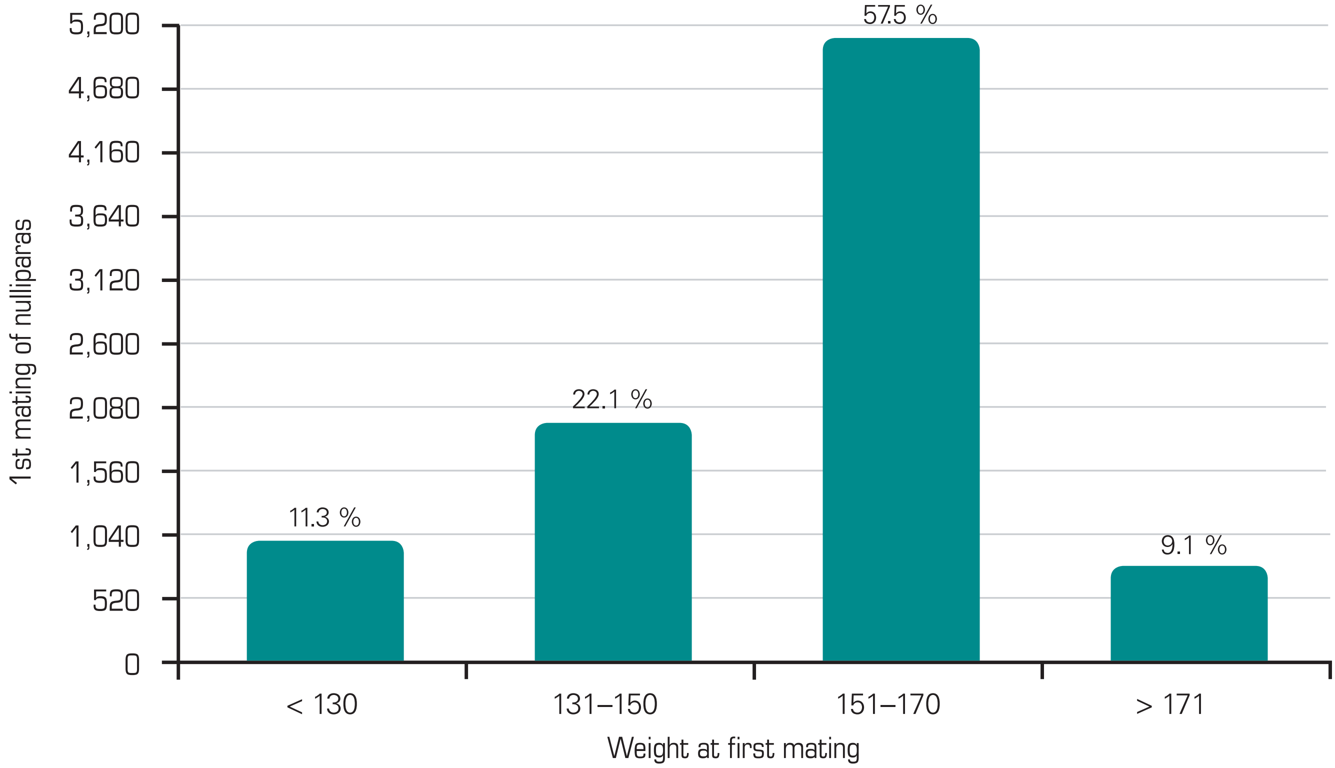
Another variable that can influence gestation performance is the number of inseminations per heat (*table 3*).

For convenience, many farms only register one insemination; however, correctly recording this data can reveal interesting patterns.

Results

The results for both the farrowing and the prolificity rates were clearly better in sows inseminated three times, compared to those that were inseminated twice. Therefore, it is likely that the increased expense in terms of catheters, doses, and management involved in carrying out three inseminations is compensated by better sow performance.

Again, it is important to confirm this conclusion in each specific case, after having registered all the inseminations carried out.

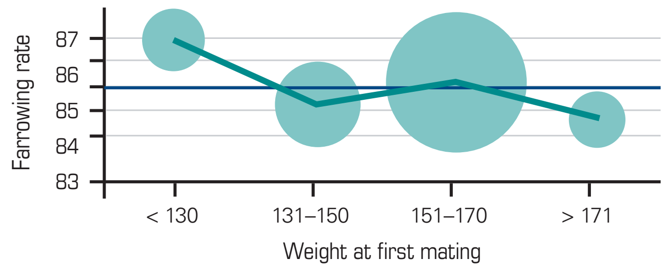


Nº of sows	1,007	1,963	5,102	808

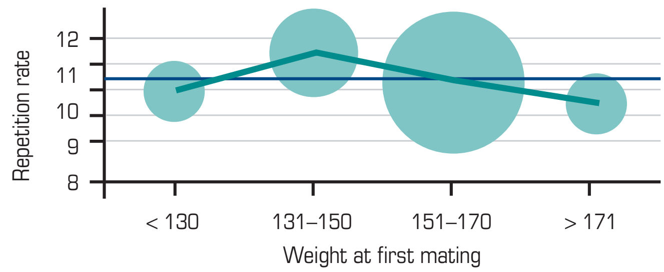
Source: PigCHAMP Pro Europa database.

Figure 4. Histogram of sow weight at first mating (2018).

5A. Percentage of repetitions and farrowing rate
(10.3% repetitions, 84.9% farrowing rate).

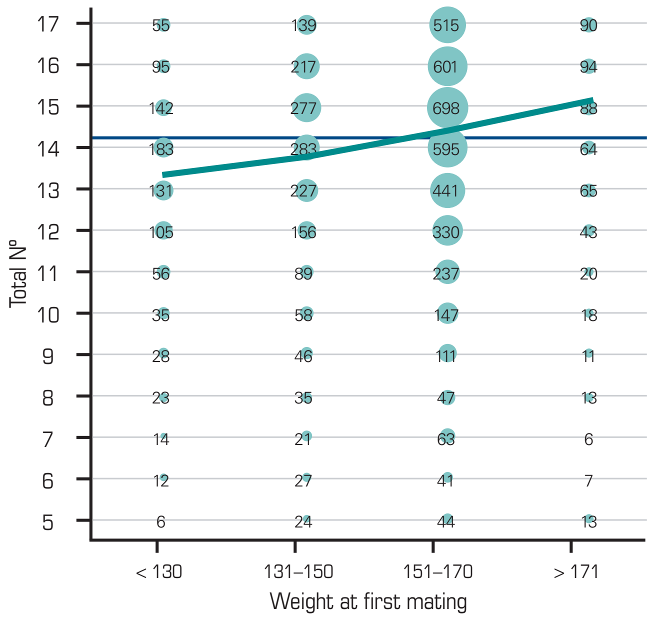


Nº of sows	1,007	1,963	5,102	808
Mean	86.7	84.2	85.1	83.5



Nº of sows	1,007	1,963	5,102	808
Mean	9.8	11.3	10.2	9.4

5B. Total number of births
(14.2 total born).



Nº of sows	946	1,825	4,670	724
Mean	13.3	13.8	14.4	15.2

Source: PigCHAMP Pro Europa database.

Figure 5. Performance by weight at first mating (2018).

Mounts/ Matings	Total matings	Mounts/ AI per mating	% Repeats	Average sow age at farrowing	Farrowing rate	Conception rate	Mean live-born piglets	Mean stillbirths	Mean total piglets born	Mean weaned piglets	% > 125 days
2 matings	15,671	2.0	10.6 %	0.0	83.7 %	84.4 %	13.1	0.9	14.3	12.1	100.0 %
3 matings	5,509	3.0	8.9 %	0.0	87.3 %	87.6 %	13.6	0.9	14.8	12.5	100.0 %
4 matings	931	4.0	8.8 %	0.0	87.9 %	88.0 %	13.5	0.9	14.6	12.4	100.0 %
5 matings	191	5.0	9.9 %	0.0	86.9 %	86.9 %	13.5	0.9	14.7	12.4	100.0 %
Total	22,374	2.4	10.1 %	0.0	84.8 %	85.4 %	13.2	0.9	14.5	12.2	100.0 %
Standard deviation		0.64		0.00			3.48	1.49	3.48	3.72	

Source: PigCHAMP Pro Europa database.

Table 3. Mating results according to the number of inseminations (2018).

N° of heats detected before the first insemination

This is another parameter that can give extremely useful information about the performance of gilts. Again, very few farms record this data, even though it can be extremely useful when making management decisions.

Table 4 shows sow performance based on the number of heats detected prior to their first insemination.

Recording various variables that can affect gestation performance can be particularly useful when trying to detect points for improvement.

Heats detected (only first matings in nulliparas)	Total matings	Mounts/AI per mating	% Repeats	Average sow age at farrowing	Farrowing rate	Conception rate	Mean live-born piglets	Mean stillbirths	Mean total piglets born	Mean weaned piglets	% > 125 days
1	3,811	1.3	8.4 %	0.0	86.3 %	87.8 %	13.2	1.0	14.6	12.4	100.0 %
2	1,572	1.2	6.8 %	0.0	89.4 %	89.6 %	13.3	1.0	14.7	12.8	100.0 %
3	408	1.1	9.3 %	0.0	86.3 %	86.3 %	13.3	1.0	14.7	12.7	100.0 %
Total	5,859	1.2	8.1 %	0.0	87.1 %	88.2 %	13.2	1.0	14.7	12.6	100.0 %
Standard deviation		0.51		0.0			3.29	1.57	3.27	4.71	

These data indicate that the sows mated after two heat cycles have been detected perform better compared to those mated after one or three heats, although in this case the difference is not as clear as it is for the number of inseminations per heat. Therefore, each farm should carry out its own specific studies for their situation.

Source: PigCHAMP Pro Europa database.

Table 4. Mating results according to the number of previously detected heats (2018).

Day of the week of the first insemination

Finally, another parameter that sometimes shows performance differences is the day of the week of the first insemination (*table 5*).

In this case, there were no appreciable differences in the global result, although we did find some wide variations at individual farms.

The differences are usually related to matings performed at the weekend, or even on Monday, and may be related to semen preservation.

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Day of the week	Total matings	Mounts/AI per mating	% Repeats	Average sow age at farrowing	Farrowing rate	Conception rate	Mean live-born piglets	Mean stillbirths	Mean total piglets born	Mean weaned piglets	% > 125 days
Sunday	11,485	1.3	10.8 %	0.0	83.0 %	84.7 %	13.4	1.0	14.7	12.5	100.0 %
Monday	25,353	1.3	11.9 %	0.0	81.6 %	83.7 %	13.4	1.0	14.7	12.5	100.0 %
Tuesday	21,280	1.3	10.5 %	0.0	83.4 %	84.7 %	13.7	1.0	15.1	12.7	100.0 %
Wednesday	19,602	1.2	10.2 %	0.0	83.5 %	84.6 %	13.9	1.0	15.2	12.8	100.0 %
Thursday	18,219	1.2	9.7 %	0.0	84.6 %	85.3 %	14.1	1.0	15.5	12.8	100.0 %
Friday	16,635	1.2	10.6 %	0.0	83.5 %	84.6 %	13.6	1.0	15.0	12.6	100.0 %
Saturday	13,396	1.2	11.1 %	0.0	82.8 %	84.0 %	13.5	1.0	14.8	12.5	100.0 %
Total	125,970	1.2	10.7 %	0.0	83.2 %	84.5 %	13.7	1.0	15.0	12.6	100.0 %
Standard deviation		0.59		0.0			3.76	1.58	3.78	3.87	

Source: PigCHAMP Pro Europa database.

Table 5. Mating result according to the day of the week (2018).

Conclusions

Of course, other variables can also be considered when analysing performance, including the thickness of the dorsal fat at the time of insemination, the pattern of inseminations during heat, the type of insemination, and the operator responsible, etc.

Therefore, to summarise this article, we can conclude that:

- With logical exceptions, the gestation efficiency of the gilts at our farms is generally lower than expected. Thus, we still have room for improvement in terms of factors such as adaptation, heat stimulation and detection, and insemination and management guidelines and techniques during the first gestation.
- Keeping records of various variables that could affect gestation performance can be especially useful when trying to detect the parameter ranges and values that produce the optimum results on each particular farm, as well as for identifying points that could be improved. Logically, this means that it must be possible to register these variables and the appropriate tools must be available to be able to analyse these data.