Understanding the importance of reducing pig weight variability

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In a sector aiming at standardising the final product at the maximum, variability in pig weight at slaughter age is still one of the major issues in the swine industry nowadays.

Producers often talk in terms of weight average, treating a batch as if it was a single animal. Consequently, the batch will be ready for selling when, on average, it reaches the optimal weight for slaughter.

However, when these pigs are evaluated, they will be considered individually: some will fall under the desired weight range, some will fall over (both carrying economic penalties), and only a few will fall inside the optimal weight range, reaching its full economical potential.

It is when we look at every group of pigs as a distribution instead of as an average that we quickly understand that, with the same average weight, the key is in reducing variance to get more animals falling within the desired range.

Also, big differences in pig weight at slaughter age affect the optimal management of a farm, preventing the implementation of efficient all-in all-out programs.

Start of variability

Variability in pig weight can start at birth. It has been widely documented that slight variations of piglet weight at birth amplify through the pig's life causing (partially) the important differences that we can then find at slaughter age.

This 'amplification effect' has been differently quantified in literature: a difference of 0.73g between the 10% and the 90% percentile at birth may become a difference of 4.73kg at fattening or 1.1kg of difference at weaning may become 3.8kg of difference at 138 days of age.

Regardless of the numerical difference per se, what is clear is that trying to homogenise piglets' birth weight could be a key factor to achieve more homogeneous pigs at slaughter.

However, and despite the theory being well known, the reality cannot be more different.

The reality at birth

If a batch of pigs at slaughter age are better described as a distribution than an average, the same applies to just born piglets. Piglets born within the same farrowing period (assuming batch management) can fall within a large range of weights. In recent data, it was shown that the difference between the 5% lightest and the 5% heaviest piglets can be more than 6kg.

Other impacts

Piglet birth weight impacts not only the final pig weight, as we have just seen, but it also has a strong influence on piglet survival rate, or better said, on pre and post-weaning piglet mortality.

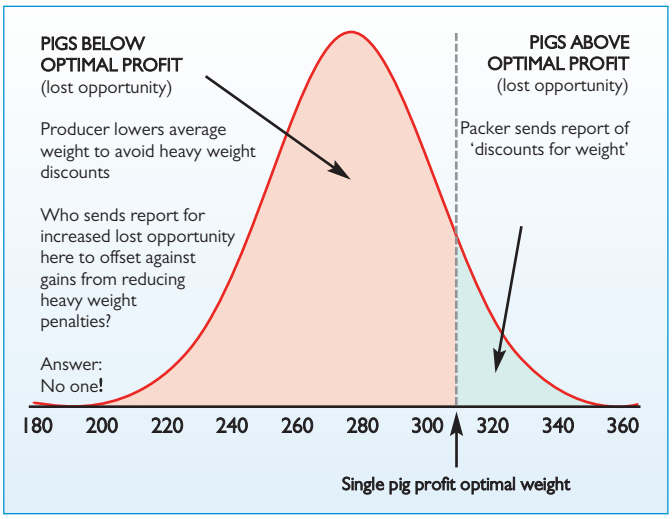

Fig. 1. Selling pigs as a distribution of weights (Di Pietri 2014).

Very recently A. Vidal demonstrated that the cumulated percentage of mortality (from day 0 to day 138) for the group of pigs coming from the lightest piglets in a specific batch (weighing less than 3kg) could rise up to 33%, whereas the mortality for the pigs coming from the heaviest groups (more than 9kg) was about 0%.

Therefore there are two reasons why we should be aiming at reducing piglet birth weight variability:

- To have more homogeneous pigs at slaughter.
- To have less small piglets thus reducing piglet mortality.

Variability at birth

We used to think that age at birth is 0 days, but this is not exactly true. At birth a piglet can be from 112 to 119 days old (ie. the gestation length).

We can say that variability in piglet weight starts before birth and comes from two sources. Indeed we have:

- Variability in piglets born from the same sow.
- Variability between piglets from different sows (different ages at birth).

Despite the first type of variability

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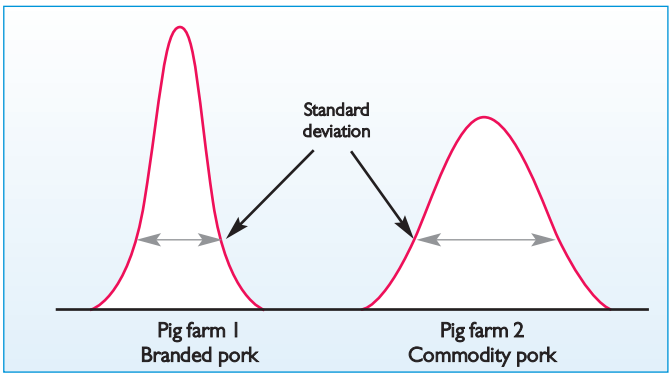
Table 1. The amplification effect (A. Vela, ESPHM 2015).

	Percentage						
Days	**5**	**10**	**25**	**50**	**75**	**90**	**95**
Birth	0.83	1.01	1.22	1.38	1.51	1.74	1.91
			0.73				
Weaning	4.13	5.06	5.31	5.81	6.11	6.76	6.86
			1.70				
Fattening	18.82	21.19	21.91	23.03	24.64	25.92	26.46
			4.73				

Fig. 2. Which farm achieves higher profit?



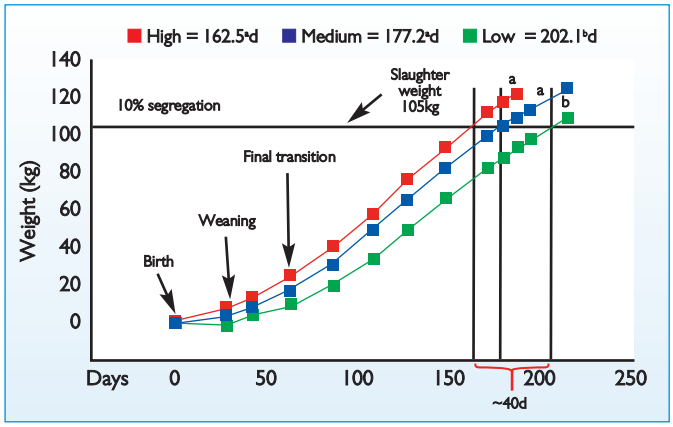


Fig. 3. Pig weight variability from birth to slaughter (Sergi López-Vergé and David Solà-Oriol, 2015).

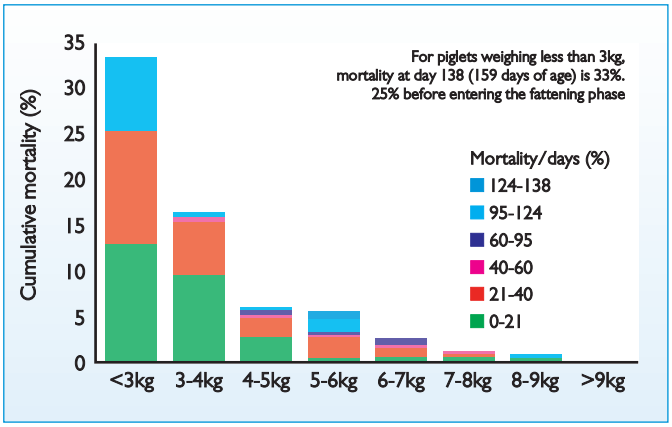


Fig. 5. Evolution of the situation at the start of the weaning phase (Albert Vidal, 2014).

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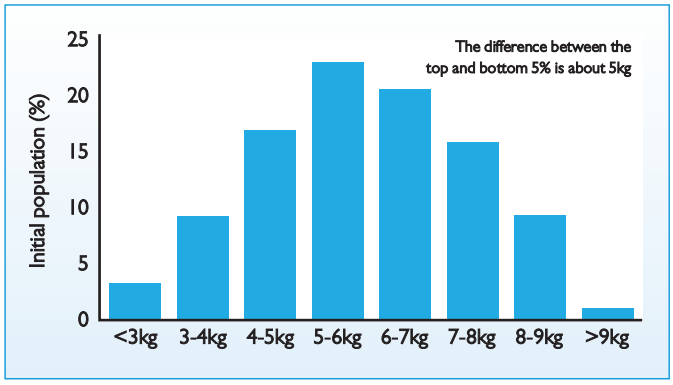
being badly understood and thus difficult to impact, we know some of the factors that explain the second type.

Variability within piglets from different sows can be explained, among others, by three main factors:

- Different conception date: Sows come to heat at different days during the week. Additionally, they are usually inseminated 2-3 times at different moments. It is logical to think that not all the sows will get pregnant at the same time. We end up having every day of the week as a possible conception day.

Fig. 4. Situation at the start of the weaning phase (Albert Vidal, 2014).



- Different birth day: for a single batch, if not synchronised, the farrows may extend during a whole week, giving birth to piglets of different ages.
- Semen from different males.

Piglets born from the same batch of sows will usually be raised together. This means that they will be weaned at the same time, fed equally, vaccinated at the same moment and treated with the same dose of antibiotic (calculated from the average age of the batch and thus theoretical average weight).

However, as we have seen, they may have quite different ages, which means that they might still have different feed needs and might still be at different stages of the development of their immunological system.

Some of the consequences of this can include digestive problems, failures in vaccination or antibiotic over or under-dosing. So, how can we homogenise piglet birth weight? If we concentrate on reducing variability within piglets from a single batch and from different sows, we have two leverages to play with:

- Synchronisation of ovulation, of insemination and of parturition to obtain piglets with the same age.
- A single insemination that would allow us to use fewer males, thus selecting the best ones, and reducing genetic variability.

Fortunately nowadays we can find market solutions to work towards these goals, such as:

- GnRH analogues (such as buserelin) to synchronise ovulation and consequently needing only one insemination at a fixed time to achieve the same good results.
- Prostaglandins (such as cloprostenol) to synchronise parturition.

If the fight against pig weight variability is far from being over, we have started understanding some of the factors we can influence to control and reduce it as much as possible. ■

References are available from the author on request