Starting up a sow farm

This article explains how to start up a sow farm, including how to plan for the required breeding stock and establish production of the sow farm.

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(Images provided by the author)

In our day-to-day work as veterinarians, we normally deal with farms that are already operating, where the infrastructure, design and even the working practices were established by someone else some time ago.

Seldom do we have the opportunity to organise the stocking and start-up of a farm. This is an exciting challenge that requires that we deal with novel situations we haven't thought about before, and it is a great opportunity to learn.

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Source: Fran Gonzalvo (2020)

The challenge of starting up a farm Targets we should set:

- Acclimatisation of the animals: to the facilities and new health conditions.
- First-time mating of all the gilts at the optimal age, weight and physical condition.
- Establishing and maintaining homogeneous mating batches.
- Quickly establishing the highest production cycle, ensuring that farrowing targets are met in all the batches.
- Staggered addition of nulliparous sows during the first 7 parities (3 years) in order to reach the ideal population structure as soon as possible.

Calculating and establishing production targets

Although we are used to determining the size of a farm based on the approximate average number of animals in production, the key to determining the size of a sow farm are (*Table 1*):

- The farrowing targets.
- The organisation of the animals into batches.

For example, in a farm with 160 farrows per week, the number of productive sows can fluctuate between 3,200 and 3,600 and between 640 and 800 farrowing pens may be needed.

Another aspect to be determined is the desired lactation length, given that, together with the number of batches, this will also determine the number of sows required and the number of farrowing pens to be built (these are the limiting factors).

As shown in *Table 2*, how the space is used can sig-nifi-cantly impact the design and cost of the facilities for the same farrowing target. One must then decide how best to manage these aspects for the maximum possible benefit:

Batch management	Lactation days	Farrowing batches	Total batches on the farm	Comments
Weekly	21	4	20	
	24	4	20.5	Two weanings per week
	28	5	21	
2 weeks	21	2	10	
4 weeks		1	5	
3 weeks	28	2	7	
5 weeks		1	4	
2/3 weeks	28	2	8	Combines the 2- and 3-week systems

The table shows how the sow batch population would be organised depending on the way that mating, farrowing and weaning tasks are grouped.

Source: Fran Gonzalvo (2020).

Table 1. Options for farrowing groups according to the batch farrowing system

Option	Farrows/week target	Approx. sow population	Batches on the farm	Total no. of farrowing pens	Lactation days
1	160	3,200	20	640 (4 weeks)	21
2	160	3,350	20.5	640 (4 weeks)	24
3	160 **(170)***	3,600	20.5	680 (4.25–**4 weeks**)	26-**24**
4	160	3,500	20.5	720 (4.5 weeks)	26
5	160	3,450	21	800 (5 weeks)	28

The table shows different options for organising weekly farrowing batches with the same farrowing target.

Source: Fran Gonzalvo (2020).

Table 2. Pig population and farrowing pens needed on a farm of 160 farrows per week (according to the different batch management options).

Option 1

Option 1 provides maximum pig flow with the minimum number of sows, but with a short lactation period, possibly under 21 days.

The intermediate option involve more ingenious use of space in the farrowing pens.

Option 2

Option 2 involves 24 lactation days with only four batches in the farrowing pens.

The strategy is to achieve two weanings per week (Monday and Thursday) so that, in practice, the four batches in the farrowing barn are divided into 8 "half-batches". In this way, the acclimatisation period between confining the sow in the farrowing pen and the farrow is cut in half, leaving the remaining time for the litter to be in the pen, from farrowing until weaning (*Figure 1*).

This requires an extra half-batch of pregnant sows to ensure pig flow, taking into account that the sows will be changing batch each cycle. Monday weaners will be mated on Thursday, Monday farrows and the weaners on the following Thursday, in the next round (*Figure 2*).

Option 3

Options 3 and 4 are variants of Option 2. The working system is the same, but additional space for a quarter or half-batch is built in the breeding barn.

This option allows for housing an excess of up to 10 farrows/week above the target, without having to accelerate weaning in a pen, nor reduce the lactation period to less than 24 days.

Option 4

Options 3 and 4 are variants of Option 2. Same working system, but additional space for a quarter-batch or half-batch is built in the breeding barn.

Option 5

This option allows for a stable average weaning period of 26 days, or to use the extra space to house nursing sows without reducing the 24-day lactation period.

In this case, lactation is extended to 28 days, which means there must be another batch of sows to ensure pig flow, and an additional 25% farrowing pens must be built.

Source: Fran Gonzalvo (2020)

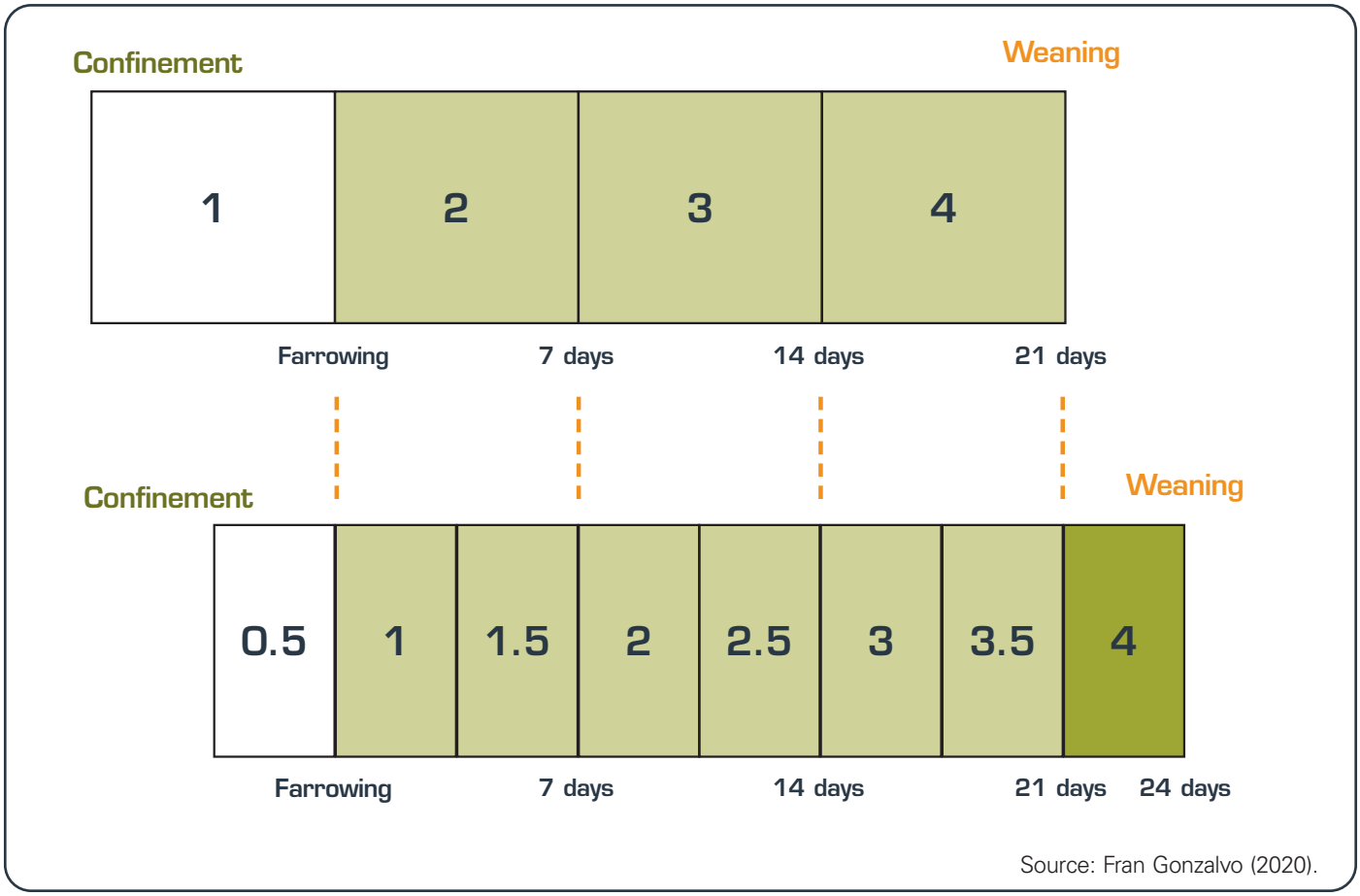


Figure 1. Extending lactation by weaning twice a week and reducing the time the sow needs to acclimatise before farrowing.

Source: Fran Gonzalvo (2020)

First cycle						Second cycle						Third cycle	
Mating		Farrowing		Weaning		Mating		Farrowing		Weaning		Mating	
Batch	Day	Week	Day	Week	Day	Batch	Day	Week	Day	Week	Day	Batch	Day
1	Monday	17	Thursday	21	Monday	**21**	**Thursday**	38	Monday	41	Thursday	42	Monday
	Thursday	18	Monday		Thursday	22	Monday		Thursday	42	Monday		Thursday
2	Monday		Thursday	22	Monday		Thursday	39	Monday		Thursday	43	Monday
	Thursday	19	Monday		Thursday	23	Monday		Thursday	43	Monday		Thursday
3	Monday		Thursday	23	Monday		Thursday	40	Monday		Thursday	44	Monday
	Thursday	20	Monday		Thursday	24	Monday		Thursday	44	Monday		Thursday
4	Monday		Thursday	24	Monday		Thursday	41	Monday		Thursday	45	Monday
	Thursday	21	Monday		Thursday	25	Monday		Thursday	45	Monday		Thursday
5	Monday		Thursday	25	Monday		Thursday	42	Monday		Thursday	46	Monday
	Thursday	22	Monday		Thursday	26	Monday		Thursday	46	Monday		Thursday
6	Monday		Thursday	26	Monday		Thursday	43	Monday		Thursday	47	Monday
	Thursday	23	Monday		Thursday	27	Monday		Thursday	47	Monday		Thursday
7	Monday		Thursday	27	Monday		Thursday	44	Monday		Thursday	48	Monday
	Thursday	24	Monday		Thursday	28	Monday		Thursday	48	Monday		Thursday
8	Monday		Thursday	28	Monday		Thursday	45	Monday		Thursday	49	Monday
	Thursday	25	Monday		Thursday	29	Monday		Thursday	49	Monday		Thursday
9	Monday		Thursday	29	Monday		Thursday	46	Monday		Thursday	50	Monday
	Thursday	26	Monday		Thursday	30	Monday		Thursday	50	Monday		Thursday
10	Monday		Thursday	30	Monday		Thursday	47	Monday		Thursday	51	Monday
	Thursday	27	Monday		Thursday	31	Monday		Thursday	51	Monday		Thursday
11	Monday		Thursday	31	Monday		Thursday	48	Monday		Thursday	52	Monday
	Thursday	28	Monday		Thursday	32	Monday		Thursday	52	Monday		Thursday
12	Monday		Thursday	32	Monday		Thursday	49	Monday		Thursday	1	Monday
	Thursday	29	Monday		Thursday	33	Monday		Thursday	1	Monday		Thursday
13	Monday		Thursday	33	Monday		Thursday	50	Monday		Thursday	2	Monday
	Thursday	30	Monday		Thursday	34	Monday		Thursday	2	Monday		Thursday
14	Monday		Thursday	34	Monday		Thursday	51	Monday		Thursday	3	Monday
	Thursday	31	Monday		Thursday	35	Monday		Thursday	3	Monday		Thursday
15	Monday		Thursday	35	Monday		Thursday	52	Monday		Thursday	4	Monday
	Thursday	32	Monday		Thursday	36	Monday		Thursday	4	Monday		Thursday
16	Monday		Thursday	36	Monday		Thursday	1	Monday		Thursday	5	Monday
	Thursday	33	Monday		Thursday	37	Monday		Thursday	5	Monday		Thursday
17	Monday		Thursday	37	Monday		Thursday	2	Monday		Thursday	6	Monday
	Thursday	34	Monday		Thursday	38	Monday		Thursday	6	Monday		Thursday
18	Monday		Thursday	38	Monday		Thursday	3	Monday		Thursday	7	Monday
	Thursday	35	Monday		Thursday	39	Monday		Thursday	7	Monday		Thursday
19	Monday		Thursday	39	Monday		Thursday	4	Monday		Thursday	8	Monday
	Thursday	36	Monday		Thursday	40	Monday		Thursday	8	Monday		Thursday
20	Monday		Thursday	40	Monday		Thursday	5	Monday		Thursday	9	Monday
	Thursday	37	Monday		Thursday	41	Monday		Thursday	9	Monday		Thursday
21	**Monday**		Thursday	41	Monday		Thursday	6	Monday		Thursday	10	Monday

Source: Fran Gonzalvo (2020).

Figure 2. Follow up and tracking schedule for mating, farrowing and weaning.

Calculating breeding stock requirements and ordering animals

Calculating number of sows required

Number of sows needed must be calculated by multiplying the farrowing target by the inverse fertility rate and by the number of batches. For example: for 20 batches of 160 farrows, with an estimated 88% farrow rate, 180 sows would have to be mated per week (160 × 1.12) = 3,600 sows on the farm (180 × 20).

Consider that at the third week of mating, 7-10% of sows will be repeated matings from the first batch, and so on, it is also expected that another 10% approximately will not farrow after the first mating due to infertility problems, poor oestrus, stance issues, etc., and as such there will be no excess sows.

Upon initiating weaning, the extra half-batch should be brought into the farm rotation to ensure 24-day lactation. The first replacement stock piglets are used for this purpose.

Organising the delivery of the initial breeding stock

The farm should be stocked in two phases of 1,800 animals each. The phases should be 10 weeks apart, with 180 animals (between 14 and 24 weeks of age) delivered each week. This will provide 10 mating batches.

Mating should begin the same week that the second delivery arrives, in order for each batch of animals delivered to have 10 weeks of acclimatisation. Remember to include a small group of boars in the first delivery to induce heat in the sows (*Table 3*).

Genetics

It is important to know the optimal age and weight recommended by the breeding company for the first mating.

As a general rule:

- Age: around 32-36 weeks old (7.5-8.5 months)
- Weight: 140 kg of live weight.

Farm example

Farm data used for this example:

- Site 1 only.
- Capacity = 865 LU (the maximum capacity according to regulations).
- Weekly batch production system = target of 160 farrows per week.
- Desired length of lactation = 24 days.

This means it is necessary to:

- Have two weaning days per week.
- Organise the animals into 20.5 batches.

It is important to know the optimum age and weight recommended by the breeding company for the first mating.

Source: Fran Gonzalvo (2020)

Weeks (batches)	Activity	Animals		Notes
(–10)	**First stocking phase**	**1,800 sows + 10 boars**		For the first 10 mating batches
(–10) to (–1)	Raising the animals Health and facility acclimatisation Staff training			
(–4)	Begin administering altrenogest	190 sows/batch		
1	**Second stocking phase**	**1,800 sows**		Finalise the mating cycle from batch 11 to 20
	First batch mating	180 sows		Monday
10	**First entrance of replacements (first cycle)**	**300 sows**		To mate from batch 21 to 40
17	**First farrows**	160 sows		Thursday
21	**First weaning**	80 + 80 sows		Monday + Thursday
	Thursday: First half-batch mating of weaned sows	80	**90**	**Extra half-batch (nulliparous sows): Monday**
30	**Second entrance of replacements (second cycle)**	**300 sows (14 per batch)**		To mate from batch 41 to 52 (+8 batches for the following year)

Source: Fran Gonzalvo (2020).

Table 3. Planning stocking times and breeding stock replacement for the first year.

Period of animal acclimatisation (and staff adjustment)

There are 10 weeks between receiving the animals and beginning insemination. This is a long period, during which there is little work, but it is of paramount importance.

Upon receiving the animals, the first thing that must be done is to monitor their health status on arrival. It is preferable to begin operations with animals in the best possible condition (negative for PRRSV, dysentery, scabies, enzootic pneumonia, etc.).

Staff training

During these weeks, at minimum, the following topics should be discussed:

- Biosafety.
- Animal behavior and welfare.
- Sow sexual cycle (and the hormones involved).
- Management of heat and insemination.

During this time it is important to train, educate and familiarise the staff with their new work.

This is the time to ensure the animals are in optimum condition for the first mating. This means:

- Ensuring acclimatisation to gestation pens (especially important if you are working with electronic feeding stations).
- Applying the entire vaccination plan to avoid reproductive problems.
- Adapting feeding regimes to requirements for maximum genetic potential, so that the sows are in optimum physical condition for mating.
- And, lastly, arranging the sows by age in the mating–control barn for acclimatisation to pens, scheduling heat and pre-mating flushing.

Another task that cannot be neglected at this time is: training, educating and familiarising the staff with their new work.

Establishing mating batches

To ensure heat synchronisation and to achieve the weekly mating target, without the security and cyclicity that weaning provides, altrenogest is an essential tool used for a stock of this size.

To ensure the success of the treatment, one should:

- Scrupulously administer the complete dose, every day, at the same time.
- Have observed the behaviours indicating that the sows are in heat, at least once, in all animals before they are treated.

Begin by applying the product (altrenogest) on Saturday and finish on Tuesday, to ensure heat and mating on Monday (or Tuesday), which will lead to farrows on Thursday (or Friday) in order to avoid a greater volume of work at the weekend (*Figure 3*).

Prepare:

- The first three big batches (of 190 sows) are not short of pregnant sows as this will be the first time your staff is administering altrenogest and dealing with sow heat and mating.
- A fourth smaller batch (160 animals), because if, in the previous batches, inducing heat was successful and there were strong fertility rates, it will not be possible to fit all the sows in the far-rowing pens and, thus, it would be necessary to wean the first piglets in less than 21 days.

From of the fifth batch, you will already have ultra-sound data on fertility, which will enable you to regulate the number of animals to synchronise with altrenogest with greater accuracy, in order to reach the mating/farrowing target without surpassing it.

What is altrenogest and what is it used for?

Altrenogest is a synthetic progestin that (like natural progesterone) blocks the release of GnRH from the hypothalamus and, therefore, blocks the hormones FSH and LH, preventing the follicle maturation in the ovary.

It is indicated for the programming of the oestrus cycle of sows (nulliparous or multiparous) in heat. 20 mg of the product should be administered per animal each day for 18 consecutive day. At the con-clusion of which, upon suspending the administration of the product, follicular growth will restart, and oestrus will occur after 5-7 days.

Source: Fran Gonzalvo (2020)

	Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Altrenogest	(–4)						1	2
	(–3)	3	4	5	6	7	8	9
	(–2)	10	11	12	13	14	15	16
	(–1)	17	18	Altrenogest/heat interval				
	Batch 1	In heat (mating)						

Source: Fran Gonzalvo (2020).

Figure 3. Schedule for the administering altrenogest to establish mating batches.

Altrenogest is indicated to program the heat cycle of sows (nulliparous or multiparous) that are cycling.

Space allocation

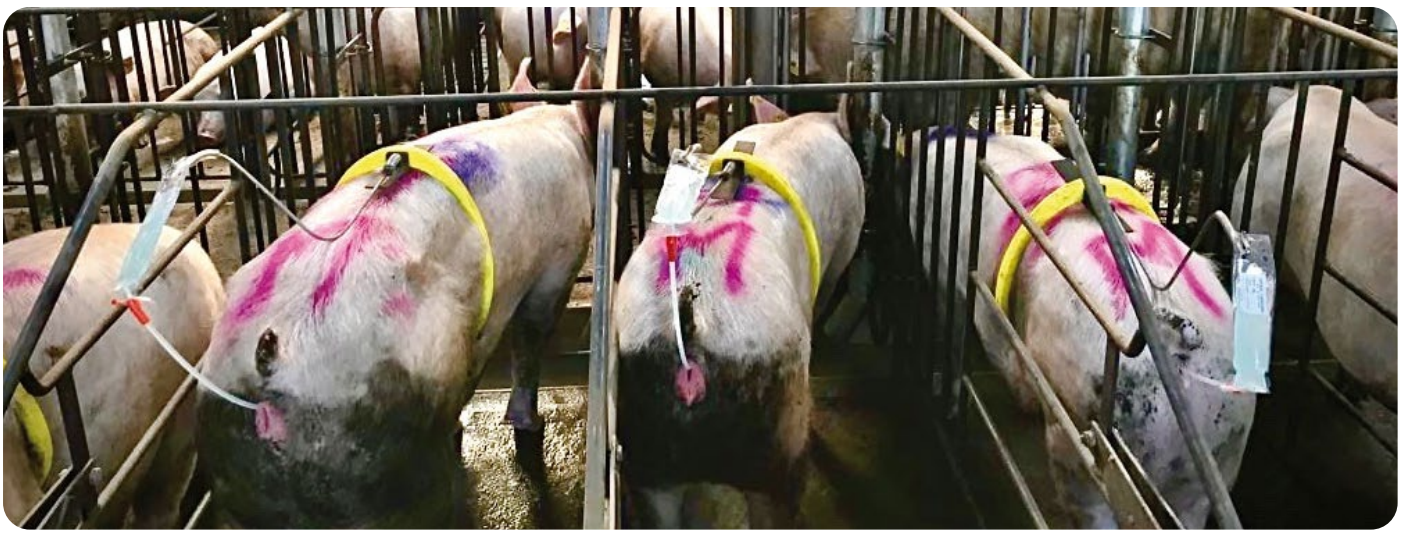
Table 4 and *Figure 4* provide a simple graphic overview of how the batches move and are distributed in the different production areas at any given time. When a farm is operating, all the spaces should be useful and occupied as a result of the normal rotation of batches through the different areas.

When initially stocking a farm, all the gilts are housed in the gestation area, so that later, when they have acclimatised, half of them (the largest ones) can be moved to the mating area to be organised into the first batches (*Table 5*).

On a farm that is being stocked for the first time, there are no weaners; thus all mating is arranged with nulliparous sows. This requires a lot of extra space in the mating area for acclimatising the animals. In principle, this space is not provided for in the farm design. This means that, during the first 15 batches, it will not be possible to keep the sows in pens until they are confirmed with ultrasound, in order to free up this space for the gilts being treated with altrenogest.

Each mating batch that goes towards farrowing or gestation leaves its space available so that a new batch of nulliparous gilts can be placed in the pens.

When a farm is fully established, all the spaces should be used and occupied as a result of the normal rotation of batches through the different areas.

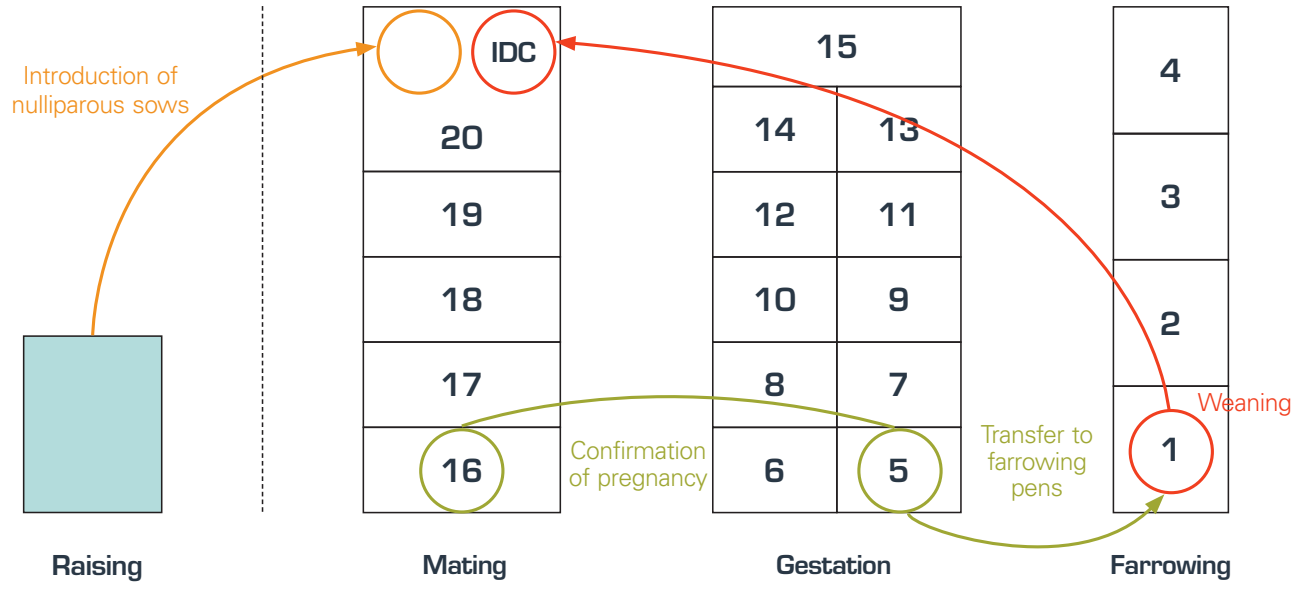


Source: Fran Gonzalvo (2020)

Area	Pens	% of space	Batches	Comments
Rearing/quarantine	**520**	**+ 15% extra**	**0**	**Incoming every 12 weeks**
Mating-control	960	30%	6	1 batch for weaning-to-mating interval + 4 batches from mating to pregnancy diagnosis + 1 batch delayed parking
Gestation	1,760	50%	11	Minimum 10 batches Extra batch sick bay
Farrowing	720	20%	4.5	Minimum 4 batches Extra half-batch of nursing sows
Total	**3,440**	**100%**	**21.5**	**(Approach)**
Only a minimal gap is provided to allow movements from weaning sows from farrowing to mating. This gap is generated when trans-ferring a batch from mating to gestation, which, in turn, is possible when the previous weaned batch is removed from the farrowing area, allowing the transfer of the gestating batch to the farrowing pens.				

Source: Fran Gonzalvo (2020).

Table 4. Approximate distribution of batches and pens by production area (for 160 farrows/week).



Source: Fran Gonzalvo (2020).

Figure 4. Spatial distribution of the batches in a farm of reproducing sows week 21 afterstart-up (start of normal rotation).

Weeks (batches)	Housing/transfers	Reason
(–10) to (–4)	All sows to gestation area (**G**)	Rearing and acclimatisation
(–4)	Half of the animals (the large ones) transferred to mating-control (**M**)	Sorting into batches and start administering altrenogest
1	Arrival of the second batch of sows: 50% biggest sows (**G**), 50% small sows to rearing/quarantine (**R**)	
1 to 4	First 4 mating batches transferred directly to farrowing (**F**) every week	In **M** there is insufficient space to accommodate both the acclimatising and altrenogest batches and wait for pregnancy confirmation
	After each transfer of a batch from **M** to **F**, a new batch is brought from **G** to **M** and treated with altrenogest.	
5 to 15	Move all the treated batches to **G** every week	
	After each transfer of a batch from **M** to **G**, bring another one from **G** to **M** and put altrenogest	
10	Incoming replacement in **R**	
16 to 20	**F** and **G** are full. Mating batches remain in **M**.	No need to administer altrenogest to additional batches
+20	Weaning frees up space in **F** for transfer from **G** (farrows), which allows moving from **M** to **G** (gestation), which allows the next weaning–mating.	Pig flow operates normally

Source: Fran Gonzalvo (2020).

Table 5. Distribution of space and movements during start-up.

How are the first 15 batches organised on a farm that is in the initial stocking phase?

The first four batches are taken directly to farrowing pens, during the same week as the mating, given that the gestation area is full of acclimatising gilts. It is important to leave at least the first farrowing pen empty, so that, a few days before farrowing, the sows can be showered and changed to a clean pen. The pen they have been removed from is then cleaned and disinfected; in this way, the animals can be redistributed to take advantage of the gaps resulting from sows found to not be pregnant upon ultrasound examination.

The following 11 batches will also be transferred to the gestation area, as soon as they have been mated. Additionally, the last five batches will remain in the mating area as normal, since no more space is required to prepare the gilts with altrenogest.

Achieving the ideal sow census

Once the farm has begun production, when the first weanings occur, one final aspect of stock planning should be organised: adding the required number of nulliparous sows in all batches, from the first cycle of weaners, in order to achieve the ideal population structure.

Nulliparous sows are gradually added to increase the population each cycle (*Table 6*) in order to reach the ideal composition of the farrowing batch (*Table 7*).

Adding nulliparous sows to all the batches, from the first cycle of weaning, makes it possible to achieve the ideal population structure.

The example assumes scheduling culls in the seventh cycle and a replacement rate of 55% (to compensate for 12% of sow losses and 43% slaughterhouse sales).

Table 8 shows a forecast, by batches, cycles and by year, of the total number of nulliparous gilts needed to achieve the targets set in *tables 6* and *7*.

Source: Fran Gonzalvo (2020)

Although at the beginning this means culling some young gilts that have not shown their full productive potential, this is the only way to get to the third year of production with a balanced population. Otherwise, there will be an old population pyramid that will have to be replaced with an excessive number of gilts; this would mean returning to a situation similar to the start of operations and would hinder and lengthen the process to establishing the pig population.

Matings	% nulliparous sows	Mating	1	2	3	4	5	6	7	Total
	100%	0	180							180
	5%	1	9	171						180
	8%	2	14	9	157					180
	12%	3	22	14	9	135				180
	15%	4	27	22	14	9	108			180
	18%	5	32	27	22	14	9	76		180
	20%	6	36	32	27	22	14	9	40	180
	22%	7	40	36	32	27	22	14	9	180

Source: Fran Gonzalvo (2020).

Table 6. Adding nulliparous sows by mating batch, as the cycles progress, to achieve, the ideal sow census (a farm with 160 farrows per week and a farrow rate of 88%).

Cycle	1	2	3	4	5	6	7	Total
N° Farrows	36	32	28	24	20	12	8	**160**
% Farrows	22%	20%	18%	15%	12%	8%	5%	**100%**

Source: Fran Gonzalvo (2020).

Table 7. Ideal composition of the farrowing batch for a stable population pyramid.

Cycle	Year	Weeks	Adding nulliparous sows				
			Batch	Cycle	Replacement	Year	Replacement
0	1st	**20**	**180**	**3,600**	**100%**	3,948	**110% (full)**
1		20	**9**	180	5%		
2		12 / 8 — 20	**14**	168 / 112 — 280	8%		
3	2nd	20	**22**	440	12%	1,220	35%
4		20	**27**	540	15%		
5		4 / 16 — 20	**32**	128 / 512 — 640	18%		
6	3rd	20	**36**	720	20%	1,872	50%
7		16*	**40**	640	22%		
Stable population	**4th**	**52**	**40**	**-**	**22%**	**2,080**	**55%**

Source: Fran Gonzalvo (2020).

Table 8. Forecast of animals needed to stock the farm and add nulliparous sows until the population is stable in the first 3 years of production (160 farrows/week).

Conclusions

1 **In stocking and starting up a new pig farm**, the most important aspects are ensuring that the desired sow population is achieved quickly and meeting the weekly farrowing target in the first round of mating.

2 **One should take the future into account:** From the time the first weaned batch is ready for mating, nulliparous sows must be added to the batch in order to reach the desired population structure by the end of the third year of production. To do this, it is best to plan, together with the initial stocking requirements, the sow-replacement requirements for the first three years.

3 **Organisation is the key aspect for a "healthy farm"**, in terms of both health and production and cost levels. The final aim of stocking the farm is to organise all the needed sows into batches so that the farm reaches the maximum production level. The way to achieve this organisation is as easy to explain as it is difficult to put into practice; it consists of maintaining a constant flow of mating, farrowing and weaning.

4 **On a farm where the pig flow has been established**, weaning is the key point, as that does not depend on the sows but, rather, is determined exclusively by the producer. If the number of weanings is kept constant, it will be very easy to reach the targeted number of matings, followed by the targeted number of farrows and, once again, weanings.

5 **Upon stocking the farm for the first time**, the first round of matings will be conducted exclusively with nulliparous sows. Altrenogest is an essential tool for ensuring that the mating target is reached (along with the farrowing and weaning targets).

Source: Fran Gonzalvo (2020)