FARROWING SOW AND PIGLETS MANAGEMENT

Guy-Pierre Martineau, DVM, PhD, Dipl. ECPHM

Strategical And Tactical Management Measures

The word ***strategy*** is often confused with tactics. In modern usage, strategy and tactics might refer not only to warfare, but to a variety of business practices, including pig business.There is no doubt that the 2000' (r)evolution is sow herd is the strategy of hyperprolificacy.

Essentially, ***strategy*** is the thinking aspect of planning a change, organizing something, or planning a war. Strategy lays out the goals that need to be accomplished and the ideas for achieving those goals. Strategy can be complex multi-layered plans for accomplishing objectives and may give consideration to tactics.

Relative to our subject, an example of a relatively new global strategy for the sow herd is the batch farrowing management system mainly adopted for farrowing sows and piglets management, which is the topic of this presentation.

Tactics are the meat and bread of the strategy. They are the "doing" aspect that follows the planning. Tactics refer specifically to action. In the strategy phase of a plan, the thinkers decide how to achieve their goals. In other words they think about how people will act, i.e., tactics. They decide on what tactics will be employed to fulfill the strategy.

The tactics themselves are the things that get the job done. Strategies can comprise numerous tactics, with many people involved in attempting to reach an overall goal. While strategy tends to involve the higher ups of an organization, tactics tend to involve all members of the organization, including pig workers.

Relative to our subject, there are many tactical management measures for the supernumerary piglets (crossfostering), each of them with advantages but also disadvantages and many constraints.

Finally, we will discuss on some never reported "counterintuitive" (and negative) consequences of the strategy of batch farrowing and some other "counterintuitive" results of some tactical managements measures on neonatal piglets implemented to increase productivity in "5H-herds": High Health, High Hygiene and in a Hyperprolificacy Herd.

Batch Farrowing

It is a management focused on sow production activities. All sows with the group are at the same stage of production: theorically breeding within three days, theorically farrowing within three days, and weaning on the same day. Some of the resulting benefits of adopting interval batches schemes are on two different fields: zootechnical performances (uniform age and weight at weaning, consistent sow

nutrition and phase feeding management, more effective use of all-in, all-out system) and health performances (disease control, herd stability). There is no doubt that the recent adoption of batch farrowing in North America is linked with the disease control, mainly PRRS as well as PCVAD.

The selection of batching interval is choosen according to the barn objective as well as herd management (such as the employees' management mainly regarding vacations).

Currently, the most common system in France is the 3-week cycle (85% of the French herds), followed by the weekly farrowing system (7% of the French herds) but also in 4-week (1%) and 5-week (3%) batch farrowing systems. This 3-week batch farrowing has been implemented in France since 30 years (late '70) in very small herds to have enough sows at farrowing to give a revenue for the producer.

In France, the implementation of this 3-week BF is in great part linked with the usage of Altrenogest (Regumate® in Europe, Matrix® in North America). It is a commonly hormonal product use in France to synchronise gilts for reproduction. The only physiological parameter to use it is that the gilts have to be cycled. Although evident and not directly in relation of this presentation, we have to underline that we have less and less boars in sow herd, a consequence of the generalisation of AI.

In North America, the majority of BF systems recently adopted is the 4-week BF (in herds of medium size, from 400 to 800 sows) and the 2-week BF (in herds over 1,000 sows).

Hyperprolific Sows

Hyperprolificacity is a characteristic of some genetic lines and widely use in France. It is a recent (r)evolution (Figure 1). Beside the positive aspects (increasing of the productivity), we have to underline some deviations of the management as well as the consequences for the piglets (see after). Indeed, due to the more and more frequent presence of hyper prolificacy sows in many herds, the number of total born, live born and wean piglets has increased for a given herd size during the last decade.

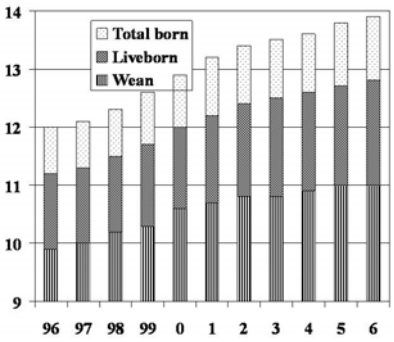


Figure 1: Evolution of the prolificacy in Britanny, France (Pellois, 2007). Since 2001, there is an increase of 0.1 piglet / year.

In 2006, mean liveborn of the top first third French herds is above 13 liveborn piglets/litter (Table 1). As the Standard Deviation is around 3, that means that 2/3 of the litters have between 10 and 16 live born piglets but also that 15% of the litters have over 16 total born piglets.

Lactating capacities of sows (number of mammary teats) are thus frequently overwhelmed and producers have to find solutions for these surnumerary piglets to survive. Later on, the higher numbers of weaned piglets result in over-density in weaning and finishing rooms, due to the inadequacy between batch size and room capacity. Indeed, most herd facilities have been designed a few years ago when litter sizes were smaller than currently.

Table 1: Sow performance in France (from the French National Analysis of sow herd, Royer, 2008)

From 01/01/07 to 30/06/07	All herds Mean *(±SE)*	First 33% Mean (±SE)
Number of herds	1915	631
Number of sows/herd	180 *(160)*	250 *(210)*
Number of boars	1.7 *(1.7)*	1.9 *(2.0)*
Born alive/Litter	12.8 *(0.9)*	13.2 *(0.6)*
Stillborn/Litter	1.1 *(0.4)*	1.0 *(0.3)*
Weaned/Sow	11.0 *(0.8)*	11.6 *(0.5)*

Beside general data, it is important to give an example of what means a “5H herd” (Table 2).

Table 2: Evolution of the productivity in a 240 sow-herd in the South of France (Charrier, personnal communication, 2007)

	2004	2005	2006
Weaners/Productive sow/Year	29.84	30.16	30.57
Total born /litter	14.90	15.26	15.32
Born alive / litter	13.60	13.92	14.05
Stillborn / litter	1.30	1.34	1.27
Weaners/litter	12.23	12.31	12.43
% Preweaning mortality on Total born	17.91	19.33	18.86
% Preweaning mortality on Born alive	10.07	11.56	11.53
Farrowing rate (%)	91.2	92.3	90.6
Interval Weaning-Conception (days)	5.8	5.5	6.2

Consequently producers have to modify their tactical management routine measures in order to face these over-densities. Moreover, producers are willing to make their herd as profitable as possible and they are aware of the importance of having full batches on profitability.

Strict observation of all-in/all-out means keeping batches of pigs the same from weaning to slaughter. However due to the heterogeneous growth of pigs, it is difficult to stick fully to this principle and producers frequently move poor doing pigs between batches. There are many consequences of a such situation.

For our topic, the major fact is the effect of litter size on the birth weight distribution (Figure 2A) and the importance of small piglets of less of 1 kg BW at birth (Figure 2B). In Figure 2A, we have to underline that there are always >1.8 kg BW piglets even if there are >15 piglets/litter. However, the percentage of piglets <1kg increase when litter size increase (Figure 2B).

Figure 2A : Effect of litter size on the birth weight distribution

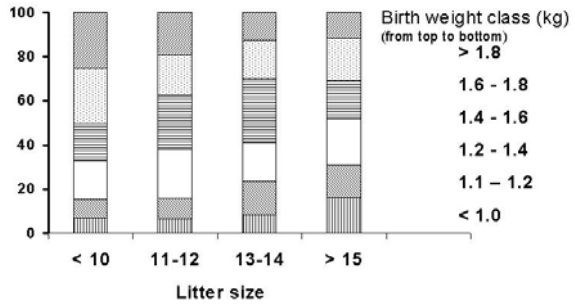
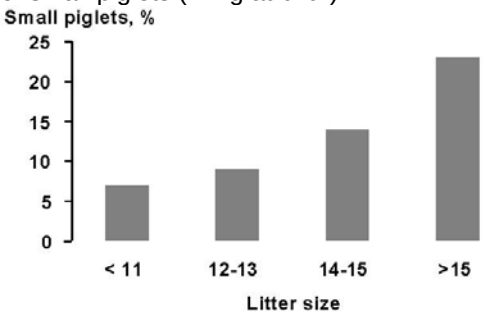


Figure 2B : Effect of litter size on the % of small piglets (<1kg at birth)



As illustrated in Figure 2B, around 20 to 25% of piglets are under 1 kg BW in large litter. There are a lot of questions regarding the evolution of light piglets during growth until market weight but this is out of our objective.

After farrowing, pre-weaning deaths (<10-12%) occurs within the first 72h post-partum. Piglet birth weight is THE critical survival factor. With respect to stillborn mortality, piglet shape and size (birth weight/(crown-rump length)^3) , body mass index (birth weight/(crown-rump length)^2), and farrowing birth order are better indicators. For live-born mortality, postnatal survival factors identified as crucial are birth weight, vigour independent of birth weight, and the latency to fist suckle (Baxter et al., 2008).

Although batch farrowing theorically allowed to obtain grouped farrowings, we have to take into account the natural variation of the distribution (Figure 3).

Sow	Mo	Tu	We	Th	Fr	Sa	Su
1	16						
2		20					
3		14					
4			18				
5				8			
6				14			
7				16			
8					19		
9					24		
10					16		
11					19		
12					16		
13					15		
14					14		
15						16	
16						15	
17							12

Figure 3: Farrowing date constraint. Example of one batch of 17 sows in a 120 sow herd in a 3-week batch farrowing system with hyper prolificacy sows (born alive for each sow is indicated). Although in batch farrowing system and with a same day of weaning, there is a “normal” variation according to the day of breeding and the duration of gestation.
In this herd, prostaglandins (PGF2α) is used only on the Thursday to obtain farrowing on the Friday (but not during the weekend). However, in this batch, 3 sows farrowed the WE).

Figure 3 allows to understand the difficulty of cross fostered in Day 1 of this week: only one sow farrowed, with 16 liveborn piglets. It is why producer have to use another management measure called “split nursing” (Donovan and Dritz, 2000).

The major consequence of hyper prolificacy is crossfostering. Although rules exist since a long time (The “10 principles” developed by Peter English, 1993; Beymon, 1997) and application for piglets for low birth weight management also well described (Biskei, 1993, 2004), it is not so easy with hyperprolific sows. In herds with hyper prolificacy, the % of cross fostered piglets if higher than commonly seen in “normo-prolific” sow herd (Straw et al., 1998).

A recent survey in 47 herds in France, Hébert (2006) shown that piglets are fostered by a sow from the previous batch whose piglets were early weaned in 27 out of the 47 investigated herds. In this survey, there are different methods of cross fostering (Figure 4).

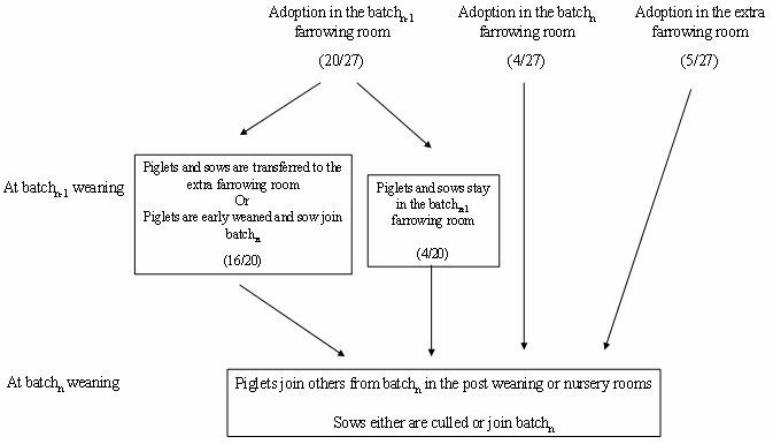


Figure 4: Example of different modalities of fostering in 27 herds resulted in a high number of tactical management decisions with variable consequences on within-herd animal movements.

A data base of 300 farms using computerized records has been used to examine the extent and timing of crossfostering being praticed in commercial herds in the Midwestern US and Canada in mid '90 (Straw et al., 1998). Authors concluded that farms under use crossfostering as a management technique. It was in agreement with English et al. (1977) that "few stockpersons exploit it [crossfostering] as fully as they might usefully do". However, in France, we are often in a situation of "over usage" of crossfostering. -An example of « over-cross fostering » syndrome in a commercial French herd is shown in Figure 5. All piglets have been identified at birth. At 6 days of age, each litter has bee also checked.

		Liveborn	PIGLETS' ORIGIN												
			571	636	635	637	638	589	536	523	620	499	573	619	618
LACTATING SOW	571	17	11		2	1									
	636	15		11								2			
	635	13	1	1	2	1		1	4			1	3		
	637	14		1	3	4						2			
	638	13					12								
	589	16				1		10				3			
	536	17			2	1			6				5		
	523	10							5	8					
	620	12	2								12				
	499	17				5		2		1		6			
	573	22			2	2						1	7		
	619	9	3										2	6	2
	618	12												3	10

Figure 5: Observational "Overcrossfostering syndrome" (Too Well Done Job Syndrome) in a herd. At 6 days of age, sow #635 has only 2 of her 13 live born original piglets. On the opposite, sow #638 has all her native ones. Therefore, there are huge variation, mainly according to the day of farrowing

What may be the consequences ? This "over crossfostering syndrome" lead to too many manipulations. Even if all these stockmen are well informed of the importance of the colostrum, there ore some "drift".

As a prelude, there is no true "big" mistake in these sow herds : there are globally good sow and piglets management. However, some measures implemented for apparently good reasons lead to bad results by a counter-intuitive behaviour. These measures lead to more severe problems. To summarize, we can say that, for each individual measures, there are two opposites aspects, like in the "Strange Case of Dr Jekyll and Mr Hyde". We have the expected « good » one (Dr Jekyll) one but also « bad » non expected « side effects » (Mr Hyde).

There are two phases in the sow and piglets management around farrowing : before (Figure 6A), during and after (Figure 6B) farrowing. Indeed, some tactical management before farrowing (Figure 6A) may have consequences on the piglets'

performances. After farrowing (Figure 6B), interaction is much more complex as management rules may be directed to the sow or to the piglets with also direct consequences between the sow and their litter.

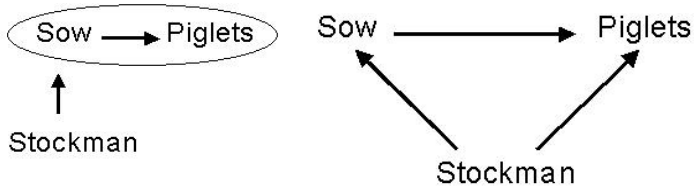


Figure 6: Before farrowing (left 6A), sow management has also consequences on piglets. After farrowing (right 6B), management is oriented to the sow and/or to the piglets

Before farrowing, and just to illustrate this duality, I will use a classical management measure: induction of farrowing. Nobody contest the fact that there are very advantages to a such program. However, there also « side negative effects » as reported in a recent experiment (Gunvaldsen et al., 2007). In this study, average gestation length in noninduced and induced sows was 117.0 and 115.1 days, respectively. Beside the effect on growth (for every day of gestation, piglet growth rate increased 26 g per day; therefore, body weights at 16 days of age were 576 grams lower), there is a risk of higher mortality. The relative risk of morbidity was 2.0 times higher, in piglets of induced sows. Therefore, there was a tendency towards higher mortality during lactation in piglets of induced sows. It is why they conclude on the importance to understand the objectives of a farrowing induction program and the average gestation length of specific sow subpopulations in herds to avoid production loss associated with premature farrowings.

In a recent observational study (Gin et al., 2008), we measure IgG content in colostrum samples from sows and blood samples from 6-day old piglets. There is a strong association between gestation length and IgG concentration in sows as well as in piglets (Figure 7).

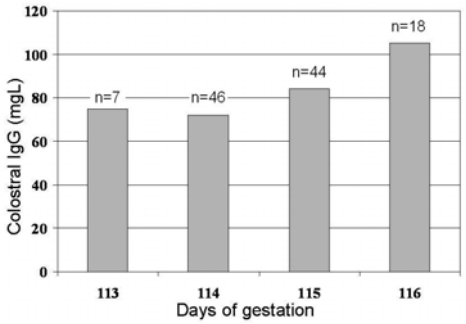


Figure 7: Relationship between gestation length and IgG concentration (mg/L) in colostrum from sows from parities in 10 herds (Gin et al., 2008).

Farrowing Sow And Piglets Management And Neonatal Diarrhea

In many “5H” herds, it is common to diagnose enzootic neonatal diarrhea which remains a major clinical problem despite very good *E. coli* vaccines, very good vaccination programs, very good hygiene, very good stockmanship, …. Therefore, we have to ask the question: Why?
Facing a such problem, we have always the same questions (Figure 8).

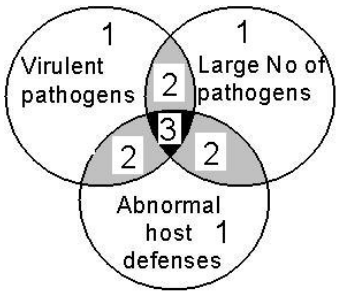


Figure 8: Schematic illustration of various risk factors for neonatal diarrhea (Adapted from Osbone). 1 = lower risk infection if only one of these factors is present ; 2 = higher risk of infection if any combination of two of these factors is present ; 3 = highest risk of infection when all three of these factors are present.
Applied to neonatal diarrhea, do we have to look for an exceptional virulent pathogen or do we have to consider that we are facing abnormal host defenses ? or both ?

In these “5H herd” with enzootic neonatal diarrhea problem, the classical «infection pressure» is very low (circle «Large No. of pathogens» in Figure 8). Indeed, there have very good biocontainment measures (such as desinfection and vaccination programs). Therefore, it remains two risk factors : new virulent pathogens or abnormal host defense. With have both these two situations.

We conducted clinical in-deep investigations for enzootic neonatal diarrhea in 20 “5H” herds (10 in 2005 and 10 in 2007). Results of the first 10 farms have been presented at the IPVS 2006 (Martineau et al., 2006). The second set-up is now finalized and confirmed that farrowing sow and piglets management are of primary importance in such pathological problems (Gin et al., 2008).

Conclusion

There is not one rule for farrowing sows and piglets management. We have to adapt it according to the country (“Country effect”) and to the time (some rules written 10 years ago may be now obsolete). Once the strategy adopted, we have to develop some tactical measures to be able to manage hyperprolificacy in “5H herds”. We will discuss during the presentation some of them according to farrowing management such as the use of oxytocine and the use of PGF2α. For each of them, we have positive effects (*Dr Jekyll*) but also negative effects (*Mr Hyde*), less known. These negative aspects are at the origine of many other secondary interventions with many secondary bad consequences.

Selected References

- Donovan T.S., Dritz S.S. Effect of split nursing on variation in pig growth from birth to weaning. JAVMA. 2000; 217: 79-81

- English, P R. Factors affecting neonatal piglet losses and management practices to minimize such losses. *The Veterinary Annual*. 1993; 33: 107-119.

- Gunvaldsen RE, Waldner C, Harding JC. Effects of farrowing induction on suckling piglet performance. *J Swine Health Prod.* 2007;15(2):84–91.

- Hébert H. Modalités de conduite en bandes en élevage porcin : effets sur les contacts entre animaux. Thèse ENVN. 2006 ; 102 : 1-101.

- Straw BE., Dewey CE., Bürgi EJ. Patterns of crossfostering and piglet mortality on commercial U.S. and Canadian swine farms. Prev. Vet. Med. 1998; 33: 83-89.