Piglet growth affected by milk supplement

Milk supplementation technology during lactation has multiple benefits to piglets if managed properly.

By **RAFAEL CABRERA***

THE selection pressure placed on high prolificacy and the high nutrients required in order to support high weaning weights have made feeding the modern dam genotype a state-of-the-art work on commercial swine farms. The fact that we allow the young gilt to conceive when she is 125-145 kg of bodyweight plus mobilizing body reserves to lactate 10-11 piglets is a heavy load if we realize that her maternal body growth is not completed until she reaches 200-250 kg bodyweight.

Animal practitioners have felt a great deal of social and moral responsibilities to make every effort to keep every newborn piglet alive after parturition. They also realized that any attempt to improve daily gain and health during the piglets' early life (lactation period) will have an impact on subsequent growth and health performance.

This article deals with the use of milk supplementation during the lactation period in order to maximize pig throughput in swine operations given the high prolificacy of modern dam genotypes. It also emphasizes the effect milk supplementation has on growth and health beyond the period of colostrum during which the sow plays a significant role as well.

Bridging the gap

The modern prolific sow has the ability to produce as much milk as a high-yielding dairy cow (expressed on a per-unit bodyweight basis). High-prolific sows produce on average 10.9 kg per day of milk, and the top 10% maximize their output at 13.6 kg per day. This allows for 256 and 311 g per day of piglet growth, respectively, in a 21-day lactation period. However, this will limit piglet growth if we realize that neonatal piglets (when milk is not being limited) can grow an average 390 g per pig per day in a 21-day lactating period (Boyd et al., 1995). This capacity is limited by day 8 during the lactation period, when sow milk output becomes a liability for piglet growth potential.

There are two significant stages during a 21-day lactation period. The first stage is the seven to eight days of lactation when piglets recognize the sow as the "only source of life" and milk output is sufficient for piglet growth. Unfortunately, this is the time when 75-80% of the piglets die due to crate space limitation, postpartum sow problems and/or starvation. The second stage is the last 11-12 days, when piglet growth outperforms the sow's milk output.

The answer to how long to supplement milk during lactation becomes a question of which goal is being accomplished: reductions of preweaning mortality or increased wean weight? It is recommended to supplement milk during the entire lactation period in order to take full advantage of both reduced mortality and increased weaning weight.

The problem with milk supplementation in the past has been twofold, including: (1) the inability to administer milk replacer in an economically feasible way (milk wastage could be as high as 30-40% when the wrong milk delivery system is used) and (2) the low quality of the milk replacers available in the market.

Ralco has been able to engineer a milk delivery system that will allow a milk:gain conversion of 1:1 and sometimes even lower. Ralco's acidified milk replacer has the ability to "clot" or slow down in the small intestine, allowing more time for the nutrients to be absorbed.

The company has always found positive responses when supplementing milk replacer for 24 hours during the whole lactation period. In a trial done in Mexico with gilts only, piglet mortality was decreased by a net 2.2% (10.8 versus 8.6%), and weaning weight increased by 0.7 lb. (9.5 versus 10.2 lb.).

The most comprehensive milk study was done (Table 1) in partnership with a large integrator (72,000 sows) with a resulting increase of 0.5 piglet per litter and 1 lb. in weaning weight. The milk:gain conversion was 1.04:1. These results can be used as example to model the economic benefits of supplementing milk replacer in swine production systems.

Penalty

Small birth-weight pigs comprise approximately 12-13% of the litter (Johnston, personal communication), and they present special challenges to health and profitability in commercial systems.

The health concern is based on their apparent failure to thrive in the nursery, during which a number of vaccines are given. Vaccine responsiveness is dependent on nutritional adequacy, health and physiological well-being. Small pigs are considered to be the most "viremic" of the population (Johnston, personal communication).

A second problem is that their grow rate from birth to slaughter is relatively low, which results in reduced market weight with significant revenue as "cull pig revenue." Their contribution to revenue is normally less than the sum of financial inputs.

Deen (2003) has studied the impact of small birth-weight pigs on profit. He estimated that for a 260 lb. market-weight target, pigs weighing less than 200 lb. at the time a finish barn must be closed out could cost up to $34 per pig due to a cull pig penalty. He estimated that pigs weighing 210 or 220 lb. could result in losses of $12 and $7 per pig, respectively. He pointed out that small birth-weight pigs are naturally more susceptible to disease, which could increase disease spread and cause other pigs to gain more slowly.

By using milk supplementation, we have been able to reduce (Table 1) the percentage of pigs weighing less than 8 lb. at weaning by 50%.

In another study, a sow farm has usually weaned around 1,800 pigs on weekly basis and reported 125 pigs rejected by the nursery managers. After implementing Ralco's milk technology in 30% of the farrowing crates, the amount of rejected weaned pigs was reduced to 50 pigs (60% reduction; Wood, personal communication).

This is a substantial economic advantage considering that those pigs are either destroyed or considered to have "no value" when sold as weaned pigs. This represents a financial burden considering that this percentage of pigs (less than 8 lb.) can be as high as 8-10% in any given swine operation, assuming there is a normal weaning weight distribution.

My company's experience with milk supplementation has demonstrated that supplementing milk helps all sizes of pigs (small, medium and big) in the crates. The biggest response in weaning weight increase has been seen with small and big pigs (1.8 and 1.6 lb. increase, respectively) compared to sow-reared pigs.

Weaning weight drives growth both in the nursery and grow-finisher. Ralco has conducted a study analyzing the effect of weaning weights on days to market (Table 2) and was not surprised to find out that by increasing pig weight 2 lb. at weaning (from 10 to 12 lb.), pigs were able to reach a market weight of 275 lb. eight days earlier (176.8 versus 168.8 days). This is an enormous savings in feed cost and barn efficiency.

Healthier?

Milk-fed pigs seem to transition and gain better right after weaning, according to producers using the Ralco milk supplementation technology. This observation indicates that feeding a milk replacer during the entire lactation period may not only be beneficial in reaching maximal pig weight gain at weaning but also may be applicable to the transition from sow's milk to solid feed.

Research studies (Zijlstra et al., 1996) have reported that at 46 days of age, pigs fed liquid milk replacer accreted more protein (10%), fat (17%) and water than sow-suckled pigs. They have also reported 74% longer villi in the proximal small intestine. The latter may indicate the pigs' ability to cope with digestive disorders normally observed after weaning.

The increased accretion may come from two sources: sow's milk and the milk replacer. Milk-fed pigs have been consistently observed as being more viable and, therefore, more able to adequately stimulate the sow for increased milk output. The intake of sow's colostrum (great amount of antibodies or inmunoglobulins) has proven to play an important role in piglet health beyond the period of colostrum since no antibodies are transferred to the piglets prior to parturition.

Even though my company's work has not entailed body composition and small intestinal morphology after feeding milk replacer, it has followed milk-fed pigs and sow-reared pigs from weaning to market to find differences in growth and mortality.

A study of a total of 1,200 pigs (600 pigs per treatment) showed a lifetime mortality difference of 9% in favor of milk-fed pigs in an unstable porcine reproductive and respiratory syndrome-positive swine system. Various swine practitioners have explained that "the very single reason why they are feeding (Ralco's) milk replacer is because of the improved health shown by milk-fed pigs in the nurseries and grow-finish sites." This assessment is consistent with company research data.

Concluding thoughts

Milk supplementation technology has multiple benefits if managed properly. A clear discussion with farm workers must take place in order for them to buy into it. It is also beneficial for them to understand that this technology is not a replacement for good animal husbandry practices but a tool that will allow them to step to the next level of pig performance. Training and maintenance of the equipment are vital in order to extract the full benefits the technology brings.

1. Benefits of supplementing milk replacer in a large system[a]

Items	Control	Milk replacer
Pigs placed per litter	11.1	11.1
Pigs weaned per litter	9.8	10.3
Net pigs weaned per litter	0	0.5
Wean weight, lb.	12.5	13.5
% weaned < 8 lb.	4.25	2.10
Milk powder per pig, lb.	0	1.04

[a]56 litters per treatment.

2. Impact of weaning weight on days to market

Wean weight, lb.	Off test weight, lb.***	Age to 275 lb., days***
10.0	263.2	176.8
12.0	270.6	168.8
14.0	275.8	167.8
16.0	273.2	164.8
18.0	277.4	162.9
>19.0	278.9	160.9

***Linear response, P < 0.001.
Quadratic response, P < 0.05.

References

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