What are the effects of probiotics on sow longevity?

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Optimal body condition score at the end of the lactation period positively influences the longevity of the sows and results in feed cost savings in the next gestation. Use of dietary probiotics has been proven to reduce weight losses during the lactation period and as a result, improve sow fertility. At the same time, probiotics are able to increase piglet weaning weight. Therefore, addition of probiotics seems to be a very promising feed strategy for sustainable pig production.

Longevity and cost

With increasing numbers of piglets born, energy requirement for milk production in prolific sows increases. Feed intake during the lactation period is often not sufficient to fulfil all the requirements for high milk production. As a consequence the sow will use her own body reserves which can lead to serious body condition losses during lactation. An important concern of this negative energy balance is the adverse effect on reproductive performance and productivity in the next cycle. In particular, gilts, which have not yet reached their mature body weight, and lean dam lines are sensitive to detrimental body weight losses. As a result, sows are often culled before their third or fourth parity which is before the time at which the sow reaches her maximum productivity and her replacement costs are covered (i.e. generally between the 4th and 7th parity).

It is estimated that every kg body weight lost during lactation has to be compensated by an additional amount of 4 kg feed in the next gestation period. Based on this estimation, a loss of body weight of 15 kg requires an additional amount of 60 kg gestation feed in the next cycle just for recovery. From financial point of view and for better life time performance of the sow, it is clear that body weight losses during lactation should be limited as much as possible.

Pro- or antibiotics

Use of probiotics is an important item to consider in sustainable pig production strategies. The term probiotic originates from 'pro' (for) and 'bios' (life) – a useful explanation as probiotics are known to support the development of beneficial microbes in the intestinal tract. Probiotics support feed digestion and create a positive environment for beneficial intestinal microbes (e.g. *Lactobacillus*). The positive shift in the microflora results in reduced amounts of opportunistic bacteria such as *Salmonella, Escherichia coli* and *Clostridium*. Supporting beneficial bacteria by probiotics is in clear contrast to the use of antibiotics, known for their ability to kill or inhibit the development of bacteria and which are therefore very effective against pathogenic bacteria species. However, antibiotics not only limit the growth of the 'bad guys'; it is well known that antibiotic treatment also negatively influences the beneficial bacteria.

Efficacy of probiotics in sows

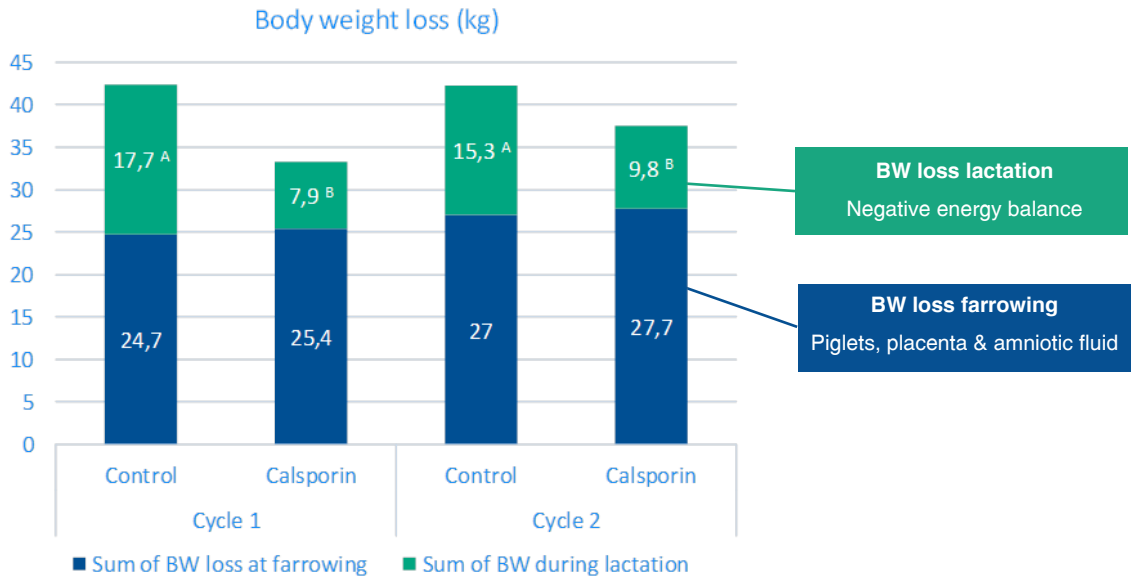
In a recent study performed at the Free University of Berlin (Germany), the effect of a *Bacillus subtilis* type probiotic* was investigated in sows over two sequential reproduction cycles. A total of 50 Danbred sows of parity 2-5 were equally divided between a control group (without probiotic) and a probiotic group, taking into account that both groups were similar in terms of parity, body condition and live weight. Over the entire study period, the sows were maintained in the same treatment group and were offered either a control or a probiotic mash diet. Cross-fostering to equalize litter size to approximately 14 piglets per litter was carried out within 24h after farrowing and occurred within the same treatment group. Suckling piglets were offered creep feed from 7 days of age to weaning (25 days of age), with or without probiotics depending on the treatment of the sow.

The addition of the probiotic in sow diets significantly reduced losses of body weight and back fat in the critical lactation period. From the end of gestation until the end of lactation, the sows lost 30 - 45 kg body weight of which 25 - 27 kg was related to the birth of the piglets (blue part of the bars, figure 1). The difference in body weight immediately after farrowing and after weaning gives a clear insight on the weight losses related to the negative energy balance in the lactation period. Use of the dietary probiotic resulted in a significantly lower

Table 1: Piglet performance during 2 cycles in Danbred sows fed a diet with or without probiotic

	Cycle 1			Cycle 2		
	Control	**Probiotic**		**Control**	**Probiotic**	
Total born piglets / litter	15.92	16.28		16.08	16.52	
Piglets after cross fostering	14.08	14.08		14.29	14.28	
Litter weight at weaning	91.02^{a}	95.41^{b}	+ 4.39 kg	88.38^{a}	92.28^{b}	+ 4.90 kg
Piglet weaning weight	6.65^{a}	6.96^{b}	+ 0.31 kg	6.54	6.83	+ 0.29 kg
Faecal scoring*	3.46^{a}	3.84^{b}	+ 0.38	3.63^{a}	3.84^{b}	+ 0.21
** Faecal scoring: 1, diarrhoea; 2, pasty; 3, formed faeces, soft to cut; 4, optimal, well-formed; 5, hard and dry*						
(a,b: Different superscript are significant different within cycle (P<0,05))						

Figure 1: Body weight loss related to farrowing (blue) and lactation (green) over two sequential reproduction cycles in Danbred sows (*a,b: Different superscript are significant different within cycle (P<0,05)*)



body weight loss of almost 10 kg (cycle 1) and 5 kg (cycle 2) difference compared to the control group (green part of the bars, figure 1).

At the same time, the probiotic positively influenced milk production as the dietary treatment resulted in larger piglets at weaning (+ 300 gram) with higher litter weaning weights (table 1). Additionally the weaning-to-oestrus interval reduced, resulting in less non-productive days. Finally the probiotic was also shown to have a positive influence on the incidence of Mastitis-Metritis-Agalactia (MMA) syndrome.

Optimal gut health

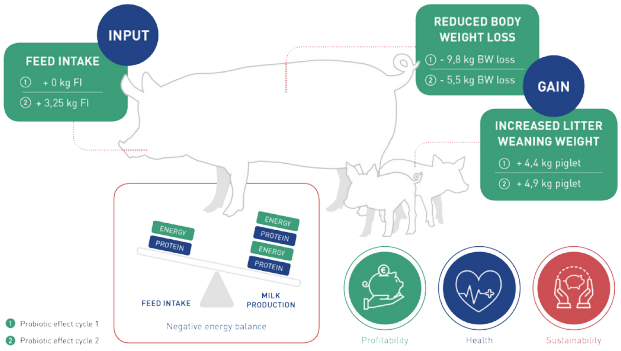
For a sow to achieve high milk production and maintain body condition during the lactation period, optimal gut health and nutrient absorption are essential. Improvements of the faecal consistency (table 1) and faecal microflora were also observed in the group of animals which received a diet with probiotics, in both the sow and her suckling piglets. At weaning age, increased numbers of the health related *Lactobacillus* and *Bifidobacterium* species were found while lower amounts of the *Clostridium* clusters and the *Escherichia* group were observed. *Clostridium perfringens* and *Escherichia coli* are often related to intestinal infections and diarrhoea. These results are in line with the beneficial effects seen in piglets using the probiotic in diets after weaning.

Probiotics support sow longevity

Increased lifespan of the sow is recognized as an important parameter from both economic and welfare point of view. Improvements in lifespan can result in decreased replacement costs and a greater proportion of adult sows in the herd that have reached their peak of reproductive performance. Increasing lifespan is complex as many factors are involved including feeding strategies, herd genetics, farm management, climate and profession of farm personnel. The term longevity is often used, although parameters to measure sow longevity and even the definition of longevity varies per researcher. However, they have one message in common namely 'extend the productive lifetime of sows'.

Use of dietary probiotics could be part of the solution to improve sow longevity, from the economic, health and welfare points of view. Improving gut health and feed efficiency support the highly productive sow to maintain her body condition and at the same time, produce enough milk for better growth of her suckling piglets (figure 2). Higher weaning weights in combination with a more optimal intestinal microflora, give piglets a better start after weaning.

Figure 2: Efficacy of addition of probiotics on sow longevity. Difference between control and probiotic treatment, performance data from two sequential cycles of with Danbred sows performed at the Free University of Berlin.



The feed cost reduction in the gestation period, to compromise the weight losses in the previous lactation, can save 13 euro / sow / year based on the results of the trial at the Free University of Berlin. Beside feed cost savings, reducing the lactation losses has a positive influence on fertility, the performance of the sow in the next reproduction cycle and subsequent litter uniformity. Overall, probiotics are able to support health, fertility and productivity, and thereby the longevity of the sows.

** Calsporin®, 30 ppm inclusion*