

Understanding peripartum metabolism to improve milk production

by Lise Boudal, pig product manager, CCPA Group, France.

Colostrum and then milk provide all the nutrients needed for piglet survival and growth until weaning. Therefore, quantities have to be adequate to feed all the litter. CCPA Group has developed a new phyto-genic feed additive, Axion Sow'Ax, which improves milk production of sows, leading to more piglets per litter and heavier ones at weaning.

Genetic selection results in a continuous increase in the number of born piglets per litter. Consequently, lactation has become a physiological challenge for sows. High yielding sows produce between 6-13kg of milk per day, meaning that one sow nearly produces three times its weight in milk per year.

Although sow's milk production increases along with litter size, it is at its peak for 6-8 suckling piglets. Beyond eight piglets in the litter, the amount of milk available per piglet decreases, compromising piglet's survival and optimal weaning weight.

In recent years, an innovative approach to health and metabolic disorders in early lactation in high producing dairy females has been developed. Maes and al. (2010) indicates that the postpartum dysgalactia syndrome (PDS) is characterised by

insufficient and inadequate production of colostrum and milk in the first days after farrowing. This is quite common in farms.

A recent study indicates that 5-35% of pig farms struggle with PDS, and 65% of the investigated farmers identified milk production troubles for their sows. Besides, PDS causes economic losses, with more digestive disorders in piglets and twice more piglet mortality during the nursing period.

Causes of PDS are multifactorial. However nutritional deficiencies in peripartum period, resulting in catabolism, may create a pro-inflammatory condition for the sows, causing PDS. This phenomenon has been described namely in dairy cows.

Peripartum metabolism

The peripartum period is a critical stage for milk production. A set of stimuli, including physical trauma of birth, infections, bacterial toxins in the digestive or uterine level and a poor nutritional status induces hydroperoxides formation and an inflammatory condition. Indeed, macrophages are one of the first cells in contact with bacteria or toxins. When stimulated, they produced free radicals which generate large quantities of hydroperoxides. The high levels of hydroperoxides cause oxidative stress and lead to immunosuppressive effects.

Fig. 1. In multiparous sows, at six days post-partum, blood levels of SAA are negatively correlated with ADG of piglets ($P<0.05$).

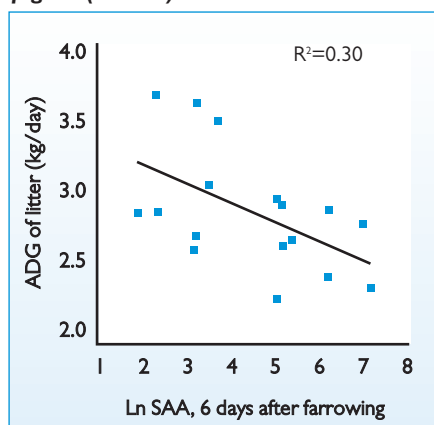


Fig. 2. The decrease of rectal temperature is significantly faster in the Axion Sow'Ax group ($P<0.05$) than in the control group.

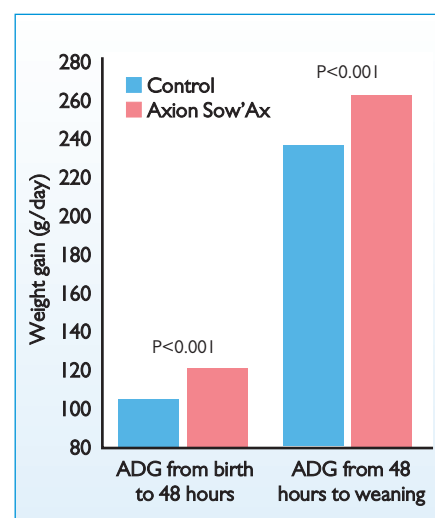
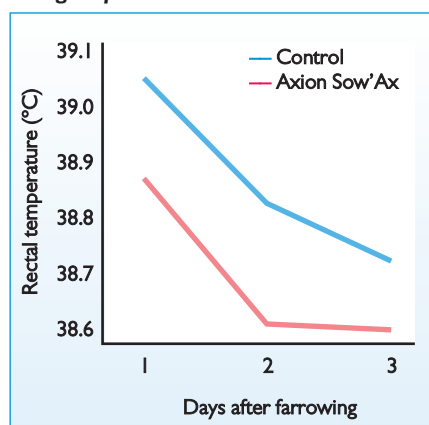


Fig. 3. A supplementation with Axion Sow'Ax improves piglets' growth.

Peripartum inflammation is induced by cellular mediators – cytokines or interleukins – produced by leukocytes or cells from different tissues producing local and systemic inflammation. The main mediators involved, mainly TNF (tumor necrosis factor), IL1b and IL6 are pro-inflammatory. This inflammatory condition contributes to the elimination of local infections and takes part in the luteolysis and uterine involution. However, excessive inflammatory response induces an increase of body temperature and catabolism, with several negative consequences, such as a decrease in feed efficiency and feed consumption, further deteriorating the already severe nutritional deficits of early lactation.

Indeed, the energy requirements for the milk and colostrum synthesis are significant. High yielding females are more likely to suffer from an intense lipolysis which releases important quantities of pro-inflammatory palmitic and stearic fatty acids into their blood.

Besides, considering that high plasmatic levels of serum amyloid A (SAA) reflects a pro-inflammatory condition, an excessive inflammatory condition drops milk production. In multiparous sows, at six days post-partum, blood levels of SAA are

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negatively correlated with ADG of piglets ($P < 0.05$) (Fig. 1, results from CCPA Group).

All taken into account, avoiding an acute inflammatory response and oxidative damage during the peripartum period is necessary to improve milk production of high yielding sows. Flavonoids are naturally present in feed for livestock and numerous studies demonstrate the antioxidant and anti-inflammatory properties of this kind of molecules.

The R&D of CCPA Group selected Baicalin, a flavonoid plant extract from *Scutellaria baicalensis*, which clearly demonstrates in vitro and in vivo anti-inflammatory and antioxidant properties

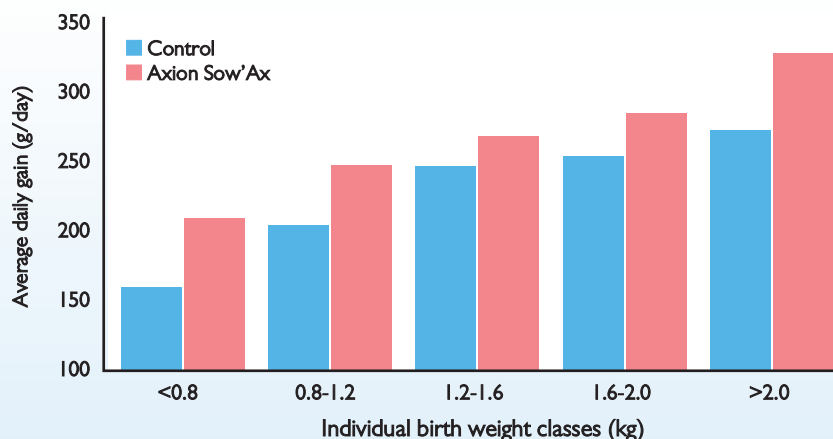


Fig. 4. Sow feed supplementation with Axion Sow'Ax improves ADG of piglets in each birthweight class.

(patent pending). Axion Sow'Ax is a phytogetic feed additive combining a concentrated extract of baicalin from *Scutellaria Baicalensis* and selected vitamins, trace elements and other synergistic plant extracts.

Distributed from five days before farrowing until weaning, Axion Sow'Ax improves colostrum and milk production of sows. As a consequence, the individual weaning weight of piglets is increased by more than 5%.

Trial results

43 LWxL sows were divided into two batches: 21 in the trial group and 22 in the control group. From five days before farrowing to day 21 of lactation, the trial group was offered feed supplemented with Axion Sow'Ax.

Feed of both groups had the same nutritional values. One day after farrowing, rectal temperature of sows in the control group was 0.16°C higher than in the trial group. The decrease of rectal temperature was significantly faster in the Axion Sow'Ax group ($P < 0.05$) (Fig. 2) than in the control group.

Colostrum synthesis began 48 hours before farrowing and is totally finished 48 hours after farrowing. Piglets from the trial group sows had a greater average daily gain (ADG) from birth to 48 hours of life ($p < 0.001$), meaning that colostrum production was enhanced by Axion Sow'Ax. Besides, piglets from the trial group sows also had a greater ADG from 48 hours of life to weaning ($p < 0.001$) (Fig. 3).

In addition, the distribution of piglets in birthweight classes shows a better growth for the piglets from the trial group regardless of class, illustrating the overall positive effect of Axion Sow'Ax (Fig. 4). ■

References are available
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