

Colostrum management: "Let them drink!"



Paying extra attention to neonatal piglets the first hours post partum is worthwhile. It helps to encourage colostrum intake which leads to better protection against specific pathogens. And later in life, pigs suffer less disease and incur reduced mortality rates and better growth. Provimi has investigated the importance of colostrum distribution, colostrum quality and piglet performance.

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Litter sizes have increased enormously in the past decade and litters with 15 live born piglets are not unusual nowadays. However, weaning and finishing correspondingly large numbers of piglets per cycle is a challenge in global pig farming. To meet these challenges requires improvements in animal health and management. The starting point is the first few days of life.

Colostrum distribution:

The first nutrition a piglet receives is colostrum from the mother. Besides the important energy 'building blocks' of lactose and protein, colostrum is the primary source of essential immunoglobulins (IgG), or antibodies, that protect the young animal against severe infections. In the immediate postnatal period the piglet must therefore rely on IgG absorbed from maternal colostrum for passive immune protection until the synthesis of IgG begins in the individual piglet (Rooke et al., 2003). After birth, the immune system of the piglet starts to produce its own antibodies but, under normal circumstances, it will not have a fully developed immune system until 90 to 100 days post partum. This means that any immunity in the first 21 to 28 days, depending on weaning age, relies on colostrum intake.

Immunoglobulins: What do they do?

Immunoglobulins (Ig) are protein structures produced by white blood cells. This means that Ig is part of the adaptive immune system of the body.

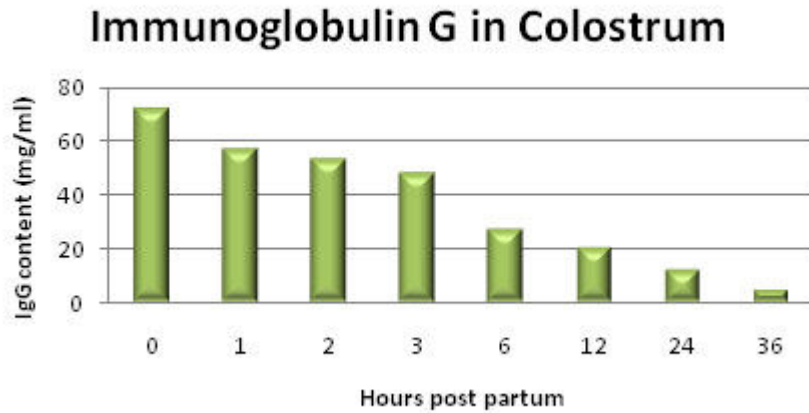
When an unknown foreign object (or antigen) enters the blood chain the immune system responds immediately. Directly after contact with an antigen the Ig is formed. The chemical structure of each Ig is specifically adapted to a certain antigen.

Subsequently 'memory cells' are formed to prevent future attacks from the same antigen. The Ig can be classified into five main groups: IgA, IgD, IgE, IgG and IgM, of which IgA, M and G are present in sow colostrum. IgA and M are referred to as lactogenic.

They prevent against bacteria in the gastro intestinal tract. IgG is produced in large quantities in reaction to specific antigens such as Streptococcus, Porcine Intestinal, Adenomatosis (PIA) and Porcine Reproductive Respiratory Syndrome (PRRS).

It is known that the protein content of colostrum reduces rapidly after farrowing, in line with the drop in IgG levels as shown in *Figure 1*. IgG levels in colostrums drop by 50% from three to six hours post partum.

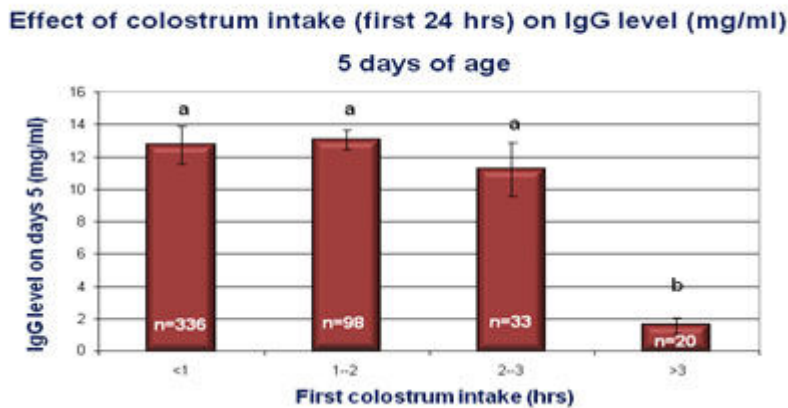
Figure 1: Immunoglobulin G level in sow colostrum (adopted from Le Dividich et al., 2006)



Immunoglobulins in piglets:

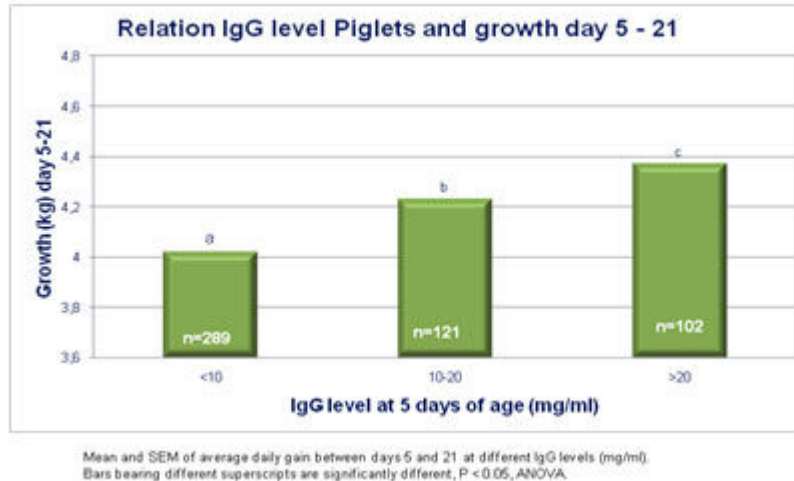
Provimi has conducted a trial with 35 litters to better understand the impact of early colostrum intake on piglet immunity up to weaning. Blood samples of 512 piglets were analyzed for their IgG content. The data shows that the IgG level of piglets five days post partum is significantly related to the colostrum intake directly after farrowing. Those piglets that had intakes of colostrum within the first three hours of life had significantly higher IgG blood levels at five days of age, compared with those piglets who were born after three hours. This shows the importance of sufficient colostrum intake in the first three hours after birth.

Figure 2: Effect of early colostrum intake on IgG level 5 days post partum (Provimi research)



It was found by Rooke *et al.*, 2003 that the colostrum IgG level in the first days of life also influenced the active immunity development of piglets. Rooke *et al.*, 2003 furthermore concluded that the IgG level in piglet plasma in the first days of life was positively related to the IgG levels at weaning at 28 days old. This indicates that the colostrum IgG level is not only important for passive immunity, but also for development of the piglets own immune system. And it explains why piglets in the Provimi trial with a high IgG level at five days old showed better puerperal growth results, as shown in *Figure 3*.

Figure 3: IgG level at 5 days post partum influencing piglet growth performance (Provimi research)



In the Provimi trial the piglets were divided into three groups depending on their level of IgG's at five days old. The 'low IgG' group had less than 10 mg IgG/ml of IgG's in their blood plasma, the 'medium IgG' group 10-20 mg/ml and the high IgG group had more than 20 mg/ml.

The analyses of the IgG content in blood samples of piglets at five days old were related to the piglet growth at 21 day weaning. Results showed that piglets with high IgG levels at five days old had significantly improved growth results.

Increasing piglet immunity

Increasing litter sizes will prolong the duration of farrowing. This means that an equal allocation of the supply of colostrum over the whole litter is even more crucial. Producers will need to pay more attention to colostrum management and ensure that all piglets get as much colostrum as possible, following the three 'f' code of fresh, frequent and fast.

The quality of the colostrum can be boosted by proper vaccination programs. And sows also need to produce high quantities of colostrum. This requires optimal sow nutrition around farrowing to ensure a solid start to the lactation.

Regulation of calcium metabolism in the sow during this phase is very important. The gestation period is focused on calcium and phosphorus retention, to support recovery and bone strength. Subsequently, the lactation period is focused on calcium and phosphorus release from the bone reservoirs to support colostrum and milk production. The mechanism of calcium and phosphorus retention or release is initiated by the balance of anions, chloride and sulphur, and the cations, sodium and potassium, in the blood. Raising the dietary anion:cation balance (ACB) supports calcium and phosphorus retention in the bones, while lowering the dietary ACB level stimulates its release. This process takes approximately a week. Therefore it is recommended to feed a lactation diet from one week pre partum with low ACB level.

As well as the sow's ability to produce colostrum, the piglet needs to be fit and able to secure intakes. One important aspect relating to piglet vitality is the ambient temperature. From literature it is known that the glycogen energy reserve in new born piglets is very restricted. Piglets that are exposed to temperatures below thermal neutrality require almost 30% more energy compared to thermal neutral piglets (Le Dividich *et al.*, 2005).

Provimi has investigated the influence of radiation temperature affecting piglet survivability. Piglets were divided according to the temperature they were exposed to. There were three main groups <32°C (20% of the piglets), 32 – 33°C (35% of the piglets) and >33°C (45% of the piglets). Correspondingly, the survivability of each group was >60%, 75% and >95% respectively. This indicates that survivability of piglets can be improved significantly by increasing the radiation temperature. From the results it was concluded that increasing the radiation by 2°C from 33°C up to 35°C improves piglet survivability by 20%.

Practical pointers

It is important for producers to understand the need for improved colostrum distribution, in order to produce more healthy piglets. Based on Provimi's research data, the following guidelines are recommended for healthy and sustainable piglet production:

- Mark the first six live born piglets and separate them from the sow after 1.5 hours post partum. This gives the latest new born piglets the ability to drink colostrum. After three hours post partum all piglets can drink together.
- Stimulate colostrum production via good dietary transition from gestation to lactation. Lowering the dietary ACB level stimulates and supports the metabolic change of the sow.
- Be aware of the radiation temperature, just 2° degrees above 33°C can improve the piglet survivability up to 20%.