Piglet serum IgG, a non disruptive method to measure colostrum distribution

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Introduction

Colostrum intake is critical for the survival of the piglet. The first 2 days of their lives, colostrum provides the nutrients to fulfill the piglets needs for homeostasis and growth and during their first weeks, the immunoglobulin (Ig) fraction passively protects the piglets from disease (1). It is estimated that a piglet needs 160 to 170 ml of colostrum per kg bodyweight to survive (2). Immunoglobulin G (IgG) is absorbed by the gut wall during 24 to 48 hours, but the IgG content of the colostrum decreases quickly after birth (1). Next to total colostrum yield and IgG concentration, the distribution of the available quantity amongst the different littermates is becoming more important with increasing litter size. Several methods to estimate colostrum intake have been described in the past but they all share one disadvantage being the extensive manipulation of piglet and or sows during the colostrum intake phase. To eliminate the impact of manipulation on sow and piglet behavior, an alternative method without extra manipulations is required.

In this study, a method based on piglet serum IgG concentration was used to measure the impact of litter size on colostrum distribution.

Materials and Methods

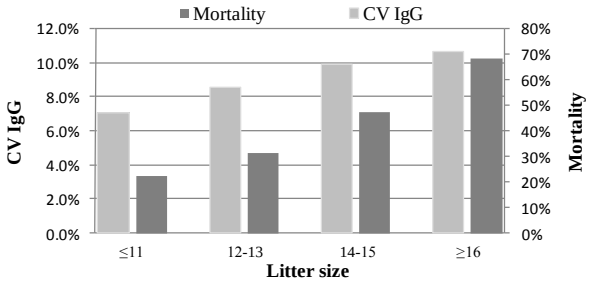
In a commercial sows farm, 114 litters were included in the study. The farm data recording system was used to retrieve the relevant reproductive data. All normal farm procedures were continued. At tail docking (day 3 post partum) a blood drop of the remaining tail bud from six randomly chosen litter mates was sampled. These samples were analyzed with a DAS-ELISA test (3) (Colostrum Quality Counter™). There is a great variability in colostrum yield and colostrum IgG concentration between sows. Therefore the absolute IgG concentrations have poor predicting value on colostrum intake. Within the litter however, these variables are not relevant. In order to be able to compare the distribution for colostrum between sows, the coefficient of variation of the piglet serum IgG (CV IgG) was calculated. This is the standard deviation divided by the average of that litter.

The statistical analysis was performed with the SAS® program. A Poisson regression model on the number of died piglets per sow was used. The total number of piglets with the sow was included as covariate.

Results

It was demonstrated that the variation in IgG levels increased with litter size (Figure 1).

Figure 1: Impact of litter size on IgG distribution and piglet mortality



The mortality rate over all litters is strongly correlated with litter size ($p < 0.0001$). Lower birth weight and vitality compromise the colostrum intake. With an increasing number of piglets, total colostrum volume becomes a second critical factor. The distribution of that colostrum should therefore be optimal. However, the data show that the distribution gets worse with increasing litter size. All measures that increase the colostrum production and facilitate the distribution of the colostrum increases the chance of the piglets to survive.

Discussion

In this study, it is shown that by using serum IgG concentrations of three day old piglets, the distribution of the colostrum can be estimated. Both pre-weaning mortality and variation in colostrum uptake (represented as CV IgG) are positively correlated with litter size. This underlines the increasing importance of individual colostrum uptake with increasing productivity of our sow farms.

References

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