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Aleta™ for sows, more colostrum and better immunity in the piglets

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Introduction

With the trend for hyperprolific sows, it is a challenge to guarantee adequate colostrum supply and intake in the piglets. Colostrum is produced shortly before farrowing and ends 12 to 24 hours after parturition. It is the only energy source for the piglets in the first days of life. Piglets which fail to ingest sufficient colostrum have lower survival, show predisposition to diarrhoea and subsequently lower weaning weights. Sows have epitheliochorial placentas, in which there is no passage of immunity from the mother to the foetuses. Therefore, colostrum is also the piglets' initial source of protection against challenges. Colostrum intake is influenced by the fitness of the piglets at birth and to a lesser extent by the variability of birth weight. Hyperprolificity results in the presence of very light piglets in the largest litters, directly affecting the variability of the birth weight and indirectly colostrum production. Nutritional tools aimed at increasing colostrum production fail to deliver consistent results. Beta-glucans are glucose polymers found in the cell walls of algae, yeasts, fungi and bacteria. Due to their action in stimulating the specific and non-specific immune response, Beta-Glucans are of interest in livestock production for reducing the impact of both disease and stress. Their efficacy as immunomodulators depend on their size, structure and solubility. Unbranched 1,3 beta-glucans from algal sources have the greatest potential to modulate the immune system. Aleta is a unique algae beta-glucan derived from *Euglena gracilis*. Aleta is beneficial for animals in various stressful situations (farrowing, weaning, housing, mixing) and young animals while their immune system matures. It helps to reduce morbidity and mortality in challenges by pathogens, increasing vaccine efficiency and supports good antibiotic stewardship.
A trial was conducted to evaluate the effect of Aleta in the pre-lactation and lactation phase of sows and its respective effect on the performance and immunological status of piglets in the nursery phase.

Material and Methods

The study was carried out on a commercial farm of 2,500 sows. This was a high health unit (PRRS negative, *Streptococcus suis* type 2 negative) A total of 120 sows were included in the study (parities ranging from 1 to 6), and their respective litters. The study period corresponded to the last third of pregnancy (day 85 to 115) until weaning (21 days), the diets fed were pre-farrowing and lactation diet, respectively.

The sows were divided into two treatments: control and Aleta. The Aleta treatment consisted of identical diets to the control group, but with the inclusion of 200 g/t of Aleta.
The following parameters were evaluated: number of total born and live born piglets, average piglet weight at birth, average piglet weight after colostrum ingestion (18h after farrowing), mortality, number of piglets weaned, average piglet weight at weaning and average feed consumption of the sow.
Up to 6 hours after delivery, 20 sows were randomly selected per treatment for colostrum sampling and manually milked, a pool sample of colostrum per sow was obtained. 4 days after farrowing, blood was collected from one piglet selected from each litter (20 piglets). The colostrum yield was evaluated per sow. Mean consumption (18h after delivery) and immunological profile (IgG, IgA and IgM) of colostrum (18h after

parturition) was evaluated, as well as serum immunological profile (IgG, IgA and IgM) of piglets at 4 days of age. For IgG, IgA and IgM analysis, ELISA tests were used. All other management practices were maintained according to the usual routines of the farm.
The normal distribution of data was analyzed using the Kolmogorov-Smirnov & Lilliefors tests, and as well as Shapiro-Wilk's ($p>0.05$). Normally distributed data were subjected to analysis of variance and Student's t-tests and non-normal quantitative data were compared using the Wilcoxon-Mann-Whitney and Kruskal-Wallis test.

Results and Discussion

The farrowing and weaning data are shown in Table 1.

Table 1. Average of total born piglets, live born piglets, piglet weight at birth of sows in the Control and Aleta groups

Parameters	Control	ALETA	CV (%)	p-value (T)
Piglets born	16.79	16.31	23.0	0.2931
Piglets born alive	15.34	14.79	24.3	0.3590
Piglet weights at birth	1.342	1.337	15.3	0.9263

CV = coefficient of variation

Aleta supplementation during the last 3rd of gestation did not significantly impact the parameters assessed at birth. On the other hand, Aleta, lead to a significantly increased colostrum production, as can be seen on table 2.

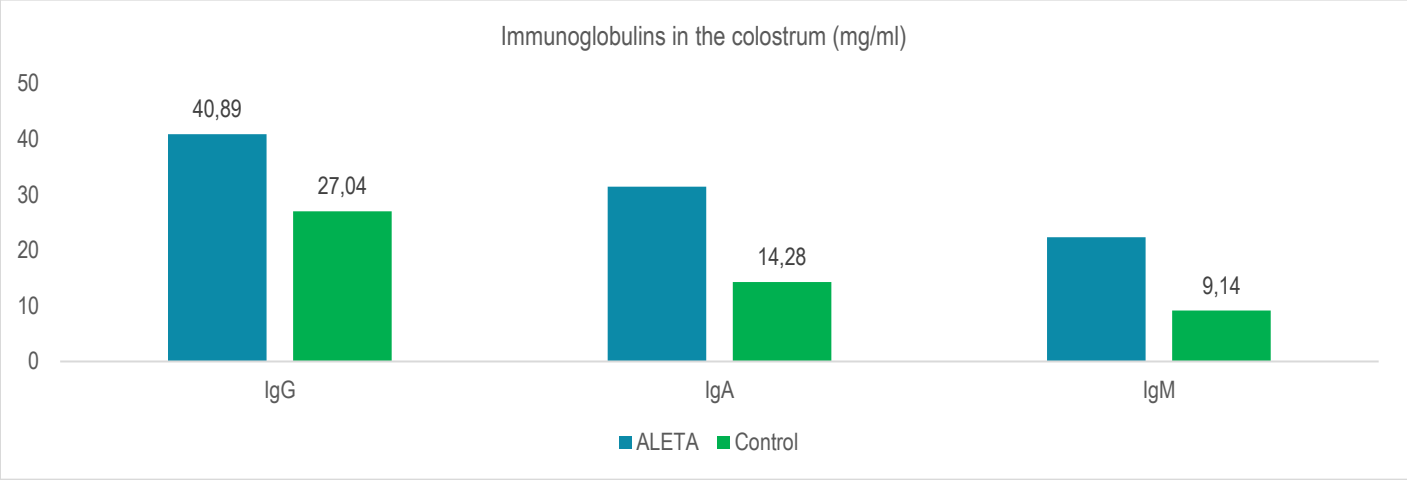
Table 2 Averages of birthweights, piglet weights at 18h, weight gains and colostrum intake in the control and Aleta groups.

	Control	Aleta	CV (%)	p-value (T)
Birthweight (kg)	1.342	1.337	15.3	0.9263
18h weight (kg)	1.403	1.426	14.9	0.7316
Weight gain at 18 h (g)	0.068[b]	**0.102[a]**	69.3	**0.0354**
Colostrum production 18 h (kg)	3.476	4.343	41.9	0.0550
Colostrum intake 18 h (g)	234.921[b]	**294.049[a]**	40.1	**0.0394**

[a,b] Samples not sharing letters are different according to Student e teste de Wilcoxon-Mann-Whitney ($p<0.05$); CV = coefficient of variation

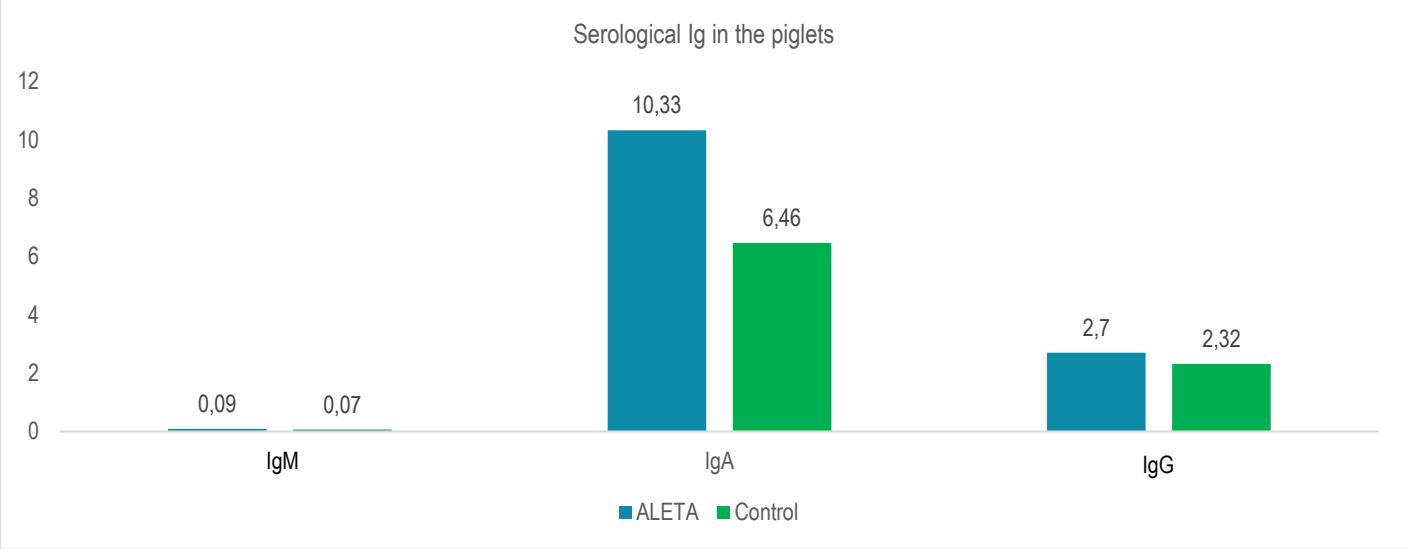
With the highest colostrum production ($p<0.06$), due to the supplementation with Aleta in the pre-farrowing phase, piglets were able to ingest more colostrum ($p<0.05$) in the period evaluated (18h after delivery) resulting in a greater weight gain in this period ($p<0.05$).
Colostrum intake is essential for every litter. Due to the increase in the number of piglets per litter because of sow genetics, intake becomes a challenge. By promoting colostrum quality, Aleta becomes a tool to promote early litter uniformity. This is probably due to allowing smaller piglets to also ingest an adequate quantity.

Additionally, Aleta promoted better production of IgG, IgA and IgM, resulting in an increase ($p<0.05$) in the quantity of these immunoglobulins in the colostrum. IgG is the main immunoglobulin present in colostrum and originates from the sows' blood. The direct action of Aleta on the maternal immune system promoted greater concentration of IgG in colostrum. Generally, the maximum concentration of IgG occurs 6h after parturition (mean 64.40 mg/mL), dropping 50% by 12h after parturition (32.20 mg/mL). Supplementation with Aleta resulted in mean levels of 40.89 mg/mL 18h postpartum, an increase of more than 50% in IgG levels versus control. The increase (even higher) was also observed in IgA and IgM, being 120% and 144%, respectively in relation to the control group.



Graph 1: Immunoglobulins in the colostrum (mg/mL); $p<0.05$

Due to the placenta structure of sows, diffuse epitheliochorial, immunoglobulins have to be transferred from the sow to piglets exclusively via colostrum. The high concentration of immunoglobulins in colostrum also resulted in higher serum concentration ($p<0.05$) in the piglets at 4 days of age.



Graph 2: Immunoglobulin concentration in piglets of 4 days of age (mg/ml); p<0.05.

IgA was the immunoglobulin that showed the greatest increase (60%), followed by IgG and IgM (16%). There were no differences between both groups in pre weaning mortality (very low for both groups) or weaning weight (160 g /piglet extra in the Aleta group) (Table 3),
The result of these improvements will be seen in the following phases with effects on the performance during grow-out of the animal depending also on the challenges the piglet will face after weaning. Piglets that do not consume colostrum, acquire immunity only 7 to 10 days after contact with potential pathogens. By having the immune system modulated, the piglets will be more prepared for the challenges and stress expected at weaning.

Table 3. Average total born piglets, piglets born alive, birth weights, weaned piglets, piglet weight at weaning, piglet daily weight gain (ADG), piglet mortality during the period and consumption average of lactation ration of the sows of the Control and Aleta treatments

Parameters	Control	ALETA	CV (%)	p-value
Total piglets born	16.79	16.31	23.0	0.2931
Piglets born alive	15.34	14.79	24.3	0.3590
Piglet weights at birth (Kg)	1.342	1.337	15.3	0.9263
Piglets weaned	14.53	14.35	5.6	0.3160
Piglets weights at weaning (Kg)	5.775	5.936	18.9	0.4275
Daily gains (Kg)	0.227	0.223	19.9	0.2932
Piglet mortality (%)	3.05	4.44	12.9	0.1492
Feed consumption sow	6.491	6.396	20.7	0.7789

CV = coefficient of variation

The fact that piglets have an immune system that is still developing at weaning is one of the greatest challenges. The addition of Aleta to sows diets pre-farrowing and during lactation, results in piglets with a higher amount of serum immunoglobulin, a prerequisite for performance in subsequent phases, especially in systems with high health challenges and/or systems looking for reduction in antibiotic use.

CONCLUSIONS

With hyperprolific sow genetics becoming more common, the need for improved colostrum quality becomes urgent, as it is the primary source of energy and immunity for the piglet. Piglet performance during lactation and for the rest of the pigs' life depends on the consumption of colostrum. In the conditions of this study, in a high health herd, when receiving Aleta during the pre-farrowing and lactation period, the sows achieved both higher production of colostrum (assessed at 18h after delivery) as well as a higher concentration of IgG, IgA and IgM in it. Their piglets had consumed more colostrum and showed improved weight gain in the first hours after farrowing (18h after birth). The use of Aleta in sows promoted better immunity of the piglets through improved concentration of immunoglobulins in colostrum, this was confirmed by their improved

serum concentration of IgG, IgA and IgM. The most challenging periods in the life of piglets occur at weaning and, like the weaning weight, the immune status is an essential and important predictor of future performance and decisive for lifelong performance, justifying this investment in the sows for profitability of the entire production cycle.

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