Cellulosic fibre – an alternative fibre source for weaning piglets

Weaning is the most critical phase in piglet rearing. Diarrhoea in the post weaning phase (first 14 days) is the most visible symptom of these problems. The ongoing ban of antibiotic growth promoters (AGP) in many countries demands new strategies to approach these problems.

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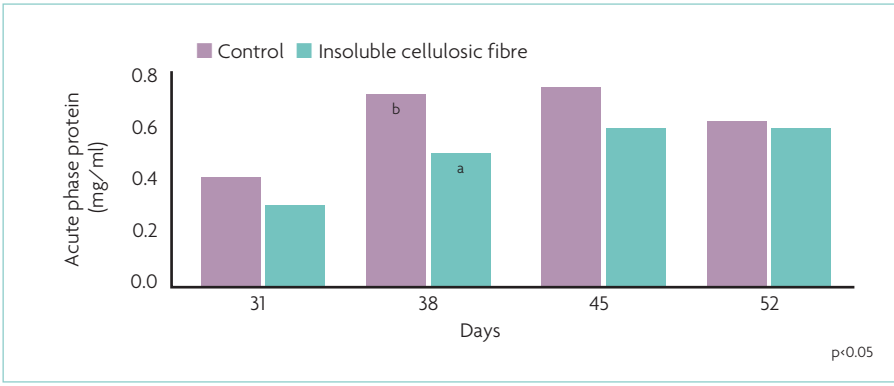

Fig. 1. Impact of cellulosic fibre (Arbocel) on the immune status of piglets.

It can be assumed that the functional properties of different fibre sources have the ability to influence the physicochemical characteristics of the gut by influencing intestinal transit time, digesta viscosity, water content (through water binding capacity (WBC)), osmotic balance and pH, thereby also modifying the microflora of the gut.

Pascoal et al. (2012) investigated the occurrence of post weaning diarrhoea as influenced by the fibre source administered.

A higher occurrence of diarrhoea was observed when soybean hulls and citrus pulp (higher soluble fibre content) was fed followed by the control group. The lowest incidence was observed in the piglets that consumed purified cellulose (insoluble fibre). The influence of guar gum (soluble fibre) on the development of weaner piglets that had been infected with E. coli (ETEC) was investigated by McDonald et al. (1999). The inclusion of guar gum increased the intestinal weight and fermentation processes. E coli was able to develop in the small intestine, resulting in reduced body weight gains.

Trial results

In a trial to investigate the effect of dietary fibre on weanling piglet growth and health, the inclusion of sugar beet pulp and soya hulls (3:1) to the trial diets increased the amount of soluble fibre and resulted in decreased voluntary energy intake and growth, noticeably in the first week after weaning. The findings show that the inclusion of insoluble fibre in the first 14 days after weaning appears advantageous.

The digestive system of piglets at weaning is not fully developed. Feeding soluble fibre at this point would increase the viscosity of the digesta and slow intestinal transit without being efficiently fermented in the hind gut. In the context of weaning this would be counterproductive. The good WBC and bulking characteristics of insoluble fibre sources, on the other hand, fill the gut, positively influence peristalsis and thereby intestinal transit time.

Stalljohann and Patzelt (2009) investigated the influence of insoluble cellulosic fibre on piglet performance during the six week rearing period. 130 piglets in the control and trial group, respectively, were fed a pre-weaning feed (10th day), starter feed (1-21 days after weaning) with 1% cellulosic fibre as top dressing. The follow starter was not substituted with cellulosic fibre (fed until 68 days). Piglets fed cellulosic fibre had higher final weight (+1.4kg) and significantly better daily weight gain (Table 1).

In a trial at the University of Parma (Table 2) animals supplemented with cellulosic fibre (1%) at weaning (day 31) for 20 days showed a higher average daily feed intake, average daily gain and feed efficiency compared to a control group. These observations were accompanied by a higher

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Table 1. Impact of insoluble cellulosic fibre on the performance of piglets.

Group	Control	Cellulosic fibre
Weaned animals	124	130
Evaluated animals	123	126
Birth weight (kg)	1.52	1.54
Weaning weight (kg)	8.0	8.3
Weight end of trial (kg)	25.62	27.04
Trial duration (days)	41	41
Age at trial end (days)	69	68
Feed intake per animal and day (g)	667	703
Daily weight gain (g)	430[b]	458[a]
Feed conversion (per kg weight gain) (kg)	1.57	1.55

[a,b] different superscripts indicate statistical differences between the groups (P < 0.05)

Table 2. Impact of insoluble fibre on performance and diarrhoea incidence.

Treatment	Control	Insoluble fibre
Body weight (kg)		
30 days	8.4 ± 0.1	8.3 ± 0.2
52 days	13.1[a] ± 0.1	15.0[b] ± 0.2
64 days	17.3[a] ± 0.2	19.4[b] ± 0.4
ADG (g/day)		
30-52 days	202[a] ± 70	326[b] ± 82
52-64 days	347 ± 22	368 ± 24
Overall	275[a] ± 8	347[b] ± 11
ADFI (g/d)		
30-52 days	481[a] ± 9	534[b] ± 9
52-64 days	559 ± 15	583 ± 17
Overall	524 ± 22	558 ± 25
Feed efficiency (g/g)		
30-52 days	0.42[a] ± 0.02	0.61[b] ± 0.02
52-64 days	0.62 ± 0.03	0.63 ± 0.04
Overall	0.52[a] ± 0.01	0.62[b] ± 0.01
Faecal score (1 = liquid to 4 = hard)		
31-51 days	2.93[a] ± 0.07	3.16[b] ± 0.08
52-64 days	3.07 ± 0.06	3.01 ± 0.04
Diarrhoea incidence (n)		
31-51 days	3.88[b] ± 0.57	1.44[a] ± 0.27
52 to 64 days	1.56 ± 0.58	0.89 ± 0.31

[a,b] Different superscripts indicate statistical differences between the groups (P<0.01).
± Mean standard error. Six piglets per pen and nine pens per group.

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faecal score and lower diarrhoea incidence. A quite new and interesting observation in this trial was the impact of the insoluble cellulosic fibre on the immune system. The animals with the insoluble fibre in the feed had a much lower level of acute phase protein (PIG-MAP) in the blood (Fig. 1). This indicates that the cellulosic fibre helps to deal with an immune challenge. A positive effect on the development of the immune system in layer birds was also observed at the La Trobe University in Australia and confirms these findings.

Almost all feedstuffs in a standard diet will deliver a certain degree of low fermentable/insoluble and fermentable/soluble fibre. In order to tackle the quantity of insoluble fibre in the diets cellulosic products are most suitable since these feed materials contain >90% insoluble dietary fibre.

In conclusion, focusing on insoluble fibre in the diets of young piglets might help reduce the incidence of post weaning diarrhoea and depressed performance. ■

References are available from the author on request