

# Maximising kg of pork per sow per year through health maintenance

A pig's health is important to the economics of pig production – whether this be sows or piglets. Newborn piglets with low weights and poor immunity are likely to have higher mortality and fail to thrive and grow as they progress through the production process.

The success of each litter is dictated by their dam during pregnancy, as well as their early nutritional experiences, especially at weaning. In all mammals, weaning is a crucial period that sets up the animal for its productive performance. At this time, the piglet needs to establish its own immunity to ensure there is not a drop off in weight gain or liveability.

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Unlike humans, the porcine placenta is epithelichorial, meaning that the foetal chorionic epithelium is in contact with intact uterine epithelium. This prevents transplacental immunoglobulin transfer. Hence newborn piglets must acquire all the antibodies required to establish initial immunity from maternal colostrum.

It is therefore particularly important that piglets ingest adequate protection through initial colostrum feeding immediately after birth. The 'weaning gap' in performance arises when the piglet has not established its own sufficient acquired immunity in response to exposure to pathogens in its immediate environment, and is still reliant

Colostrum Immunoglobulin	Control	MOS (Bio-Mos 2 kg/t)	Significance (P value)
IgA (mg/dl)	1097	1178	0.06
IgG (mg/dl)	4,842 <sup>b</sup>	5,853 <sup>a</sup>	<0.01
IgM (mg/dl)	241 <sup>b</sup>	273 <sup>a</sup>	0.03

**Table 2. Immunoglobulin content of pre-nursing colostrum samples from sows fed control or Actigen-supplemented gestation diets (Funderburke et al., 2006).**

on the dwindling immunoglobulin (Ig) from its initial colostrum meal. This can lead to increased mortality and losses in weight gain or increased diarrhoea during this period – all of which can set back piglets for the rest of their growth phase.

It has been suggested that for every 100g drop in weight gain at weaning, the pig will require another whole day on farm to attain final body weight pre-slaughter, incurring more costs for the farmer and reducing the number of pigs produced per year due to increased days to slaughter.

Keeping both the sow and her piglets healthy by minimising pathogen impacts at a gut level and promoting immunity development and Ig secretion in colostrum is key to good productive performance in the litter as it progresses through weaning as well as during its growing and finishing phase. Specialist feed ingredients have been shown to have a major impact on this in sow and piglet feeding trials.

The mannan-oligosaccharide-based product Actigen (Alltech Inc) is known to have the ability to bind pathogens in the gut, reducing competition for nutrients in the animal and preventing damage to the

gut wall that can impact on absorption. In addition, pathogens bound to Actigen are 'presented' to the immune system, increasing the scope of the reactions to any perceived threat, including increasing Ig expression, whether directly or via colostrum.

## Trial results

Trials have been conducted to examine the influence of feeding Actigen to sows on their litters. The early trials reported by spring in 2001 demonstrated that Ig levels were higher in colostrum from sows fed Actigen, which resulted in better pre-weaning piglet performance.

This was associated with increased levels of circulating Igs in the piglets, making them more robust when faced with pathogen challenges from the environment and less likely to experience a drop in weight or incidence of diarrhoea at weaning.

In the trial reported by Funderburke et al. (2006), sows were fed diets supplemented with Actigen during gestation and lactation. They did not differ in their initial or final body weights, and the numbers of piglets born alive were statistically the same. However, average birth and weaning weights of the piglets were higher in litters from sows fed the Actigen during gestation. This resulted in higher daily gain and lower mortality in these groups of piglets during the suckling stage (Table 1). When these researchers examined the Ig levels in the colostrum from the sows used in the experiment, they found that the control-fed sows had lower levels of Ig expression compared to the Actigen-fed group, which was significant for IgG and IgM, and showed a strong trend (P=0.06) for IgA (Table 2).

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**Table 1. Effect of Actigen-supplemented sow diets on piglet performance from birth to weaning at 21 days of age (Funderburke et al., 2006).**

	Control	Actigen	Significance (P value)
Pre-weaning mortality (%)	11.27 <sup>a</sup>	9.09 <sup>b</sup>	<0.01
Average birth weight (kg) <sup>1</sup>	1.66 <sup>b</sup>	1.69 <sup>a</sup>	0.05
Average weaning weight (kg)	5.46 <sup>b</sup>	5.79 <sup>a</sup>	<0.01
Piglet ADG (kg)	0.177 <sup>b</sup>	0.195 <sup>a</sup>	<0.01
Piglet weight gain (kg)	3.79 <sup>b</sup>	4.11 <sup>a</sup>	<0.01

<sup>1</sup>Recorded at neonate processing (- 24 to 30 hours post-farrowing)

Treatment	Control (saline)	Actigen active component (0.75 g/d)	Standard error	Significance
Serum IgG (mg/ml)	42.08	55.62	3.015	P<0.001

**Table 3. IgG concentration in 48 hour old piglets receiving either saline or Actigen active suspension orally at birth and 24 hours of age (Lazarevi et al., 2010).**

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Such benefits in increased Ig levels in colostrum from sows fed Actigen are readily passed to their piglets, and were attributed to the increase in growth and decrease in mortality seen in their litters.

Other trials in sows and piglets investigated direct responses to Actigen in piglets. Randomised trials were conducted to investigate the effect of feeding Actigen to newborn piglets by giving it orally at birth (0.75ml per piglet of the active mannan-oligosaccharide ingredient in Actigen). Major increases in IgG were observed, amounting to 32% higher circulating blood levels (Table 3).

Such findings demonstrated the direct influence of Actigen on immune status of young piglets, which would be expected to influence their performance at weaning and beyond.

To support this, further work was carried out in 2014 analysing blood taken after tail docking in 30 piglets randomly selected from litters from sows fed with and without Actigen in their feed.

Results showed that piglets from Actigen fed sows had 59% higher levels of IgG compared to the control group, and were 0.2kg heavier at birth.

When piglet litter data from the whole year was compared, sows fed Actigen had 0.6 more piglets born alive per litter, with 0.5kg more piglets reared to weaning.

Sows had a reduced wean to service interval of 0.6 days, which reflected the increase in nutrient availability and reduction in pathogen challenge when fed Actigen.

More recent data from trials in the UK have investigated the impact of feeding 0.08% Actigen in sow feed on piglet data through to weaning (Table 4). Again, there were no differences in numbers born in

total or alive. However, piglets from sows fed Actigen had significantly higher birth weights; more survived to day three of age and they were weaned half a day earlier with a higher litter weight.

Hence, feeding the sows Actigen during gestation and lactation has benefits in terms of piglet health and performance, which is related to increased production at the end of the finisher phase. Higher piglet weights at birth and survival in the first critical days is considered to be due to the reduced pathogen load in the sow during gestation.

This allows her to absorb and utilise more nutrients from the feed due to decreased competition with bacteria in the gut, as well as being able to withstand immune attack from any ingested pathogens.

The important transfer of immunity from sow to piglet has been shown to increase when sows are fed Actigen due to the higher levels of Igs expressed in the colostrum. The mode of action for this is due to the presentation of inactivated pathogens by Actigen to sampling cells within the gut wall, which increases the efficiency of immune expression.

This means that the piglets are better prepared to undergo the nutritional stresses of weaning, and will be more robust when faced with pathogenic challenges common at this period. Healthier sows and piglet litters are important in the economics of pig production, as it saves time in finishing pigs ready for slaughter.

Earlier weaning means that sows are available for returning to oestrus faster, giving less turnaround time and more litters per sow, per year. ■

References are available from the author on request

**Table 4. Effects of Actigen fed to sows on piglet litters (Taylor-Pickard et al., 2016).**

Parameter	Control	Actigen	P value
Piglet birth weight (kg)	1.509 <sup>a</sup>	1.551 <sup>b</sup>	0.0009
Total litter weight born (kg)	20.976	20.996	0.9755
No. piglets day three after birth	12.123 <sup>a</sup>	12.464 <sup>b</sup>	0.0339
Litter age weaning	26.614 <sup>b</sup>	26.024 <sup>a</sup>	0.0028
No piglets weaned	11.658 <sup>a</sup>	12.080 <sup>b</sup>	0.0081
Litter weight weaning (kg)	95.9 <sup>a</sup>	99.2 <sup>b</sup>	0.0395
Age weaning (days)	26.6 <sup>b</sup>	26.1 <sup>a</sup>	<0.0001

<sup>a</sup>Means with different superscripts vary significantly (P<0.05)