

Fishmeal gets young pigs off to the best of starts

IFFO organise a trial in China

One of the most critical phases in pig farming is weaning the baby pigs off the sow's milk and onto formulated feeds. It is critical to get the formulation of the diet right so that the young pigs' intestines adapt to the change in diet. Get it wrong and the pigs will suffer from diarrhoea and will grow poorly; get it right and the pigs can get off to the best possible start and be large healthy young pigs ready to grow-on rapidly.

In February and March 2009 IFFO undertook a trial with the Animal Husbandry & Veterinary Research Centre which is part of the Beijing Academy of Agriculture and Forestry. The trial was to investigate the effect of feeding 28 day-old un-weaned pigs on diets containing different levels of high quality fishmeal (2%, 5% and 8%).

The trial was run on a commercial farm close to Beijing and involved 60 baby pigs (hybrid Large White x Landrace), which were randomly divided into nine different sties, with three sties being fed each diet.

The diets were formulated to contain the same levels of energy, protein, calcium, phosphorus , lysine and methionine, but contained the three different levels of high quality imported fishmeal. The protein level was balanced with soybean meal at levels of 19, 15.1 and 10.5% for the three diets with increasing fishmeal. The farmer was unaware of the composition of the three diets which were simply labelled 1, 2 & 3.

The pigs were weighed at the start and 33 days later at the end of the trial and the pigs were given free access to the feed and the amount eaten recorded daily. The gut micro-flora were monitored as was the degree of diarrhoea. The blood levels of omega-3 fatty acids (EPA & DHA), Interleukin, and Porcine C-reactive protein (CRP) were also all sampled at the end to see if there was any difference between the treatments.

Trial results

A summary of the growth performance results can be seen in Table 1. This clearly shows that, with increasing amounts of fishmeal, the young pigs had significantly greater daily weight gains while eating about the same amount of feed (or possibly less), thereby giving significantly improved feed conversion ratios.

Table 1 Growth performance of Pigs over 33 days

Fishmeal level in the diet	2%	5%	8%
Average Start Weight kg	6.78±0.84	7.31±0.89	7.62±0.85
Average End Weight kg	20.01±2.33	21.38±1.59	23.59±1.96
Average Feed Consumed kg/pig	26.27	24.75	25.15
Average Daily Weight Gain g/pig/day	400.8 ± 46.2^{a}	426.5 ± 27.9^{b}	484.9 ± 35.3^{c}
Average Feed Conversion Ratio	1.99^{a}	1.76^{b}	1.57^{c}

Note: A significant difference (P<0.05) is denoted by a different superscript letter

Previous experience indicated that levels below 2% fishmeal would have resulted in mortalities due to acute diarrhoea; for this reason 2% was the minimum inclusion level. However, it was clear from the prevalence of early diarrhoea (Table 2) in the low fishmeal diet fed group that the intestines of these pigs were severely challenged. The 5% group were certainly better, but by far the healthiest group was that receiving 8% fishmeal (only one pig in the group of 20 suffered diarrhoea for a short time, at the very start). No significant differences were seen in the intestinal microflora.

Table 2 Intestinal health of pigs during the trial

Fishmeal level in the diet	Units	2%	5%	8%
Diarrhoea rate during days 1-10	%	75^{a}	15^{b}	5^{c}
Diarrhoea rate during days 11-33	%	0	0	0
Mortality during trial	%	0	0	0
Lactic acid bacteria in faeces	CFU/g	4.5×10^{8}	1.1×10^{8}	6.6×10^{7}
Colon bacillus in faeces	CFU/g	4.3×10^{6}	1.27×10^{6}	2.8×10^{6}

Note: A significant difference (P<0.05) is denoted by a different superscript letter

There is increasing evidence that the long-chain omega-3 fatty acids EPA and DHA play a critical role in the healthy development of young animals and fishmeal (since it contains around 10% fish oil) is a rich source of these fatty acids. These fatty acids have been shown to play a role in cardiovascular health as well as neural and immunological development in a range of different mammals. It is therefore important to see (Table 3) that there were significantly higher serum levels of these fatty acids with increasing fishmeal inclusion. This could be one factor in the improved health of the pigs receiving higher levels of fishmeal.

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Under normal healthy conditions pigs have low plasma levels of both Interleukin1 and Porcine C-reactive protein, but any inflammation will result in significantly elevated levels of these two indicators. It can be seen in table 3 that the 8% fishmeal fed group had significantly lower levels of these two indicators than either of the other two groups, clearly indicating the better health status of this group.

Table 3 Serum levels of some key health indicators

Fishmeal level in the diet	2%	5%	8%
EPA (C20:5) fatty acid mg/100ml	0.84±0.27[a]	3.32±0.68[b]	5.18±0.59[c]
DHA (C22:6) fatty acid mg/100ml	1.49±0.20[a]	2.72±0.30[b]	3.05±0.40[c]
Interleukin 1 (IL-1(pg/ml	77.31±9.1[a]	81.17±19.26[a]	31.11±3.63[b]
Porcine C-reactive protein (CRP) ug/ml	14.84±22.23[a]	27.50±33.29[b]	7.42±1.38[c]

Note: A significant difference (P<0.05) is denoted by a different superscript letter

Financial analysis

If we analyse the financial effect to the pig farmer of using the three different levels of fishmeal (Table 4) we can see that the feed price is obviously higher with the increasing fishmeal inclusion. This assumes a fishmeal price of 8400 RMB/tonne at the feed mill and the protein was balanced by soymeal at a price of 3550 RMB/tonne. However, because the pigs on the higher fishmeal level ate slightly less feed, the cost of feed consumed was similar. But the improving feed conversion ratios resulted in better weight gains with increasing fishmeal.

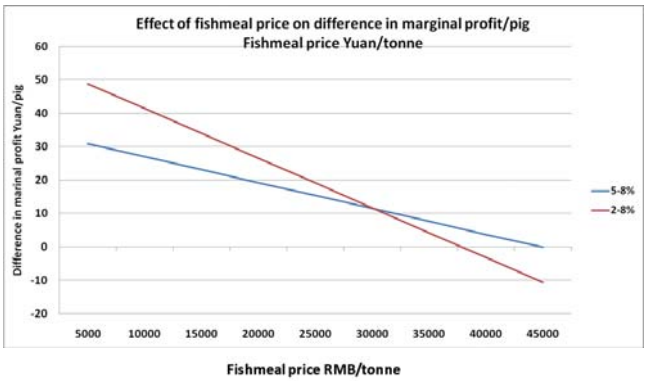
Taking the revenue generated from the weight gained during the trial (based on 17 RMB /kg) and subtracting the cost of the feed gives a value for the additional profit generated for the three different treatments. Table 4 clearly shows that, despite the additional cost of increasing fishmeal inclusion, the better performance generates a lot more profit. If we compare the 8% inclusion with the 2% inclusion, an additional 45.2 RMB/pig of profit is generated, or alternatively 29.0 RMB/pig when compared 8% with 5% fishmeal.

Table 4 Financial analysis

Fishmeal level in the diet	2%	5%	8%
Feed price Yuan/kg	2.51	2.59	2.68
Feed consumption kg/pig	26.27	24.75	25.15
Cost of feed consumed Yuan/pig	65.9	64.1	67.4
Weight gain kg/pig	13.23	14.07	15.97
Average price of baby pigs Yuan/kg	17	17	17
Marginal profit Yuan/pig (value weight gain-feed cost)	158.9	175.1	204.1
Improvement in marginal profit 2-8% Yuan/pig			45.2
Improvement in marginal profit 5-8% Yuan/pig			29.0

Finally, based on the results achieved and the prices outlined, we can examine what would be the effect of an increase in the price of the fishmeal on the marginal profit. If all the ingredient costs remain the same, only the price of fishmeal being varied, one can then draw a graph of the effect of the varying fishmeal price on the marginal profit between the different treatments.

The graph clearly shows that, because of the improved performance, including the feed conversion ratio, the marginal profit falls very slowly with an increase in the fishmeal price and the benefit only reaches zero when the fishmeal price reaches 35,000-45,000 RMB/tonne. Clearly in reality other factors would be relevant long before this price was achieved, for example the price of alternative high quality protein sources such as spray dried milk powder. However, it is clear that the advantages gained by including fishmeal at a level of 8% in early weaner diets for pigs, are so significant that



Conclusions

The addition of increasing levels of high quality fishmeal (up to 8%) into the diets of young pigs, grown under standard Chinese conditions, produces improved performance and health that more than compensates for the price increase to the feed.

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