The role of probiotics in pig health management

by Jens Noesgaard Jorgensen, Chr. Hansen A/S, Hørsholm, Denmark and Robert Lantz, PAS Animal Health & Nutrition, Milwaukee, Wisconsin, USA.

Diseases are a burden to pork production as they can lead to reduced productivity, reduced animal welfare, mortality, and increased production costs. As an example, in 2008 the average annual expense for veterinarians and medicine in Denmark was €65/sow; €2.4/piglet and €0.8/slaughter pig.

The huge economic load that diseases put on the pork industry stresses the importance of health management. The management of health should be addressed at all levels – strategic, tactical, and operational.

Strategic health

Strategic health management encompasses a long time horizon, measured in years, and involves considerations such as:

- Location of the operation. The distance to other existing and potentially new livestock and poultry operations.
- Location of buildings. Single or multi-site production, and their relationships to other operations. Quarantine stable.
- Health level of herd. Should this be an SPF (specific pathogen free) herd?
- Manure storage and handling, as well as a manure management plan.

	Pre-starter	Starter	Grower
Feed units for pigs/100kg feed	121	116	111
Crude protein (%)	19.7	19.2	18.1
Crude fat (%)	5.1	6.2	4.7
Lysine (g/kg)	12.8	12.9	11.5
Methionine (g/kg)	4.1	4.0	3.6

Table 1. Nutrient composition of diets.

- Design of individual buildings.
- Producer-owned versus contract feeding systems.
- Purchased versus raised replacement genetics.

Tactical health

At this planning level the time horizon is shorter, typically a year or less. Here decisions regarding the following are typically made:

- Rules for handling of visitors.
- Participation in health control and monitoring programs.
- Immunity management programs.
- Vaccination protocols.
- Cleaning and disinfection protocols.

Operational health

At this planning level the time horizon is short, typically from daily to a few weeks. The main activity here is the implementation and control of agreed upon programs and procedures. An alternative way to address health management is to split the issues into:

- External infection protection.
- Internal infection protection.

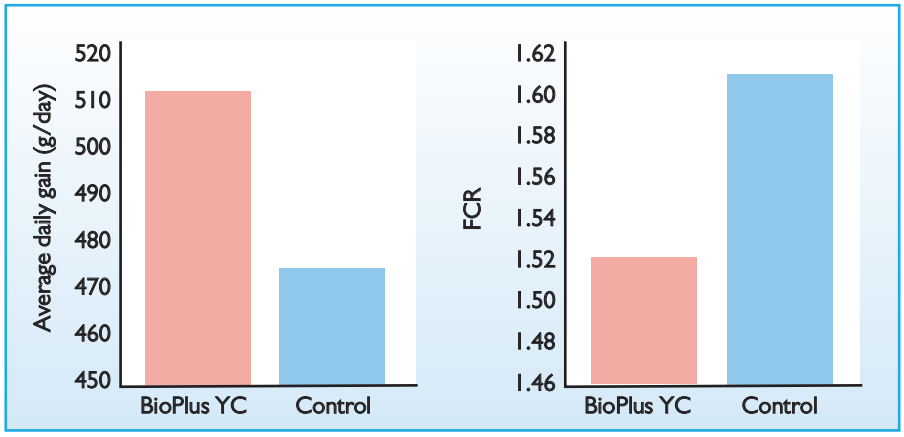
Internal infection protection covers all elements related to prevention of transfer of pathogens between different groups of pigs within the herd.

External infection protection relates to all factors that may prevent outside pathogens from entering the herd.

It should be noted that the points mentioned above are not a complete list of the issues that must to be considered regarding health management.

For a more detailed description of the issues, visit the homepage of the Danish Pig Research Centre.

Fig. 1. Effect of probiotics on pig growth (P≤0.08) and feed utilisation (P≤0.03).



Immunity management

With implementation of health control programs, immunity management becomes increasingly important. A high degree of immunity is beneficial; however this becomes more difficult to obtain with good health management.

Controlled, active, involvement in the spreading of infectious agents present in a herd is often recommended. This can be accomplished by the way new females are introduced into the herd, as well as feedback for certain health issues in the sow herd.

It is always under constant debate because this is typically done by moving manure between groups of pigs.

It has to be realised that there will always be viruses and bacteria entering a pig unit as new animals enter the herd.

Continued on page 21

Continued from page 19

These pathogens can also enter via feed, bedding and air through ventilation.

Microbiota management

There will always be a microflora in the gastro-intestinal tract of the pig. This community of micro-organisms (called microbiota) will always contain some pathogens.

Over growth of these pathogens will lead to intestinal disorders which can lead to suppressed productivity and, in some cases, even mortality.

Thus, securing intestinal health is an integrated part of health management today and is often referred to as microbiota management.

Securing the health of the gastro-intestinal tract is done by controlling the quality of the ingredients in feed rations, by controlling the physical structure of the feed and by use of probiotic additives.

Probiotics

Probiotics are live microbial feed supplements that have a beneficial effect on the intestinal microbial balance of the host animal and are thus an effective ingredient to obtain optimal health and functionality of the alimentary tract.

	Control	BioPlus YC	Difference (%)
Number of pigs	591	502	
Number replicates	8	7	
Weight in (kg)	7.1	6.9	-2,7
Weight out (kg)	26.1	27.6	+5,7
Feed intake (g/day)	765	776	+1,4
Average daily gain (g/day)	473	512a	+8.2
FCR (g/g)	1.61	1.52b	-5.0
Withdrawn	1.2	0.9	-25

a: P≤0.08; b: P≤0.03

Table 2. Effect of applying probiotics to pig diets.

The use of probiotics has shown significant benefits in pig production through their mode of action which includes:

- Competitive exclusion.
- Inhibition of pathogens.
- Production of digestive enzymes.
- Increased nutrient digestibility.
- Stimulation of the immune system.

A trial illustration

An illustration of the positive impact of the use of probiotics can be seen in the results from a recent Danish trial.

The trial was conducted with the probiotic BioPlus YC on a Danish commercial farm producing pigs under high sanitary conditions (SPF/AP12 status).

A total of 1,092 Danbred pigs were on trial for approximately 40 days from weaning (weaned at 28 days and fed on trial to 68 days of age).

Pigs were allocated to one of two treatment groups, control or probiotic, with 35 pigs/pen and two pens/trial unit. This resulted in 7-8 replicates/treatment.

Pigs were from three consecutive farrowings and treatments were evenly allocated to trial units within section in order to secure balanced simultaneous testing.

The diets were based on wheat, barley and soy and 1000 IU phytase were applied in all of the four feeding phases used:

- Phase 1 (day 28-38): Pre-starter.
- Phase 2 (day 38-45): Starter + 2500ppm zinc.
- Phase 3 (day 45-60): Starter.
- Phase 4 (day 60-): Grower.

The only difference between the diets in the two treatment groups was the inclusion of 400g of probiotics/ton of feed in the probiotic group.

Nutrient composition of the diets can be seen in Table 1. Feed and water were provided ad libitum throughout the trial.

The trial results are presented in Table 2 and Fig. 1. The results for the control group places the pig farm among the top 50% pig farms in Denmark, especially with respect to disease load (% withdrawn for trial).

Adding probiotics to the diets reduced the disease load (expressed as percentage withdrawn from trial) even further. As a consequence the pigs reacted by improving average daily gain and FCR with 8% (P≤0.08) and 5% (P≤0.03), respectively.

Based on actual feed cost and pig prices in Denmark (week 26, 2010) the use of probiotics gave a return on investment (ROI) of 10:1 in this trial.

Conclusion

This trial illustrates that even in high performing swine operations the gastro-intestinal tract is still subject to malfunction/reduced functionality originating from pathogens.

It also demonstrates that probiotics can improve the gastro-intestinal health and functionality to such a degree that significant improvements in production parameters and economy are obtained. ■