SDPP: Creating robust young animals

Bioactive peptides in spray-dried plasma have a positive effect on young animals. Studies show that this bio-functional feed ingredient fits in an animal health strategy to reduce the use of antimicrobials.

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Reducing antimicrobial use is a worldwide challenge for the production of animal proteins. Some countries have made significant progress, other countries just start to face the challenges. Antibiotics are easy to use, and are effective. But prudent use is required. Today, also the preventive and therapeutic use has to be restricted, as required by national and private programs. To reduce usage of antimicrobials all facets of animal management must be in scope. Feeding, housing, health management, and biosecurity are the most important. Feeding management is the most critical in reducing non-therapeutic use of antibiotics, and this goes beyond taking out the antibiotics and replacing them with additives that mimic the anti-bacterial effect. It also encompasses restricting protein contents, providing proteins with good digestibility, feeding fibres, and proper balancing of nutrients.

A role for spray-dried plasma?

Several studies have evaluated whether spray dried plasma protein (SDPP) can reduce the need to use antibiotics. SDPP contains all the bio-active proteins of blood, from which the functionality is conserved by the processing methods applied. SDPP gives positive effects as well in pigs, in poultry and aquatic species. There is an increasing number of studies showing the beneficial effects in these animals.

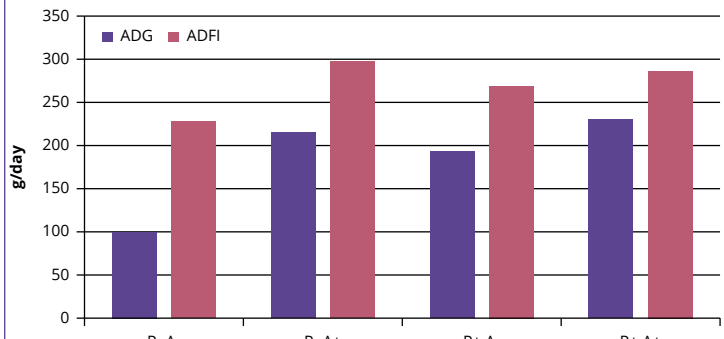
Weaned piglets that are fed diets containing SDPP show performance improvement, according to many studies during the last three decades. Four studies compared spray dried plasma against groups with antibiotics included in the feed to control weaning diarrhoea and prevent under-performance. The first, from Torrallardona *et al.*, made a comparison where plasma (7%) replaced the use of colistin. Pigs were challenged with infection with *E. Coli* K99 after weaning. The piglets receiving plasma or colistin performed better than the group without treatment. The effect of colistin was numerically a little stronger than plasma. The best performance was seen in the group receiving plasma and colistin, see *Figure 1*.

Secondly, in a study presented by Bosi *et al.*, 2004; 6% SDPP (P) and/or (A) 250 mg/kg Colistin + 500 mg/kg Amoxycillin was used. Animals were challenged with an *E. Coli* K88 infection at day 4 after weaning. Here SDPP showed a little stronger effect. And again an additive effect was shown, see *Figure 2*. The colistin and amoxycillin used in these two experiments should not be used in feed, but the experiments show that SDPP can do a comparable job.

The results of these previous studies have been confirmed by recently performed studies. One, by Wageningen University, studied whether a high dose of Zinc could be replaced by SDPP. Especially a strategy where the inclusion of SDPP was decreased in two steps (first 2 weeks 5% inclusion, the following two week 2.5% and the last week 0.5%) gave similar intermediate and final results with regard to feed intake and growth as the zinc group. Use of ZnO improved growth performance and faecal consistency as reported in other studies.

Finally, a study performed at Chengdu's Agricultural University showed that the performance of plasma dosed piglets (the first two weeks after weaning at 5%, followed by 2,5% plasma inclusion for 3 weeks) was equivalent with a group on broad spectrum antibiotics (5 weeks according current China standards) and zinc (1600 mg/kg for 2 weeks) in the formulation. A fourth experimental group in this study received chicken plasma instead of porcine plasma. In this chicken plasma group no improvement was observed.

Figure 1 - Performance of weanling pigs fed diets containing plasma (P) and/or colistin (A) (day 0-14).



Source: Torrallardona et al., 2003

PHOTO: DARLING INGREDIENTS

Enabling robust animals

SDPP has an outstanding record of improving performance in young piglets. The reviewed studies show that weaned piglets had the same performance when zinc or antibiotics were replaced by spray dried plasma. The SDPP makes piglets more robust against the consequences of a bacteriological infection. The immunoglobulins hinder ingested pathogens colonise or infect the animals or disturb the gut microbiota. Besides the local gut effect, studies suggest that there are also systemic health effects. For example, it is observed that SDPP fed piglets had a stronger protection after vaccination against respiratory diseases compared to non-SDPP fed piglets.

Use of spray-dried plasma is legally allowed in almost all parts of the world, including the European Union. Nevertheless, some retailers restrict the use of animal proteins including plasma in their supply chains. Decreasing antibiotic use, a low carbon footprint of processed by-products, and circularity of agro-systems are argument to use these proteins. This must challenge these retailers to re-evaluate the imposed restrictions.

A second hurdle in the application of SDPP is the fear that SDPP is not safe. This hesitation became bigger since Porcine Epidemic Diarrhoea (PED) broke out in the north America in 2014 and African Swine Fever (ASF) in China (2018). However, internal and external risk assessments have shown that the controls that are in place guarantee the biosafety of the final product. By sourcing blood of clinically healthy animals, heating throughout the substance for drying, and post processing storage in hot rooms, no infectivity is present at the final stage of production. Studies investigating different viruses at different production steps have repeatedly shown the effective virus killing. Furthermore, epidemiological investigations support that plasma has not let to transmission of disease to disease free areas. All together plasma is safe, like OIE has stated.

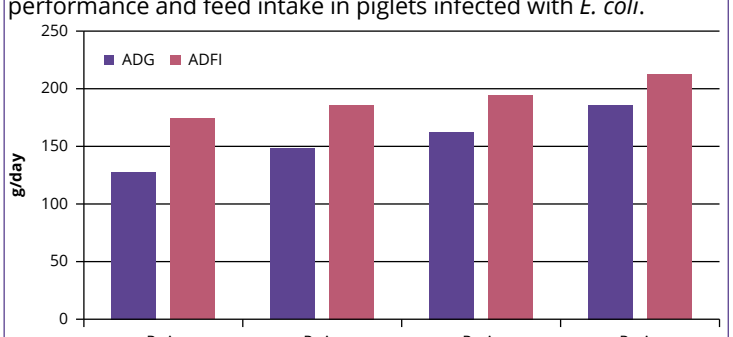
Effective alternative to limit resistance

Critical or transition periods in juvenile live are also seen in poultry and aqua culture. The number of studies in these animal species is increasing. And also in these species antibiotics are applied to overcome the challenges at the critical transitional stages of live. SDPP can also here decrease the need to use antibiotics. Young chicks grow faster and less mortality is seen in shrimp with feeds containing SDPP.

To reduce the reservoir of resistant bacteria in animal populations it is necessary to reduce the use of antibiotics in primary production. Using plasma as an ingredient showed to improve the quality of feed an reduce diarrhoea. Use of SDPP should be considered when restricting the usage of antibiotics.

References available on request

Figure 2 - Effect of plasma protein (P) and antibiotic (A) on growth performance and feed intake in piglets infected with *E. coli*.



Source: Basi et al., 2004