Improving piglet performance with phytogenic feed additives

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Piglet production and especially the weaning process remains one of the most challenging periods in a pig's life. The impact of being removed from the sow and experiencing a total change of social structure reduces water and feed intake drastically. According to Varley and Stockill (2001), half the pigs of a weaned group do not take in any water at all within the first 24 hours after weaning (Fig. 1).

The influence on feed intake is, of course, even more severe, as studies from the Longview Animal Research Centre in the USA show. Piglets need up to five days until they reach a significant feed intake of 250g/day (Fig. 2).

This results in a loss of body weight that needs at least three days post weaning to compensate for the weight loss (Fig. 3).

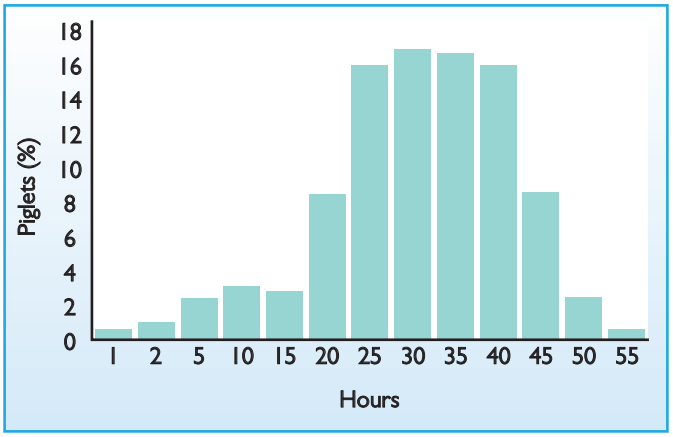

Fig. 1. Distribution of weanling piglets over elapsed time to first drink.

Susceptible to challenge

At the age of four weeks or less, the digestive tract, as well as the active immunity, is not that developed, which makes young pigs more susceptible to challenges from outside such as bacterial pressure leading to intestinal disorders.

So, what can be done to support young pigs during these transition times? An increase in weaning age could be one answer, which is currently happening in the US, where weaning ages have gone up to 24-28 days again. However, under current performance pressure of increasing litter size and the use of high prolific sows with large number of piglets, more needs to be done to support the young pig at weaning.

The use of feed additives has proven to improve the performance of livestock production.

Due to increased interest in alternative natural feed additives the application of so called phytogenic (= plant based) feed additives has been researched more intensively in recent year and these studies should give an overview of the potential of phytogenic feed additives for young pigs after weaning.

Table 1 shows a summary of various studies which focus on different aspects of piglet diets with respect to feed additive equipment as well as production environment.

The objective of all three studies was to evaluate the growth performing potential of Delacon's phytogenic feed additive Fresta F.

The feed additive consists of a standardised combination of essential oils of caraway, peppermint and lemon in a microencapsulated powdery form on an excipient of dried crushed herbs.

The mode of action is based on nutritional effects influencing the gut environment by stimulating the production and activity of endogenous enzymes.

This leads to a better digestibility of nutrients and subsequently to better growth and feed conversion ratio.

The flavour of the ingredients stimulates the production of saliva and digestive juices in the GI tract. Furthermore, the active ingredients are able to reduce the adhesion of pathogen bacteria to the pig's gut wall by blocking the chemical receptors of pathogens.

Study one

The first study is characterised by a European set up, which does not have any antibiotic growth promoters or high contents of zinc and copper. It is a meta-analysis of five trials performed in Spain under institute conditions as well as in commercial swine farms.

The trials were performed in accordance with the guidelines for registration of a zootechnical feed additive according to EU regulation 1831/2003, which was a 42 day trial period with a 14 day pre-starter and 28 day starter period. Table 2 shows all trials included in this analysis.

The application of Fresta F at a

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Fig. 2. Feed (pellets) intake of the weaned pig. Initial weight 11.7lb (Longview Animal Research, Land O Lakes Purina Feed, 2006).

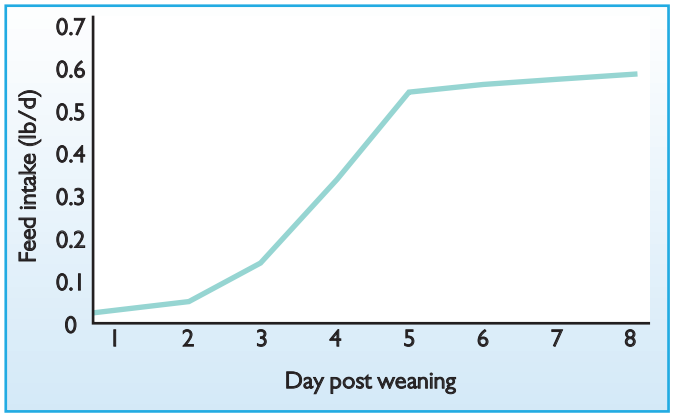
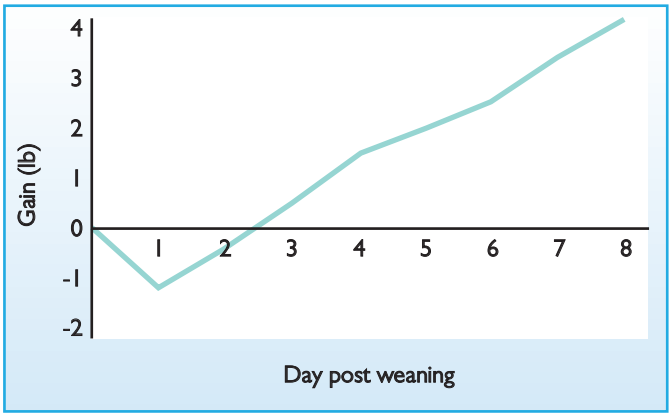


Fig. 3. Results showing the loss of bodyweight post weaning (De Rodas et al, 1995).



Location and time	Trial design	Number of animals/repetitions	Diet/ objective
Institutes and commercial farms in Spain, 2008	Meta analysis of five trials, Two treatments: Negative control Negative control + Fresta F	1040 animals weaned at 21-28 days/total 77 repetitions	Typical weaner diet without high levels of zinc and copper and no antibiotic growth promoters; assess growth promoting potential
Dankook University, Korea, 2006	Four treatments: Negative control Positive control Negative control + Fresta F Positive control + Fresta F	96 piglets weaned at 21 days/six repetitions/treatment	Diet with organic acids, yeast and high zinc oxide; assess replacement potential for AGP and synergistic effect with AGP
Wean to finish barn, Northwest Iowa, USA, 2009	Three treatments: Positive control with AGP (mash feed) Positive control + Fresta F (mash) Positive control + Fresta F (pellet in last phase)	792 pigs weaned at 17-21 days/12 repetitions/ treatment	Diet with antibiotics, high zinc and copper; assess the potential of synergistic effects with AGP mash and pellet diets

Table 1. Overview of trial designs and objectives.

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rate of 250ppm resulted in a 3.6% higher final body weight for the trial group at day 70 of life.

The average daily weight gain was improved by 5.2% from day 28 until day 70 of life.

Furthermore, daily feed intake was improved by 4% through the addition of Fresta F.

The feed conversion rate was improved by 2% overall which represents just a numerical improvement. However, feed conversion was significantly improved by 13% in the trial group during the pre starter phase.

These results prove that in a series of trials Fresta F delivers repeatability to improve production parameters such as weight development, feed intake and mortality.

Study two

The second study was performed in a purely scientific setting under Asian conditions at the Dankook University in South Korea. The trial comprised four treatments:

- **NC.** Negative control basal diet (corn, soybean meal, vitamins, minerals, high zinc) without antibiotics.
- **PC.** Positive control basal diet+ antibiotics (chlortetracycline 100g+ sulphathiazole 100g+ penicillin G procaine 50g) 0.1%.
- **NCF.** Basal diet+ Fresta F 0.03%.
- **PCF.** Basal diet+ antibiotics (chlortetracycline 100g+ sulphathiazole 100g+ penicillin G procaine 50g) 0.1%+ Fresta F 0.02%.

From day 0 to 14, average daily feed intake was increased in pigs fed PCF diet. Average daily weight gain and gain/feed tended to improve in pigs fed the PCF diet.

From day 14 to 28, pigs fed the PCF diet increased daily gain and daily fed intake compared to pigs fed the NC diet.

From day 28 to 49, daily gain and feed intake in pigs fed the PCF diet were higher than in pigs fed the NC diet.

Through the entire experimental period, daily gain and feed intake in pigs fed PCF diet were the highest among the treatments.

Study three

The third study was performed in a typical wean to finish barn in North West Iowa, USA in 2009. The trial was done under typical local conditions with regard to five feed phases (see Table 3) as well as antibiotic growth promoters and high zinc and copper levels.

The trial was done in three treatments where treatment one was a basal diet as described, treatment two was a basal diet plus Fresta F at 200ppm, all phases with mash feed. Treatment three was the same as treatment two with a pellet feed in phase 4.

The application of Fresta F at a rate of 200ppm resulted in a significantly higher average daily weight gain for treatment two and three for the phase of 0-42 days post weaning.

Furthermore, daily feed intake was improved significantly through the addition of Fresta F in treatment two. Feed conversion rate was improved significantly in treatment two and three.

The mortality in general remained low with 0.8-2.7% and did not show any statistically significant difference among the treatments.

Furthermore, the addition of the phytogenic feed additive reduced the number of light weight (<20kg) pigs by 5% and improved the number of heavy weight (>25kg) pigs by 10% versus treatment one.

The results of that trial fed the Fresta F supplemented pelleted diet suggests that the full potency of Fresta F was maintained when pelleted.

On average, pigs fed the Fresta F supplemented basal diet in meal form gained 5.9% faster and 2.6% more efficiently than those fed the basal diet without Fresta F.

Diet	Days fed	Medication	Zinc (ppm)	Copper (ppm)
Prestarter[a]	0-7	39ppm tiamulin + 441 ppm chlortetracycline	2,670	140
Phase 1	8-14	55ppm carbadox	2,850	140
Phase 2	15-21	55ppm carbadox	2,850	140
Phase 3	22-28	39ppm tiamulin + 441 ppm chlortetracycline	2,488	140
Phase 4	29-42	None	120	230

[a] *Fed as a common diet to all pigs for the first seven days of the trial.*

Table 3. Feeding phases of US commercial trial, Northwest Iowa, 2009.

Table 2. Trials used for meta-analysis in Spanish experiments, 2008.

Trial ID	Location	Period	Pigs/treatment*	Sex	Age
F115-2008ES	Swine farm (A), Segovia, Spain	02/08 - 04/08	360 pigs: 18 pens of 10 pigs/treatment	Males and females	28 days
F120-2008ES	Experimental farm Madrid, Spain	04/08 - 05/08	168 pigs: 21 pens of 4 pigs/treatment	Males	21 days
F125-2008ES	Experimental farm Madrid, Spain	06/08 - 07/08	112 pigs: 14 pens of 4 pigs/treatment	Males and females	25 days
F127-2008ES	Swine farm (A) Segovia, Spain	07/08 - 08/08	280 pigs: 14 pens of 10 pigs/treatment	Males and females	28 days
F131-2008ES	Swine farm (B) Segovia, Spain	11/08 - 12/08	120 pigs:10 pens of 6 pigs/ treatment	Males and females	28 days

Conclusion

The three studies presented show a clear significant improvement through the phytogenic feed additive under different production environments.

The results suggest that the feed additive improves the performance of weaning pigs either with antibiotics and high contents of zinc and copper or without these additives present.

Therefore, Fresta F can be used as an alternative to traditional growth promoters as well as in conjunction to achieve synergistic effects and support weaning pigs in critical transition phases. ■

References are available from Delacon on request