Innovative tool to optimise piglet post weaning performance

Using functional proteins in post weaning diets is not a novelty and can have promising results. Above all, a purified functional protein should be palatable and have high digestibility. It should also encourage the rapid development of the young gut and enhance the immune status of the piglet.

Furthermore, with the continuing spread of African swine fever, increasing attention is being given to the traceability and safety of feed ingredients.

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To address the growing protein challenge facing today's swine industry, Phileo Lesaffre has invested in the research and development of a premium yeast extract (Prosaf) which has unique characteristics, compared to the majority of yeast extracts which are currently available.

The product is a primary culture of a selected proprietary baker's yeast strain, produced under a standardised hydrolysis, solubilisation and purification process. Prosaf is also produced under a food grade process, which guarantees it as a consistent, safe and traceable product.

The distinctive characteristics of Prosaf include a minimum 63% of protein content, high amino acids digestibility (Table 1), alongside high levels of total nucleotides and glutamic acid – 7.7% and 10.9% respectively.

Superior digestibility

The superior amino acids digestibility of Prosaf is explained by its peptide composition. Amino acids can be transported across the Prosaf brush border membrane of intestinal epithelial cells either in free form or as dipeptides and tripeptides.

Several authors have demonstrated that the absorption of dipeptides and tripeptides have a faster uptake, in terms of time, than their constituent amino acids.

Prosaf also has a predominantly small size peptides composition: 95% of the product is classified at under 3.6 kDa, with 45% being below 1.9 kDa.

This enhances amino acid uptake and absorption at the enterocyte level (Fig. 1).

The higher glutamic acid content of Prosaf, at 10.9%, has an important role to play, not only in palatability but also in gut development and consequently performance. Of the 20 free amino acids in sows' milk, glutamic acid is the most abundant, accounting for >50% of total free amino acid content.

In addition, high levels of glutamic acid helps to influence taste acceptability in post weaning diets.

Glutamine is a key nutrient for the intestine. Across the various intestine tissues, the utilisation of total glutamine is approximately 30%. In gut physiology, glutamine is related to the promotion of enterocyte proliferation, the regulation of tight junction proteins and is involved in suppressing pro-inflammatory signalling pathways to protect cells against apoptosis and cellular stresses during normal and pathologic conditions.

The results of several studies with animals suggest that dietary nucleotides may affect the gastrointestinal tract by promoting the ultrastructure, modulating the intestinal microbiota and activating immune-enhancing cells.

Although nucleotides are synthesised endogenously, it has been suggested that dietary supplementation with nucleotides may have beneficial impact on small intestinal growth and development, lipid metabolism and hepatic function.

Prosaf produced a positive 7.7% total nucleotide composition impact on young piglets, when used prior to post weaning.

Proven benefits in post weaning diets

To validate and scientifically prove the efficacy and potential of Prosaf supplementation in post weaning swine diets, several trials were carried out to determine inclusion rates per phase, the best use of Prosaf in combination with other

Crude protein (%)	Yeast extract	Prosaf
	40.5	63
Total amino acids (%)		
Lysine	3.1	4.3
Arginine	1.91	2.9
Histidine	–	1.2
Leucine	2.9	3.8
Isoleucine	2.12	2.7
Methionine	0.74	0.8
Phenylalanine	1.7	2.3
Threonine	1.4	2.6
Tryptophan	2.07	0.7
Valine	2.2	3.2
Alanine	2.38	5.0
Aspartic acid	4.09	5.9
Cysteine	0.24	0.6
Glutamic acid	4.47	10.9
Glycine	1.67	2.6
Proline	–	3.0
Serine	2.19	2.6
Tyrosine	1.4	1.7
Standard ileal digestibility (%)		
Lys	82.9	91.5
Met	75.6	93.4
Hist	76.5	94.6
Trp	83.3	84.3

Table 1. Prosaf standard ileal digestibility (SID) for weaned piglets (Schothorst trial 2018, The Netherlands).

Fig. 1. Size distribution of peptides in Prosaf (88% < 3.6kDa, 38% < 1.0 kDa).

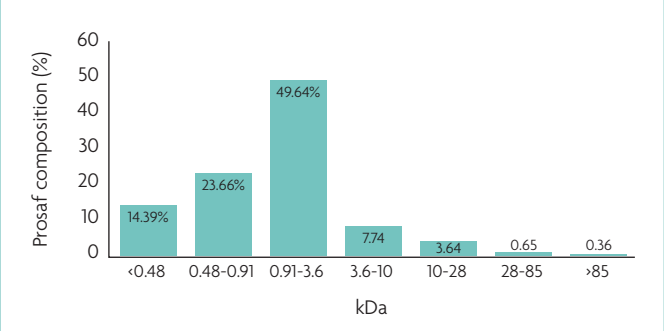
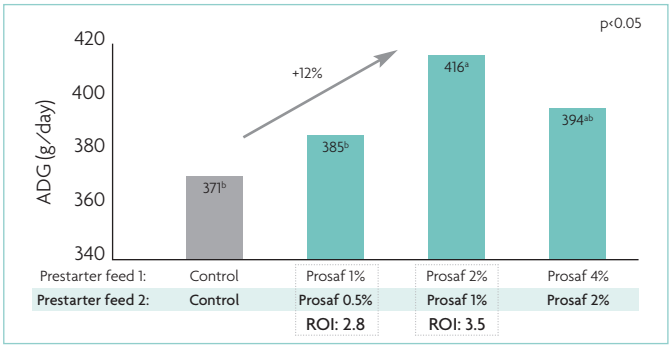


Fig. 2. Average daily gain from day 23 (weaning) to 65 days old.



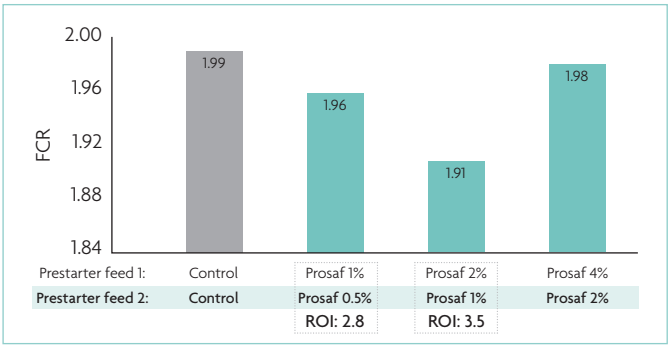


Fig. 3. Feed conversion ratio from day 23 (weaning) to 64 days old.

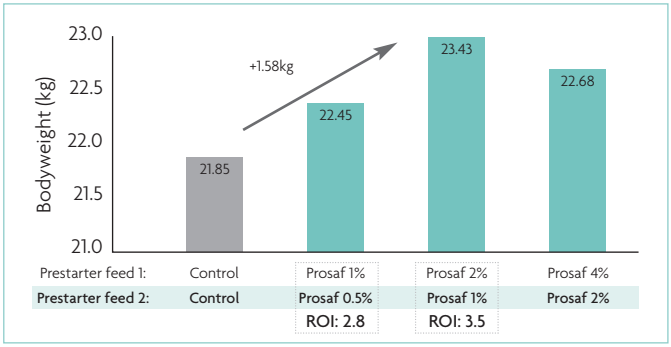


Fig. 4. Final body weight at 65 days of age (AKEA, Brazil, 2018. Internal report).

functional proteins and the benefits of using the product under both low and high farm challenges.

Generally speaking, Prosaf performed best when used as a 2% inclusion in the first pre-starter diet (normally used during the first two weeks post weaning), moving to 1% inclusion on the second diet (following two weeks after the first diet).

The inclusion program per diet will obviously depend on the nutrition program of the farm, a fact which Phileo Lesaffre research recognised in concluding that the full benefit of Prosaf is achieved when piglets are able to consume between 160g and 200g of product in the first 28 days post weaning.

Trial results

Results from the following three trials demonstrate the ability of Prosaf to improve piglet performance and health, showing, above all, a good return on investment.

In the first trial, 192 pigs were assigned at weaning (day 0 at approximately 23 days of age) to one of four different treatments: T1: control diet, T2: Prosaf 1% and 0.5%, T3: Prosaf 2% and 1%, and T4: Prosaf 4% and 2%. All treated groups had Prosaf included in their diet for the first 28 days post weaning.

The trial was continued to the end of the nursery phase when the animals were 65 days old. From days 52 to 65, all animals were given the same diet. During the trials, the animals consumed mashed feed and all diets were isocaloric and isonutrient.

Results showed that animals from T3 (inclusion of 2% in first diet and 1% in second diet) had a better average daily gain (+ 12%), improved feed conversion ratio (-4%) and higher final body weight (+7%, equivalent to an extra 1.57kg at the end of the nursery period) as presented in Figs. 2, 3 and 4.

This result guaranteed a return on investment (ROI) of 3.5:1 for the Prosaf group under the T3 inclusion rate.

The improved performance was partially achieved as a consequence of the better start achieved by piglets treated with Prosaf in relation to the control group.

From the start of the trial, these animals recorded a higher feed intake (+10% in the first 14 days after weaning) and a faster average daily gain (+36%). This suggests that the functional proprieties of Prosaf not only helped to provide a more palatable diet but also promoted faster gut development, leading to a more efficient post weaning gut.

In the second trial, 144 piglets, weaned at approximately 20 days, were randomly divided into the following different treatments: T1: Control diet, T2: Spray dried plasma (4% for the first 9 days and 2% for the next 12 days), T3: Prosaf at 2% for the first 9 days and 1% for the next 12 days (Figs. 5 and 6).

Animals were fed ad libitum mashed feed. All diets were isocaloric and isonutrient.

Both the positive control groups (Prosaf 2% & 1% and plasma 4% & 2%) returned similar performance figures, which were numerically superior to the negative control in terms of average daily gain and final body weight at 42 days of age.

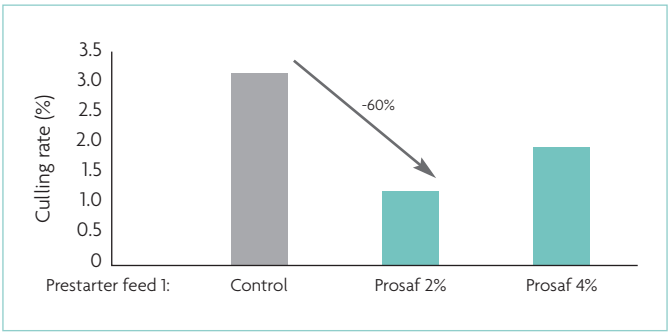
Following the same format as the previous trial, piglets given Prosaf had a faster start in the first pre starter diet, achieved better feed intake (+12%) and better average daily gain (+23%) when compared to the control diet.

The third trial was carried out on a farm which was under a high health challenge. The animals were supplemented with Prosaf (2% or 4%) for 15 days post weaning.

Prosaf supplementation reduced the number of culled pigs after weaning by 60% (Fig. 7).

This improved animal resistance can be explained as being due to the impact of Prosaf in promoting better gut health and general well being.

Fig. 7. Culled pigs – day 45 after weaning (Field trial, Jiahua China, 2018, internal report).



Conclusion

Prosaf is a purified yeast extract with a distinctive composition compared to most other products on the market.

The combination of its functional active ingredients, associated good palatability, amino acid profile and high digestibility, provides an innovative cost-effective tool for farmers to use in post weaning piglet diets, leading to increased feed intake, better gut health and improved piglet performance. ■

References are available from the author on request

Fig. 5. Average daily gain from 20 days old (weaning) to 41 days old.

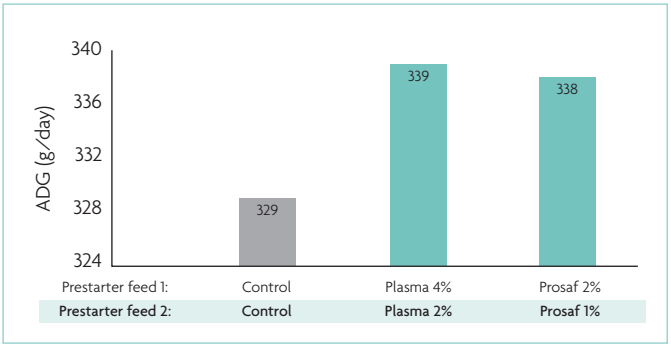


Fig. 6. Body weight at 41 days (Biofarma, Argentina, 2018 internal report).