**Application**

A nutritionally enhanced protein source (DevAmine) influences the synthesis of myo-inositol, a conditionally essential nutrient for optimal growth performance of weaned pigs.

**Introduction**

Myo-inositol is a naturally occurring sugar alcohol enzymatically synthesised from glucose (Su et al., 2023). In mammals, myo-inositol plays an essential role in many physiological processes, such as cell signaling, glucose homeostasis and osmolarity regulation (Kiani et al., 2021). Recent studies have shown that increasing concentrations of myo-inositol in pigs can improve growth performance, feed efficiency and regulate the integrity of the intestinal barrier (Moran et al., 2019, Ogunribido et al., 2022). DevAmine is manufactured by processing a mixture of proteins and amino acids with sugars under conditions of temperature and pressure to ensure all amino acids and sugars are released at a rate commensurate with efficient absorption and ultilisation. The sugar released from DevAmine could act as a precursor for myo-inositol synthesis. The objective of this study is to evaluate if diets containing different protein sources balanced for dietary sugar content affect the plasma concentration of myo-inositol in weaned pigs. The study focuses on weaned pigs as myo- inositol may be a conditionally essential nutrient in weaned pigs due to greater metabolic effects observed in this age group. The study balanced dietary sugar levels to ensure that any effect demonstrated on myo-inositol levels was due to the inclusion and release mechanism of DevAmine, rather than the addition of pure sugar sources.

**Materials and Methods**

Ninety-six piglets (14.5kg ± 0.35 s.e.m.) were fed a diet containing either vegetable protein (VP), synthetic amino acids (SYN), nutritionally enhanced protein product (DevAmine), or a combination of sources (COM) (Table 1).

*Table 1 Proximate analysis of diets containing vegetable protein, synthetic amino acids, DevAmine or a combination of all three sources.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nutrient** | Combination | Intact Protein | Synthetic amino acids | DevAmine |
| Energy, DE MJ/Kg  Protein  SID Lysine, %  Sugar, % | 15.4  19.6  1.3  10.4 | 15.7  24.8  1.3  10.2 | 15.4  19.6  1.3  10.4 | 15.4  19.6  1.3  10.6 |

Pigs were assigned to the dietary treatments based on weight, sex and dam. Blood samples were collected post-feeding and analysed using GC-MS with d27-myristic acid as an internal standard (Palazoglu, 2009). The myo-inositol concentration was normalised to the internal standard and reported as the mean normalised value. Each individual pig was considered a replicate, and results were analysed by one-way ANOVA, with statistical significance determined by P<0.05. The Tukey-Karmer test was used for post-hoc analysis to assess the significance between treatment groups.

**Results**

Plasma concentrations of myo-inositol were significantly increased when pigs received the DevAmine protein source compared to all other treatments (Table 2). The results indicate that a DevAmine-based diet will result in a 139-fold increase in myo-inositol compared to typical commercial diets.

*Table 2 Normalised plasma Myo-inositol levels in weaned piglets fed diets containing either a combination or one of 3 protein sources (Intact protein, synthetic amino acids or DevAmine) at 360 minutes post-feeding.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Combination | Intact Protein | Synthetic amino acids | DevAmine | S.E.M | P-Value |
| Myo-inositol, normalised | 0.54a | 0.06a | 0.16a | 22.24b | 0.82 | <0.05 |
| a,b superscript of different letters between columns indicates statistical significance P<0.05 | | | | | | |

Previous myo-inositol studies in pigs focused on direct supplementation of the diet or from the supplementation of phytase; catabolism of phytase produces myo-inositol as a breakdown product (Moran et al., 2019, Kiani et al., 2021). This study, in comparison, had no supplemented myo-inositol or phytase, so the increases observed are due to increased synthesis from glucose. Due to the relationship between myo-inositol and improved animal performance and biological processes, the results indicate that DevAmine-based diets could improve pig growth, particularly in weaned piglets, by increasing the supply of a conditionally essential nutrient.

**Conclusions**

Inclusion of DevAmine into weaned piglet diets results in a significant increase in myo-inositol, a conditionally essential nutrient for optimal growth performance at weaning.

**References**

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