



PHOSFEED® 18, a record digestibility rate of 75.8%

Evaluation of total tract digestibility of P and Ca in male growing pigs



In 2023, Wageningen Livestock Research performed a study in which the total tract digestibility of P and Ca of 5 different phosphate sources in male growing pigs was determined. In this study, five dicalcium phosphates DCPs were evaluated. All tested phosphate sources were commercially available products and obtained from the market for feed materials.

Materials and Methods

The experimental protocol used was the Standard Total Tract Digestibility (STTD) of phosphorus, a method that combines radioactive markers and a suitable diet to measure endogenous phosphorus mobilized within the body, allowing for the determination of real phosphorus digestibility values. The study's data were analyzed using the ANOVA statistical model (analysis of variance), ensuring the robustness of the conclusions.

The study was conducted to determine the P and Ca digestibility of five commercial five DCPs. These products were added to a basal low-P diet. In total, 48 pigs with a mean initial body weight (BW) of 25 kg were tested during a five week period in two rounds. After an acclimatisation period of one week in which all pigs received the same diet, each of these two periods comprised an adaptation period of 9 days and a 5-day period in which grab samples of faeces were collected twice a day.

During the adaptation and collection period, each pig received one of 6 diets, a low P basal diet with digestible P content at 50% of recommendations, or a diet supplemented with 1.5 g of P from one of the commercially available DCP as mentioned above.

Table 1. Analysed content calcium (Ca) and phosphorus (P) and calculated Ca/P ratio in the experimental diets.

Diet	Product	DM	Ca	P	Ca/P
1	Basal Diet	878	4.74	3.63	1.30
2	DCP OCP	880	6.57	5.16	1.27
3	DCP Europe	880	6.32	5.18	1.22
4	DCP Brasil 1	881	6.71	5.23	1.28
5	DCP Brasil 2	880	6.41	5.15	1.24
6	DCP USA	880	6.58	5.10	1.29

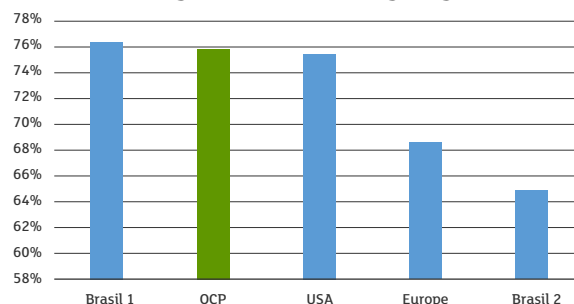
The basal diet was based on maize and soybean meal as main ingredients and did not contain microbial phytase. Limestone was used to assure a constant Ca:P ratio of 1.25 in all diets.

Results

Phosphorus Digestibility

The study revealed a record digestibility rate of 75.8% for the Moroccan DCP (PHOSFEED® 18) produced by OCP. This rate is higher than the other DCP sources, with a difference of 7 points compared to the DCP from the USA and Europe (68.6%) and a difference of 10 points compared to the DCP from Brazil (64.9%). Another Brazilian DCP based on Moroccan phosphate rock showed a slightly higher digestibility by 0.6 points, with no statistically significant difference. The mean STTD of P in DCP was 72.2%, varying from 64.9 to 76.4%

P absorbability of DCP sources by Origin



The superior digestibility of PHOSFEED® 18 has a very positive environmental impact, as it reduces phosphorus release in animal excrement, which could otherwise contaminate soil and surface water. Feed formulations should therefore consider nutrient digestibility to optimize diets and minimize excrement losses, promoting sustainable farming.

Growth Performance and Feed Utilization

The growth performance and feed utilization data showed no significant differences between treatments. The pigs' mean body weight increased from 34.7 kg to 45.3 kg during the treatment period, with an average daily gain (ADG) of 731 g/day and a feed conversion ratio (FCR) of 1.88.

Diet	Product	BW-start, kg	BW-end, kg	Feed intake, kg/d	ADG, g/d	FCR
1	Basal diet	34.6	44.7	1.369	701	1.97
8	DCP OCP	34.7	45.2	1.369	730	1.88
9	DCP Europe	34.7	45.0	1.367	713	1.92
10	DCP Brasil 1	34.9	45.8	1.377	752	1.84
11	DCP Brasil 2	34.6	45.1	1.361	723	1.89
12	DCP USA	34.8	45.0	1.372	703	1.95

Conclusion

- The study highlighted significant variability in the digestibility of phosphorus among commercially available DCP sources. PHOSFEED® 18 from OCP emerged as the most digestible and environmentally beneficial phosphate source.
- These findings underscore the importance of considering nutrient digestibility when formulating pig diets to enhance performance, reduce waste, and promote sustainable farming practices.
- Accurately evaluating digestibility is critical for formulation managers as it allows precise matching of nutrient supply to the animal's requirements, thereby avoiding both over-supplementation and deficiencies.
- Over-supplementation can lead to increased feed costs and environmental pollution due to excessive phosphorus excretion, while under-supplementation may compromise animal growth and health. Additionally, optimizing digestibility data helps formulation managers reduce feed costs by efficiently using high-digestibility ingredients.
- This aligns with sustainability goals, minimizing nutrient losses and reducing the ecological footprint of livestock farming.
- Integrating digestibility values into feed formulation is therefore essential for economic efficiency, animal welfare, and environmental stewardship.