

# Pilot study – effects of extracorporeal predigestion of a commercial dog feed with pancreatic enzymes on prececal digestibility of nutrients - study using pancreatic duct ligated ileo-cecal fistulated pigs as a model for canine patients suffering from EPI

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## 1. Introduction

Exocrine pancreatic insufficiency (EPI) is a disease resulting in distinct maldigestion and malabsorption of diverse nutrients in dogs and other species. Pancreatic enzyme replacement therapy (PERT) is standard to treat EPI in human as well as veterinary patients. PERT is safe and risk of overdosing is low but costs of therapy may result in the decision to give away or euthanise the dog. Therefore measures to optimise efficacy of PERT and to reduce costs are of great interest. Prececal (pc) digestibility (dig) of a home-made diet based on food compounds supposed to be highly digestible was reduced markedly in EPI-minipigs compared to controls. While PERT resulted in a distinct increase of pc dig of fat, the PERT failed to normalize pc dig of crude protein (Mößeler et al. 2017). Need and efficacy of extracorporeal predigestion of a diet with pancreatic enzymes (PE) are discussed controversial. This study aimed to test, whether incubation of soaked dry pet food with PE improves pc dig in the EPI-minipigs.

## 2. Material and Methods

8 adult female minipigs, fitted with an ileo-cecal re-entrant fistula to determine pc dig of nutrients were used in this study. In 4 pigs (PL-pigs) the pancreatic duct was ligated to induce an EPI. The over-the-counter dry pet food contained (on dry matter basis): 21 % crude protein (cp), 21 % crude fat (cfa), 32 % starch. Tests were performed as a Screening-test (Becker 2005). Each PL-pig received the diet five times in a randomized order: a) without PERT, b) with PERT added directly before diet was fed, c) PERT was added 10 hours before feeding [“+incubation”] and feed was stored at 20° C (room temperature). The diet was always soaked for 10 hours (250 g of diet + 800 ml of water). PERT (porcine pancreatic enzyme preparation) was given at a dosage of 100.000 IU lipase [100] or 300.000 IU lipase [300] accounting for 5.767 resp. 17,300 IU protease and 102.000 resp. 306,000 IU amylase per meal.

Healthy controls (normal pancreatic function)

Control

Pigs with experimentally induced EPI

PL

Enzyme dosage

100

- incubation

+ incubation

Enzyme dosage

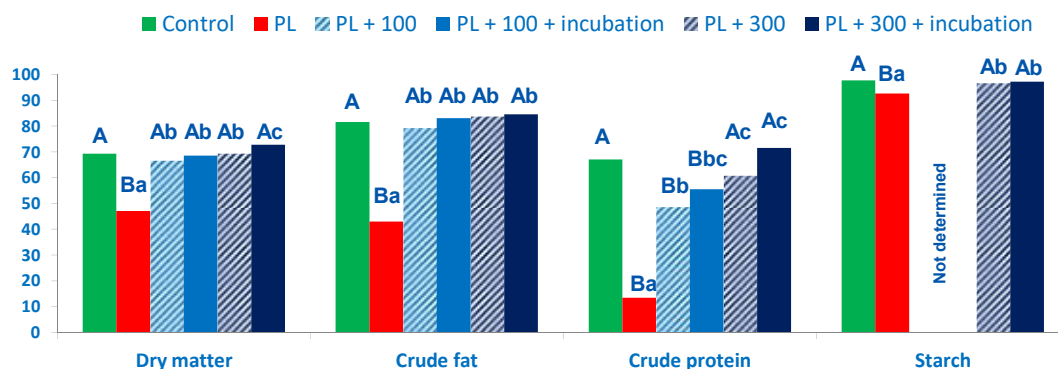
300

- incubation

+ incubation

## 3. Results

The pc dig of all tested nutrients was – as expected - quite high in control pigs and significantly reduced in PL-pigs receiving no PERT (although pc starch dig reached 93 %). There was a significant increase in pc digestibility of nutrients when PE were added – reaching level of controls for fat (for both dosages used) and for protein (at highest dosage tested). Incubation of food with PE numerically increased pc digestibility. It is noteworthy that this effect was seen for pc protein dig in both dosages tested. For protein there was also a significant effect of enzyme dosage on pc digestibility (see figure 1).



I: Diet without incubation  
II: Diet after incubation

Figure 1 : Prececal digestibility (%) of nutrients in healthy controls as well as in PL-pigs (without or with PERT; including 10 hrs of extracorporeal predigestion); A;B: sign. difference ( $p < 0.05$ ) between controls and PL (t-test), a,b,c: sign. difference ( $p < 0.05$ ) between differently treated PL-pigs (paired t-test)

## 5. Discussion and Conclusions

PERT efficiently normalised pc dig of nutrients in EPI-pigs. Interestingly a “normalisation” of fat digestibility could be achieved even when the lower dosage was used – while pc protein digestibility reached levels of controls only when the high dosage was used. **Extracorporeal predigestion (incubation) with PE tended to improve pc dig of crude protein (+ 11 percentage points at high dosage) in PL-pigs.** This finding is of special interest as protein digestibility can only be estimated on pc level. As studies regarding pc digestibility in dogs are scarce (due to public concerns) it seems appropriate to use the PL-pig model to study the effects of enzyme therapy on pc digestibility of dogs diets to gain information whether an incubation of diet and PE is of benefit.

## References

Becker (2005), Thesis, University of Veterinary Medicine Hannover;  
Mößeler et al. (2017) Proc. of the 71<sup>st</sup> Congress of the Society of Nutr. Physiol. (26), 61

