Effect of improved feed efficiency by *Lawsonia intracellularis* vaccination on Phosphorus emissions in pig production

Robert Tabeling, Friederike von und zur Mühlen, Christine Renken
Intervet Deutschland GmbH; MSD Tiergesundheit, Unterschleißheim, Germany

Background and Objectives

Phosphorus (P) is an essential element for pigs, especially for bone formation. Due to its ability to accelerate the eutrophication process, upper P limits are defined for German agriculture and pig farms must fulfil an individual nutrient management plan. The aim of this report was to illustrate the effect of the enhanced pig performance by *Lawsonia intracellularis* vaccination together with different feed rations (defined P content classes) on the P-excretion.

Material and Methods

Performance data (e.g., average daily gain, ADG; feed conversion ratio, FCR; Table 1) from field observations of 9 farms with a history of subclinical or clinical ileitis was recorded in non-vaccinated (NV) and vaccinated (PL) (intramuscularly/ intradermally Porcilis®Lawsonia/ID; at 3-11 weeks of age) batches. NV batches, used as historical control, were compared to PL vaccinated batches after implementing *Lawsonia intracellularis* vaccination to control ileitis.

Table 1. Animal numbers and performance data of the 9 observed farms before (NV – Non-Vaccinated) and after (PL – Vaccinated) introduction of Porcilis®Lawsonia vaccination.

	Animal Number	ADG	Weight Gain	Mortality	FCR
NV	64943	920.7	94.9	2.8	2.84
PL	21951	936.9	96.6	1.8	2.73

P excretion was calculated using the freely available program “Calculation of an individual stable balance” of the Lower Saxony Chamber of Agriculture (LWK NDS) (1). Effects of performance data on P emission were calculated with four different P containing rations (g P/kg 88% dry matter: “universal feed” 5.1; “P reduced” 4.6; “P greatly reduced” 4.3; “P very greatly reduced” 4.1).

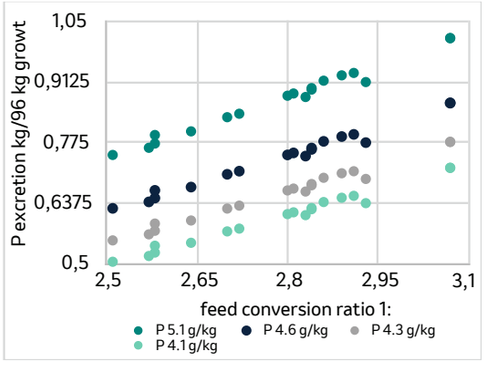
Results

Calculation of the P excretion in PL vaccinated batches showed a mean reduction by 5.7-6.4% (P in feed 5.1-4.1 g) with a maximum of 17.1%, when compared to non-vaccinated batches (Table 2). On the farm (non-vaccinated batch) with the most unfavorable FCR and assumed highest P content in feed (FCR 3.07; 5.1 g P/kg FM), P excretion was 10.5 g/kg LW or 1012 g/ 96 kg weight gain. The most favorable calculated case (PLvaccinated FCR 2.51; 4.1 g P/kg FM) had a P excretion of 5.2 g P/kg LW or 503.9 g P/96 kg weight gain. The P excretion between these two scenarios has thus halved (Fig. 1).

Table 2. Effect of FCR change with Porcilis®Lawsonia vaccination compared to NV batches on the P excretion (%) of fatteners fed with different P containing rations (5.1 to 4.1 g/kg FM; 88% DM)

farm	FCR change		Calculated change P excretion %			
	1:	%	P 5.1 g	P 4.6 g	P 4.3 g	P 4.1 g
1	-0.16	-5.21	-7.78	-8.21	-8.55	-8.82
2	-0.27	-8.79	-13.0	-13.7	-14.3	-14.7
3	0.02	0.74	0.95	1.01	1.06	1.10
4	-0.03	-1.06	-1.36	-1.45	-1.52	-1.57
5	-0.10	-3.41	-3.72	-3.95	-4.13	-4.28
6	-0.07	-2.71	-5.72	-6.14	-6.47	-6.74
7	-0.06	-2.27	-3.46	-3.70	-3.90	-4.06
8	-0.27	-9.51	-14.8	-15.7	-16.5	-17.1
9	-0.03	-1.04	-1.31	-1.39	-1.45	-1.50

Figure 1. Calculated P excretion of fatteners (kg/96 kg growth) with different P containing rations (5.1 to 4.1 g/kg FM; 88% DM) and FCR observed on the farms before and after the introduction of the Porcilis®Lawsonia vaccination.



Discussion and conclusion

Under the conditions of this field observation and model calculation, it has been shown that the P excretion in pig farming can be reduced markedly by improving performance data with *Lawsonia intracellularis* vaccination and by modulating P content in the ration. This data suggests that *Lawsonia intracellularis* vaccination together with the feed design has a high potential for improving sustainability with particular interest for farms in very pig dense areas.

[1] LWK NDS: Berechnung einer individuellen Stallbilanz; https://www.duengebehoerde-niedersachsen.de/duengebehoerde/news/33749_Berechnung_einer_individuellen_Stallbilanz; Retrieval date 10.07.2023