



Tropentag 2013, Stuttgart, Germany
September 17-19, 2013

Conference on International Research on Food Security, Natural Resource
Management and Rural Development
organised by the University of Hohenheim

Dietary potassium diformate in sows during pre-farrowing till weaning: Effects on piglet performance in Thailand

Christian Lückstädt¹ and Kai-Jens Kühlmann²

¹ADDCON GmbH, Bonn, Germany

²ADDCON Asia Co. Ltd., Bangkok, Thailand

Abstract

Potassium diformate has been shown in numerous trials to improve health and performance in piglets, growing-finishing pigs and sows. It is furthermore the only zootechnical additive with EU-approval for use throughout the whole pig production chain. The effects of potassium diformate (KDF) are often described as strong antimicrobial and digestibility enhancing. Most of the data available on the use of KDF in sows are from trials performed at universities and research institutes in Europe. The objective of the present study was to assess the subsequent effects of KDF, fed to sows, on their piglets under practical conditions in Asia.

The study was carried out with 49 sows during late gestation. The experiment was conducted on a commercial farm in Bureerum province in Thailand. The sows were randomly allotted to 2 treatment groups. Group 1 served as a control in which sows were fed a complete diet, mainly based on corn, rice bran, soybean meal and fishmeal without supplemented antimicrobial agents. Sows in group 2 were fed the complete diet containing 2 kg/t KDF. The experimental feeding of sows started 5 days before farrowing and finished at weaning (26 days after farrowing). Feed was available in mash form, while water was available ad libitum. Data on weight and number of piglets (born and "born alive") were recorded and analysed using the t-test. The results are given as mean \pm SD and a confidence level of 95% was defined for these analyses.

Feeding KDF to sows did have significant effects on the new-born piglets. There was a numerical ($p=0.11$) increase in the number of piglets born alive. The number of weaned piglets however, and the total weight of weaned piglets per sow were significantly increased ($p<0.05$). Losses during weaning were therefore reduced.

These results show that the inclusion of potassium diformate into the diet of sows can enhance performance in piglets. This is in general agreement with observations made in Europe. It can be therefore concluded that the use of KDF in sow diets under Asian conditions will be able to improve pig production.

Introduction

Agricultural production and the feed industry world-wide continue to suffer from losses caused by contamination with pathogenic bacteria and the associated consequences in livestock, such as reduced weight gain and increased mortality. According to many scientists it is believed that "...Dietary acidifiers can actually become the most common and efficacious alternative solution to antibiotics, in order to improve health status and performance of pigs" (Papatsiros and Billinis, 2012). Currently, only potassium diformate (FORMI; KDF) is approved by the European Union as acidifier-based zootechnical additive (former non-antibiotic performance enhancer) for piglets, fattening pigs and sows – thereby covering the whole pig production chain. Numerous trials have

been carried out world-wide and a *Holo*-analysis of all published trials confirms that potassium diformate improves on average feed intake in swine by 3.5%, weight gain by 8.7% and feed efficiency by 4.2% (Lückstädt and Mellor, 2010). Most of these data stem from the use of KDF in weaned piglets and growing-finishing pigs. However, more recently, also data on the use of KDF in sows are available. Øverland et al. (2009) described the effect of KDF in the diet of reproducing sows, especially on performance of sows and litters. The authors concluded that adding KDF to diets for sows had a positive effect on sows' backfat thickness in gestation and on growth performance of piglets. A further study (Lückstädt, 2011) found that the inclusion of KDF in sow diets from pre-farrowing till weaning can furthermore improve feed intake and condition in sows (Table 1).

Table 1: Diet effects on feed intake, body weight loss and backfat reduction in sows (modified from Lückstädt, 2011)

	Control	0.8% KDF	P-level
Initial sow weight [kg]	200.2±17.5	204.2±18.0	0.25
Feed intake till farrowing [kg/pig/d]	2.33±0.14	2.36±0.11	0.41
Feed intake from farrowing [kg/pig/d]	4.64±0.47	5.08±0.30	0.096
Weight loss [kg]	18.7±9.9	13.6±9.1	0.050
Backfat loss [mm]	2.4±1.9	1.5±1.7	0.061

Most of the data available on the use of KDF in sows are from trials performed at universities and research institutes and have focused mainly on the effects on sows alone. Furthermore, those trials have been carried out in Europe only. Currently, the use of potassium diformate has been extended to tropical Asia, in order to improve pig production under sub-optimal conditions. As of now it is mainly used in piglet diets. The objective of the present study was therefore to assess the subsequent effects of low inclusion rates of KDF, fed to sows, on piglets under rural tropical Asian conditions.

Material and Methods

The study was carried out with 49 sows during late gestation. The experiment was conducted on a commercial farm in Bureerum province in Thailand. The sows were randomly allotted to 2 treatment groups. Group 1 served as a control in which sows were fed a complete diet, mainly based on corn, rice bran, soybean meal and fishmeal without supplemented antimicrobial agents. Sows in group 2 were fed the complete diet containing 2 kg/t KDF. Potassium diformate (KDF) is the potassium double salt of formic acid with a hydrogen bond and consists of around 70% formic acid equivalents in a crystalline structure (Figure 1).

The experimental feeding of sows started 5 days before farrowing and finished at weaning (\approx 26 days after farrowing). Feed was available in mash form, while water was available ad libitum. Data on weight and number of piglets (born and "born alive") were recorded and analysed using the t-test. The results are given as mean \pm SD and a confidence level of 95% was defined for these analyses.

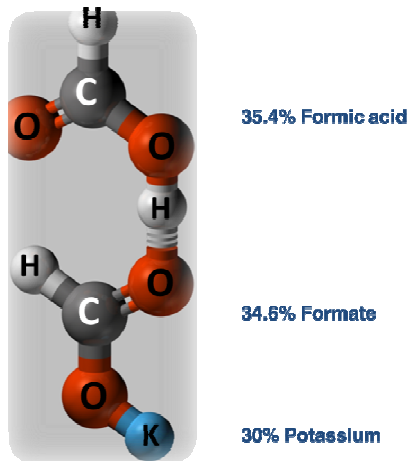


Figure 1: Molecule structure of potassium diformate

Results and Discussion

Feeding KDF to sows did have significant effects on the new-born piglets (Table 2). There was a numerical ($p=0.11$) increase in the number of piglets born alive, which accounts for an increase of almost 12%. The number of weaned piglets furthermore, and the total weight of weaned piglets per sow were significantly increased ($p<0.05$), by more than 21% and 10 kg respectively. Therefore losses during weaning were reduced, by approx. 10%. All this was achieved with a weaning period roughly one day shorter than the control.

Table 2: Performance parameter of piglet from sows fed with or without KDF

	Control	0.2% KDF	P-level
Number of sows	12	37	-
Piglets born [n]	12.9±3.6	13.3±2.7	0.35
Piglets born alive [n]	10.9±3.5	12.2±2.9	0.11
Avg. birth weight [kg]	1.31±0.5	1.41±0.2	0.16
Weaned piglets [n]	8.5±1.7	10.3±2.0	0.003
Avg. weaning weight [kg]	7.45±1.5	7.06±1.1	0.17
Total weaning weight per sow [kg]	62.75±16.3	72.67±16.6	0.04
Weaning age [d]	26.8±3.5	25.8±3.7	0.22

These results show that the inclusion of low levels of potassium diformate (FORMI) into the diet of sows from late gestation till the end of the weaning period can improve performance and survival rates in piglets under rural tropical conditions. Similar observations have been made by Øverland et al. (2009) and Lückstädt (2011). Øverland et al. (2009) for instance found that piglets born to sows receiving KDF tended to have increased individual ($P=0.05$) and litter ($P=0.08$) birth weight, while they had a significantly higher weaning weight ($P<0.05$). The presented data, especially on the reduced mortality, are also in line with unpublished data from the Nong Lam University in Vietnam (2010), which found reduced mortalities (Control: 7.2%; KDF: 3.7%) in piglets from sows fed with KDF.

References

Lückstädt, C. 2011. Effects of dietary potassium diformate on feed intake, weight loss and backfat reduction in sows: pre-farrowing till weaning. Proc. BSAS, Vol. 2(1), 145.

Lückstädt, C., Mellor, S. 2010. Holoanalysis – the acid test in pig diets. Feed Magazine / Kraftfutter. 1/2, 18-21.

Øverland, M., Bikker, P., Fledderus, J. 2009. Potassium diformate in the diet of reproducing sows: Effect on performance of sows and litters. Livest. Sci. 122, 241-247.

Papatsiros, V., Billinis, C. 2012. The prophylactic use of acidifiers as antibacterial agents in swine. In: Antimicrobial Agents, Bobbarala, V. (Ed.), ISBN: 978-953-51-0723-1, Chapter 14., pp. 295-310.