

Dietary sodium diformate and monolaurate affect faecal pathogen load in lactating sows

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Introduction: It is generally agreed that good gut health is effective against intestinal pathogens, a strategy that has only been made possible through the removal of antibiotic growth promoters in feed. Creating and maintaining a healthy intestinal environment has become essential to productivity and food safety programmes alike. Diformates, double-salts of formic acid, have been shown in numerous trials to improve health and performance in piglets, growing-finishing pigs and sows. Thus, for instance potassium diformate was the first non-antibiotic growth promoter approved in the European Union for use in swine. The effects of the various diformate salts, like potassium- or sodium diformate are often described as digestibility enhancing and strong antimicrobial. A significant impact of dietary diformate on the reduction of *E.coli* in the intestine of pigs was reported by Øverland (2000). However, the antimicrobial impact of organic acids and their salts, including diformates, is mainly directed against Gram-negative bacteria. Medium chain fatty acids (C6 to C12) have also been shown to have an antibacterial impact against various Gram-positive bacteria (Preuss et al., 2005). This is especially true for lauric acid and its monoglyceride ester monolaurate (Ruzin and Novick, 2000). Combining both strategies may lead to a “broad decontamination” of sow faeces and may help in reducing infections for the sow itself – but also the pathogen load for the suckling piglets. This formed the impetus for the trial.



Material and methods: This study tested the efficacy of a blend of sodium diformate (80%) with the monoglyceride of lauric acid – monolaurate (20%), on decontamination of Gram-negative and Gram-positive bacteria in sow faeces. Forty multiparous sows on a research farm in Saxony-Anhalt, Germany, were allocated to two equal groups and fed a commercial lactation diet from one week before farrowing until the piglets were weaned at 26 days. The test diet contained 1.0% of the sodium diformate – monolaurate mixture (traded as FORMI GML, ADDCON). Water was available *ad libitum* throughout the trial. The lactation diet was fed according to a feeding curve, from the last week before farrowing to day 13 of lactation and thereafter *ad libitum*. On the 21st day of lactation, freshly excreted faecal matter was collected from all sows and analysed for *E. coli*, *Enterococci* and *Streptococci* counts. Data were analysed using the t-test and a significance level of 0.05 was used in all tests.

Results and discussion: Results of the microbial analysis revealed a strong impact of the diformate-monolaurate mixture on the bacterial population in the faecal matter of sows. This holds true for *E.coli*, *Streptococci* and *Enterococci* counts. The data are displayed in Table 1.

Table 1: Bacterial counts (CFU/g) in sow faeces (n=40) fed with or without 1.0% of the additive mixture (FORMI GML) and their respective reduction rates in per cent

	Control (n=20)	Formi GML (n=20)	Reduction (%)
E. coli	1.20 × 10 ^{4a}	2.00 × 10 ^{2b}	-98.3
<i>Standard deviation</i>	(1.58 × 10 ⁴)	(0)	-
Enterococci	5.85 × 10 ^{5a}	6.36 × 10 ^{3b}	-98.9
<i>Standard deviation</i>	(1.27 × 10 ⁶)	(5.29 × 10 ³)	-
Streptococci	1.92 × 10 ^{4a}	4.78 × 10 ^{3b}	-75.1
<i>Standard deviation</i>	(2.42 × 10 ⁴)	(1.30 × 10 ⁴)	-

*detection limit; ^{a,b} Means with a different superscript differ significantly at P<0.05

The *E.coli* count in the faeces differed significantly (P=0.0012) between the control and treatment group. Faeces of treated sows had a 98% lower *E.coli* count (CFU/g). Similar results were measured for *Enterococci* (P=0.027) and *Streptococci* (P=0.014), which were reduced by 99% and 75%, respectively. In general it can therefore be stated that the use of dietary sodium diformate and monolaurate is an effective and sustainable tool in improving gut health in sows, by reducing pathogen load at intestinal level and decontaminating the faeces of the sow and thus reducing the risk of cross-infection to the piglets.