

## SALMONELLA CONTROL STRATEGIES IN PIGS

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### Introduction

As part of the follow-up to the EU's "White Paper on Food Safety", European member states must develop a programme for salmonella reduction throughout the pork production chain. *S. enterica typhimurium* is the most common serovar in pigs and attention is therefore focused on reducing the incidence of *S. typhimurium* on the farm. Factors influencing gut health have a significant effect on the incidence of *S. typhimurium*. For example, feeding coarsely-ground, instead of finely-ground diets, can positively influence gut health and thereby reduce the incidence of salmonella. Addition of potassium diformate (KDF) to the diet has also been shown to reduce the incidence of salmonella by positively influencing gut health. KDF delivers formic acid to the small intestine, where it acts against gram negative bacteria including *Salmonellae*. A series of controlled studies and field trials were carried out to determine the effects of KDF on salmonella status in piglets and in growing pigs.

### Materials and Methods

In 3 controlled trials (T1- T3), 20 weaned, Salmonella-negative piglets were divided into a control group (CG) and a treatment(TG) and fed *ad libitum* with the following diets:

- T1& T3 CG: finely ground, pelleted diet  
 TG: coarsely ground, pelleted diet + 1.2 %KDF  
 T2 CG: coarsely ground, pelleted diet  
 TG: coarsely ground, pelleted diet + 1.2 %KDF

Treatment piglets were orally infected with a bouillon containing 10<sup>9</sup> CFU/ml *S. Derby*. At day 0 of T1 + T2 each of the piglets was orally infected, In T3, 2 piglets per group were experimentally infected and returned to the other uninfected group members 4 days post-infection (DPI). Salmonella excretion was observed via rectal swab for a period of -3 – 32 DPI. In T1 and T2 piglets were sacrificed every 4 days beginning at day 16. In T3 the piglets were sacrificed at days 24, 25 and 26, and analyses of chyme carried out.

In a field trial carried out in Denmark, (T4; Olesen, 1999) 15 grower-finisher herds with recurrent salmonella problems were categorised according to the Danish salmonella monitoring programme from level 3 (poor) to level 1 (good). Farms categorised in levels 2 and 3 must actively work towards improving salmonella status. In T3, a level of 0.6% KDF was introduced to the diets at time 0 and salmonella monitoring was carried out for 3 months before, to 5 months after, KDF addition.

### Results & Discussion

In trials T1 and T2 each of the experimentally infected piglets excreted Salmonella 2 to 3 days post-infection via the faeces. Results showed that both coarse grinding of

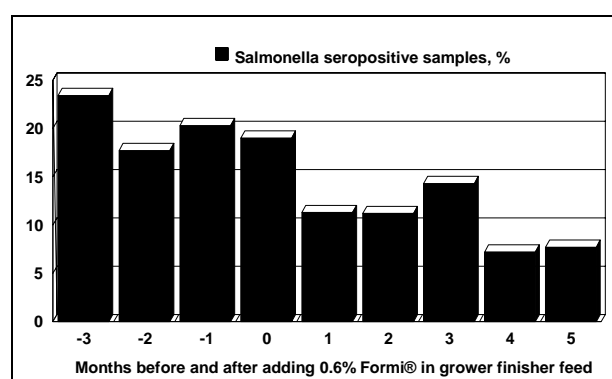
ingredients and the addition of KDF reduced the faecal excretion ratio and shedding duration (Table 1). Reduced excretion of salmonella in the experimentally infected piglets resulted in a significantly lower infection rate of the other piglets of the treatment group in T3. Addition of KDF resulted in reduced counts of *E. coli* and increased counts of Lactobacilli and gram positive bacteria in the chyme of some parts of the digestive tract. Feed conversion ratio of the pigs fed the coarsely ground, KDF- diet was better than that of pigs fed the control diet.

Table 1: Effect of coarse grinding and potassium diformate on frequency and duration of salmonella shedding in piglets.

		Control	Treatment
T1	Ratio (in %) (positive/tested piglets)	77.0±14.2	39.2±19.5
	Duration of Salmonella excretion (in d)	19.2±7.4	12.6±7.1
T2	Ratio (in %) (positive/tested piglets)	49.4±20.0	34.4±15.7
	Duration of Salmonella excretion (in d)	12.3±8.1	9.3±5.4

In T4, Incidence of salmonella was markedly reduced within 1 month of KDF addition, and over a longer period was reduced even further. Farms that had been categorised in level 3 and 2 were re-categorised to reflect the improved salmonella status (figure 1).

Figure 1 :Effect of 0.6% KDF on incidence of salmonella in Danish grower-finisher herds.



### Conclusions

Addition of potassium diformate at 0.6-1.2% is an effective strategy to prevent and reduce salmonella infection in piglets and grower-finisher pigs.

### Reference

Olesen, 1999. KFK, Denmark (personal communication).