

Table 2 *Lactobacillus* : coliform and *Lactobacillus*: *E. coli* ratio in the faeces of 2-week old piglets FLF-fermented liquid feed; NFLF-nonfermented liquid feed; DF-dry feed; ^{ab} within the rows, means with the same superscript are not significantly different.

	FLF	NFLF	DF
Lactobacilli: Coliforms	0.33 ^a	0.31 ^a	-0.19 ^b
Lactobacilli: <i>E. coli</i>	0.42 ^a	0.40 ^a	-0.17 ^b

The faecal *Lactobacillus*: *E. coli* / coliform ratio of piglets from liquid-fed mothers was significantly higher ($P < 0.01$) than for piglets born to DF-fed mothers (Table 2). PCR method confirmed that the *L. salivarius* strain, used to ferment the feed, survived passage through the intestinal tract of sows and that it was present also in piglets' faeces on the 14th day of suckling.

Discussion: These results demonstrate that the coliform and *E. coli* challenge to the newborn piglet can be reduced by feeding sows fermented liquid feed. A similar beneficial effect of FLF on the microbial ecology of the pig gut was obtained in the study of Moran (2001). Multiple factors may account for this beneficial effect of FLF, which may act independently or synergistically. The low pH of the diet, the high numbers of lactobacilli and high concentration of lactic acid represent the most important characteristics of FLF in terms of its protective effect. The ability of LAB to inhibit the growth of various gram-negative bacteria, especially pathogenic *E. coli*, is well documented both *in vitro* (Jin et al., 2000) and *in vivo* (Muralidhara et al., 1977). Higher faecal *Lactobacillus*: Coliform / *E. coli* ratio is usually associated with bacterial flora that contributes to improved animal growth and performance (Muralidhara et al., 1977).

Conclusions: This study demonstrated that by appropriate nutritional regimes there is an opportunity to beneficially influence the sows' bacterial excretion, which could be reflected in more 'friendly' bacterial flora in the neonate GI tract. This approach would represent a very natural way of protecting piglets during this short but critical period after birth.

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O 48 A Randomised Controlled Trial To Reduce *Salmonella* Infection In Finisher Pigs

AJC Cook¹, RH Davies¹, AM Miller¹, R Gopal¹, C Byrne¹, PJ Heath² & S Cousens³

¹ Veterinary Laboratories Agency – Weybridge, New Haw, Addlestone, Surrey KT15 3NB UK Tel +44 1932 341111 Fax +44 1932 349983 e-mail a.j.cook@vla.defra.gsi.gov.uk. ² VLA Bury St Edmunds, Rougham Hill, Suffolk IP33 2RX. ³ Infectious Diseases Epidemiology Unit, London School of Hygiene & Tropical Medicine, London WC1E 7HT

Summary: Twenty-two finisher farms were randomly assigned to an intervention or a comparison group. The intervention group implemented a package of hygiene and biosecurity measures to

reduce *Salmonella* infection, measured by culture of pooled pen faecal samples and use of the meat juice enzyme-linked immunosorbent assay (MJ-ELISA). Data on hygiene and biosecurity practices were used to calculate compliance scores, which were significantly greater on intervention farms. *Salmonella* was isolated from 38% (95% confidence interval [ci] 22% - 53%) of pens on intervention farms and 42% (95% ci 27% - 58%) of pens on comparison farms. The prevalence of MJ-ELISA positive pigs on intervention farms was 40% (95% ci 26% - 58%) and 58% (95% ci 41% - 75%) on comparison farms. These differences were not statistically significant. The power of this study was reduced by a strong farm effect. The prevalence of infection amongst introduced pigs at the start of the finisher cycle had a significant impact upon overall pen prevalence.

Keywords: Intervention; UK; epidemiology; hygiene; biosecurity

Materials and Methods: All farms that were contracted to raise finisher pigs for one integrated company were invited to participate in this study and 22 farms volunteered. These farms followed a strict all in/all out policy and used the same feed and management regimes. At an initial meeting, a package of feasible measures intended to reduce *Salmonella* infection was agreed and farmers were then allocated to either an intervention or a comparison group by drawing names from a hat. Intervention measures were intended to improve between-batch hygiene, limit the risk of introducing *Salmonella* and reduce the risk of transmission during production. A total of 24 different measures were described and a compliance score was calculated for each of the 22 farms, according to the number of these measures that were actually undertaken. Every farm completed an initial questionnaire and a weekly recording sheet documenting compliance. Pooled faecal samples (25g) were collected from a random selection of pens within 24 - 72 hours of the arrival of the pigs and these pens were then sampled at approximately monthly intervals. Samples were pre-enriched in buffered peptone water and selectively enriched in Diassalm agar plates. Samples from this were inoculated onto Rambach agar and suspect *Salmonella* colonies were subjected to a slide agglutination test using a range of typing sera and to the minimum phenotypic criteria for identification to *Salmonella* species. A subculture of each confirmed *Salmonella* isolate was submitted for full serotyping and phage typing, where applicable (Davies et al 2001). Meat samples were obtained from a random sample of 40 pigs from each unit shortly after slaughter. The meat juice was tested using an enzyme-linked immunosorbent assay (MJ-ELISA) for antibodies to group B and C1 *Salmonella* serotype lipopolysaccharide. Samples were tested in duplicate by the Guildhay VetSign *Salmonella* ELISA Kit, according to the manufacturer's instructions. During testing, field samples of strong and weak positive sera and meat juice were run alongside the tests, as well as the kit controls. Plate results were accepted when all controls met the expected results. A cut-off value of 0.25 (sample:positive ratio) was used to classify samples as positive or negative. All data were stored in MS ACCESS and then analysed using Stata v8 software.

Results: Intervention farms showed significantly improved hygiene and biosecurity practices with a mean compliance score of 15.2 (95% ci 13.8 - 16.5) compared to 7.7 (95% ci 4.6 - 10.8) for comparison farms (t-test; $p < 0.001$). Particular intervention measures that were followed more assiduously included - use of detergents and disinfectants when cleaning pens and feed hoppers; disinfection of muck heap sites and cleaning and disinfecting tractors, scrapers and other equipment regularly. However, the mean number of sources of weaners used to restock the farms was 2 (95% ci 1 - 3) for intervention farms and 3 (95% ci 1 - 5) for comparison farms - this was not significantly different (t-test; $p = 0.362$). The mean time from the last pig of the previous batch leaving a farm and the first pig of the trial batch arriving was 26 days (95% ci 16.4 - 35.2) on comparison farms and 33 days (95% ci 15.7 - 49.7) on intervention farms, but this difference was not significant (t-test; $p = 0.380$). Pens were first sampled within 24-72 hours of the arrival of the first pigs to detect introduction of infection. There was no significant difference in the prevalence of infected pens at this time (28% for comparison farms and 30% for intervention farms; 95% ci's 18% - 38% and 17% - 42% respectively). No significant differences were detected in herd performance (daily liveweight gain, days to slaughter, mortality or feed conversion

efficiency). By the end of the trial, the mean prevalence of pens from which *Salmonella* was isolated at least once was 42% (95% ci 27% - 58%) for comparison farms and 38% (95% ci 22% - 53%) for intervention farms. The prevalence of MJ ELISA positive pigs was 40% (95% ci 26% - 58%) on intervention farms and 58% (95% ci 41% - 75%) on comparison farms; this difference was not statistically significant (t-test; $p=0.118$). It was noted that one farm in the intervention group had no *Salmonella* isolated from any pen during the trial and only one of the 40 pigs tested had a positive MJ ELISA result. The data were used to investigate the impact of the prevalence of infected pens at the first sampling visit upon the outcome of the trial. There was a significant relationship between the prevalence of infected pens at the start of the trial and of the prevalence of pens that were ever infected ($p<0.001$). This is unsurprising, since across the whole trial 324 out of a total of 787 pen samples were positive and 242 of these occurred at the first visit. A pen from which *Salmonella* had been isolated on the first visit was nearly twice as likely to have *Salmonella* isolated on a subsequent occasion, compared to a pen that was negative on the first visit (odds ratio = 1.9; 95% ci 1.2 - 2.9). No significant association was detected between the prevalence of infected pens at the first visit and the prevalence of MJ ELISA positive pigs.

Discussion: This trial was conducted on a group of farms that already had a good awareness of biosecurity and hygiene. The intervention group achieved a commendable increase in their activities, but this was not rewarded by a significant decrease in either the prevalence of infected pens or of MJ ELISA positive pigs. However, this trial was relatively small and the results are compatible with a potentially important reduction in *Salmonella*. Thus, a more extensive trial is justified. A major factor that may confound the beneficial effects of the intervention was the level of infection introduced by weaners.

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O 49 Selection of finishing pig herds with a low *Salmonella* prevalence for logistic slaughtering.

P.J. van der Wolf¹, M. Swanenburg², H.A.P. Urlings^{2,3}, J.M.A. Snijders⁴

¹ Animal Health Service, Pig Health Department, P.O. Box 9, 7400 AA Deventer, The Netherlands

Tel.: +31-570-660378, Fax.: +31-570-660345, E-mail: p.vd.wolf@gdvdieren.nl, ² Institute of Animal Science and Health, Department of Infectious Diseases and Food Chain Quality, Lelystad, The Netherlands, ³ Dutch Meat Company (Dumeco), Boxtel, The Netherlands, ⁴ University of Utrecht, Faculty of Veterinary Medicine, Department of the Public Health and Food Safety, Utrecht, The Netherlands

Summary: The aim of this study was to select 50 herds with a low *Salmonella*-contamination rate. Per herd 40 blood samples were collected which had to be negative for antibodies against *Salmonella*. Infection of the pigs at the abattoir was measured by culturing tonsils for *Salmonella*. The results showed that not enough herds could be selected when the original criteria were applied. Less strict criteria had to be applied. We conclude from this trial that it is possible to select herds with a lower *Salmonella*-prevalence resulting in a lower introduction of *Salmonella* into the abattoir. Strict criteria must be applied to select herds with a minimal risk of being *Salmonella*-positive. To select *Salmonella*-free herds bacteriological examinations are necessary in addition to serological screening. Prolonged monitoring with a high frequency is necessary. We conclude that the effectiveness of the cleaning and disinfection protocols for transport vehicles should be improved.