3 - 18 h to eliminate Salmonella or E. coli from feed at 20 °C compared with 30 min – 2 h at 30 °C and less than 30 min at 37 °C. Lactic acid concentration also plays an important role in the elimination of enteropathogens from FLF and in this study high concentrations of lactic acid were achieved via inoculation with Lb plantarum. With proper management, i.e. temperature control and inoculation with lactic acid bacteria to ensure adequate lactic acid production, FLF systems have the potential to play an important role in the reduction of enteropathogens in the food chain.

Acknowledgements: Alltech Inc, Kentucky, USA, for supporting C. Moran’s PhD studies and supplying the culture of Lb plantarum. The Veterinary Laboratories Agency, UK, for providing the cultures of E. coli and Salmonella.

References:


Population of a farrowing unit by Salmonella negative animals

Ann Letellier(a), Ph.D., Martin Bonneau(b) D.M.V., Catherine Michaud(b) Agr., Sylvain Messier(b) D.M.V., Sylvain Quessy(b), DVM, PhD

(a) Research Chair in Meat Safety, Faculty of Veterinary Medicine, Université de Montréal, , 3200 Sicotte, St-Hyacinthe, Québec, Canada, J2S 7C6, Phone: 450-773-8521 ext 8640, Fax: 450-778-8113, ann.letellier@umontreal.ca.
(b) Génétiporc Inc., 1312, rue St-George, St-Bernard, Québec, Canada, G0S 2G0, Phone: 418-475-6601

Summary: In order to obtain a better control of Salmonella in swine herd, it is important to ensure introduction of negative replacement animals. The objective of this project was to introduce negative sows in a new farrowing unit by use of a protocol based on a combination of bacteriology and serology to select replacement gilts in the finishing unit of origin. Animals were selected from a finishing unit known to be moderately contaminated by Salmonella based on previous bacteriological and serological analysis. Based on the results, animals were separated in 2 groups. The first group (group A) consisted of seronegative gilts from Salmonella negative pens, designed NP/NS. Group B was composed of seronegative gilts from positive pens, was designed PP/NS and gilts were treated with neomycin to reduce Salmonella shedding. All animals were also washed at their arrival in the farrowing unit. Results demonstrated that it is possible to populate new herds by negative animals (NP/NS) coming from a positive herd by selecting animal using bacteriology and serology, and by application of biosecurity and prophylactic measures.

Keywords: biosecurity, prophylactic, serology, excretion, salmonella-free

Introduction: Pork products have been associated with many cases of salmonellosis in human (Beran et al., 1995). Since Salmonella is a facultative intracellular pathogen, following the infection, many animals will remain healthy carrier up to the end of the fattening period (Letellier et al., 1999). When stressed (e.g. transport to slaughter), many healthy carriers will shed the bacteria and contaminate other
animals, trucks and packer’s facilities. Carcasses from animals positive to *Salmonella* are three times
more likely to be contaminated by this bacteria following the slaughter process (Beran et al., 1995).
The control of this foodborne pathogen at the pre-harvest level in swine is thus a critical step to
decrease the prevalence of foodborne salmonellosis in humans. In most instances, measures applied
on swine farms to reduce prevalence of *Salmonella* have been based on the control of various risk
factors and improvement of hygiene. In order to obtain a better control of *Salmonella* in swine herd,
it is important to ensure introduction of negative replacement animals. The objective of the study was
to develop and verify the effectiveness of a protocol based on a combination of bacteriology and
serology to select *Salmonella* negative gilts for population of a new farrowing unit.

**Materials and methods:** Animals were selected from a finishing unit known to be moderately
contaminated by *Salmonella* based on previous bacteriological and serological analysis. Bacteriological
status of pens and serological status of animals were evaluated twice, one month and one week before
transportation to the new unit, after stress periods such as genetic selection. Bacteriological status of
pens was evaluated by conventional enrichment and culture procedures performed using 5 g (5 X 1g)
of feces. Briefly, fecal samples were homogenized in nutrient broth (NB) and incubated 18 h at 37°C.
One mL of NB of each specimen in the primary enrichment was transferred to 9 mL of tetrathionate brilliant
green and incubated for 24 h at 37°C, for selective enrichment of *Salmonella* spp. Then, one loopful
(10 mL) of the selective enrichment media was inoculated in brilliant green sulfua agar (BGS) containing
novobiocin at 20 mg/mL and incubated for 24 to 48 h at 37°C. Typical colonies were tested biochemically
and tested by agglutination with a polyvalent O-antisera (Poly A1-VI). *Salmonella* isolates were serotyped
at the Office International des épidizoties (Olá) *Salmonella* Reference Laboratory, Health Canada in
Guelph, Ontario. Serological analysis were performed on each gilt using an ELISA test (Maxivet Inc) for
detection of antibodies against *Salmonella* (group B, C, N and E). Sows were considered positive at 30%
cut-off value (40% value is the positive cut-off for the test and 30 to 39% values are considered
doubtful). Based on the results, animals were separated in 2 groups. The first group (group A, n=754)
consisted of seronegative gilts (<30% cut-off) from *Salmonella* negative pens, designed NP/NS. Group
B was composed of 184 seronegative gilts from positive pens and were designed PP/NS. Based on the
antimicrobial agent profile of the *Salmonella* strain recovered from pens, gilts were treated with neomycin
(50 mg/kg) during 5 days after transportation. All animals were also washed at their arrival in the
farrowing unit and housed separately in individual stall. A sub-population of each group was followed
by bacteriological cultures to evaluate the presence of *Salmonella* in selected animals.

**Results:** In group A, 144 individual fecal samples were collected and all gilts were found negative.
In group B, only one sample was positive to *Salmonella*. This gilt was then removed to prevent the
dissemination within the room. Strict biosecurity measures were in place during all the experiment.

![](Table_1_Recovery_of_Salmonella_in_the_farrowing_unit_after_arrival_of_sowsFarm_B.png)

**Discussion:** So far, most on farm *Salmonella* control programs are targeted against the appropriate
management of known risk factors such as presence of rodents, lack in hygiene. However, it is known
that the status of incoming animals and the number of sources for replacement animals are important
features to consider for appropriate management of *Salmonella* in swine herds (Letellier et al., 1999;
Quessy et al., 1999). The identification of sows status is thus critical for the reduction of *Salmonella*
in farrowing unit and to produce *Salmonella* free piglets.
Optimal identification of positive animals is thus imperative in order to avoid introduction of positive
animal in a herd. Since it may be difficult to obtain replacement animals from herds with a confirmed
negative status for *Salmonella*, we were interested in this study to determine if it was possible to develop a protocol that would allow the population of a negative farrowing unit by use of animals from a herd known to be moderately contaminated by *Salmonella*. Since serology can not detect recently infected animals and since bacteriology can not detect most healthy carriers, we used a combination of serology and bacteriology, ensuring that the last sampling was done after the stress period caused by the selection process.

In the first part of this study, we observed that all sampled animals from NP/NS pens were negative after introduction in the new farrowing unit. Interestingly, it was also possible to populate an almost negative section of the new unit by use of PP/NS animals. To do so, few basic measures were applied to these animals such as a Neomycin treatment in water and the washing of gilts at their arrival to the new unit. In addition, few special precautions such as maintenance of the integrity of pens and biosecurity measures such as changing/washing boots between positive and negative pens, were applied throughout the experiment.

**Conclusions:** Results obtained in this study demonstrated that it is possible to populate a swine herd with animals negative to *Salmonella* coming from a positive herd by selecting animal using bacteriology and serology combined with application of biosecurity and prophylactic measures. Further studies will be possible on seronegative gilts from positive pens, to investigate their possible resistance to *Salmonella* infection.

**Acknowledgements:** The authors want to thanks, Annie Desrosiers, Sylvie Côté and Sandra Laplante for their technical help in this project. This work was supported by Génétiporc inc.

**References:**


**Field trials to evaluate the efficacy of mash feed to reduce *Salmonella* shedding in swine**

Ann Letellier(Preferences), Ph.D., Julie Ménard(Preferences), D.M.V., Sylvain Quessy(Preferences), DVM, PhD

(Preferences) Research Chair in Meat Safety, Faculty of Veterinary Medicine, Université de Montréal, , 3200 Sicotte, St-Hyacinthe, Québec, Canada, J2S 7C6, Phone: 450-773-8521 ext 8640, Fax: 450-778-8113, ann.letellier@umontreal.ca. (Preferences) F. Ménard Inc., 251, Route 235, Ange-Gardien, Québec, Canada, J0E 1B0, Phone: 450-293-3694, Fax: 450-293-2622, bureau@fmenard.com

**Summary:** The objective of this study was to evaluate the effect of corn based mash feed as a pre-harvest intervention strategy to reduce shedding in pigs herds contaminated by *Salmonella* spp. In this study, three nurseries previously found contaminated by *Salmonella* in successive production cycles were selected to evaluate the effect of mash feed. Pelleted feed was administered for the first part of the experiment and mash feed was then introduced in all herds for a period of four production cycles. Samples from pens were cultured to evaluate the prevalence of *Salmonella* in each production cycle. A total of 195 samples for the period corresponding to pelleted feeding and 68 samples for the period corresponding to mash feed were collected. Results indicated a significant reduction of *Salmonella* shedding in herds following mash feed utilization.