Evaluation of subtherapeutic use of apramycin on reducing *Salmonella enterica* carriage by fattening pigs.

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Abstract

Salmonella enterica is one of the major causes of foodborne diseases in humans and pigs. Pork meat is an important source of human salmonellosis. In order to reduce pig carcass contamination at slaughterhouse, a very effective measure could be the identification of *Salmonella* contaminated livestock farms and the reduction of *Salmonella* in carrier pigs.
The aim of the study was the control of *Salmonella* shedding in pigs by the use of apramycin (200 ppm) in feed medication in fatteners. After one week of treatment, grower pigs had been fed for three months with a mixture of formic acid (21%) and lactic acid (26%) (1000g/ 100 kg of feed). A group of un treated pigs was left as control. The two groups of pigs were tested for *Salmonella* faecal carriage both at the beginning, and in the middle of the trial period by means of pooled faecal samples. Prior to slaughter, each animal was tested by a single rectal swab. Microbiological examination of the two groups showed no differences in *Salmonella* shedding between the two groups.

Introduction

Salmonella has long been recognised as an important pathogen of economic significance in animals and humans. The ongoing increase in human outbreaks of salmonellosis originating from infections in animals contaminating eggs, carcasses, meat products, milk and other foodstuffs (food-born infections/diseases) need concern to be focused on the prevention and control of *Salmonella* in animal production by WHO (WHO, 1993) and the EU (Dir 92/117/EEC). The control of salmonellosis in breeding animals was primarily devoted to poultry production, but the need to control *Salmonella* in swine production is increasingly focused nowadays.
This study aims at evaluating the use of chemical agents (apramycin plus acids) in reducing the faecal carriage of *Salmonella* by fattening pigs, thus reducing the hazard of microbiological contamination of pig carcasses, environment and equipments at slaughter.

Material and methods

Fattener pigs reared in a farrow to finish 2000-sow herd located in Piedmont region, Northern Italy, were fed with apramycin (200 ppm) in feed. After one week of treatment, the grower pigs had been fed for three months with a mixture of formic acid (21%) and lactic acid (26%) (1000g/ 100 kg of feed). The selected pigs were divided into two groups (80 animals per group). A group of pigs was kept untreated and served as "control" group. The pigs were reared in four boxes of 40 animals each. Treated and control pigs did not share contact for the entire trial period.
The two groups of pigs were tested for *Salmonella* faecal carriage both at the beginning, and in the middle of the trial period by means of pooled faecal samples. Prior to slaughter, animals were individually tested by a single rectal swab. Samples were kept at 4°C and transported to the laboratory the day of collection.
For *Salmonella* detection, the ISO 6597:2002 method was followed. A 10-g aliquot of faecal material was diluted 1:10 in Buffered Peptone Water (BPW) and rectal swabs were transferred in tubes containing 10 mL of BPW. After incubation at 37 °C ± 1 °C for 18 ± 2 h, 1 mL of the pre-enrichment cultures was transferred into 10 mL of Muller-Kauffmann tetrathionate/novobiocin broth (MKTT) and 0.1 mL into 10 mL of Rappaport Vassiliadis broth with soya (RVS broth). Enrichment broths were incubated at 37 °C ± 1 °C and 41.5 °C ± 1 °C for 24 ± 3 h, respectively. Thereafter,

10-µl aliquots of the broth-cultures were plated onto Xylose Lysine Deoxycholate agar (XLD) and Brilliant Green Agar (BGA) selective media. The selective plates were incubated at 37°C °C for 24 ± 3 h and examined for suspect colonies. Negative plates were re-incubated for additional 18-24 h. *Salmonella* suspect colonies were picked up and subjected to biochemical (TSI, LIA, urease) and serological tests (*Salmonella* O-omnivalent serum). For *Salmonella* genus identification, the API 20 E ® (bioMérieux, Marcy l'Etoile, France) system was employed. *Salmonella* strains were serotyped by the Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna, Brescia, Italy.

Results and conclusions

The microbiological findings showed no differences in *Salmonella* shedding between the "antimicrobial plus acids" treated pigs and the "controls". The results are shown in table 1. The only *Salmonella* serovar detected in the faecal matter of the two groups of pigs was *S.* Rissen, that is rather common in pigs and cattle in Italy (Enter-Vet, 2005).

	1st sampling (farm) (faecal pools)	2nd sampling (farm) (faecal pools)	3rd sampling at slaughterhouse (individual swabs) *
Treated group	Negative	Positive	5%
Control group	Positive	Positive	5%

* prevalence of Salmonella positive faecal swabs

On our opinion, more studies on *Salmonella* carriage reduction by pigs should be encouraged, together with the control of the introduction of infected-carrier pigs in livestock farms.

References

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