

THE IMPORTANCE OF VERTICAL VS. HORIZONTAL SALMONELLA
TRANSMISSION CONCLUDED FROM A WHO-PROJECT IN A POULTRY
MEAT CHAIN - LESSONS FOR SWINE

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The aim of the project (Kaesbohrer and Blaha, 1997) was to determine the reasons for the steady increase of *Salmonella* findings in the poultry meat produced at a slaughterhouse in Northern Germany, and, concluding from the results to implement pre-harvest food safety measures (Blaha, 1997) to reduce the introduction of *Salmonella* into the production line from the broiler flocks supplying the slaughterhouse.

METHOD

Bacteriology: For this study, a modification of detecting *Salmonella* according to ISO 6579 was developed. The method used consisted of pre-enrichment of the samples in buffered peptone water at 37°C, selective enrichment in tetrathionate brilliant green-broth and Rappaport-Vassiliadis-broth at 42°C, and culturing on Rambach agar and xylose lysine desoxycholate-agar at 37°C (Mueller et al., 1997).

Meat production chain: The poultry meat production chain consists of one grand parent flock, several parent flocks with two hatcheries, 35 producers of chicken, one poultry slaughterhouse and one poultry meat processing plant. For the first phase of the study, seven producers of chicken were selected, in the second phase all producers were involved. The animals were sexed and kept on floor. Hens are fattened for 45 days, roosters until 59 days.

Sampling strategy: The *Salmonella* prevalence in animals and the *Salmonella* presence in and on materials in the environment of the animals were determined before (phase I) and after (phase II) implementing intervention measures at farm level using the following standardized sampling plan: The day-old chicks were sampled at the hatchery and at arrival at the farm. During the fattening period, the flocks were investigated at days 14, 35 and 49. At each time, 60 fecal samples and 20 dead animals per flock were bacteriologically examined. Before restocking, each pen was checked bacteriologically for effectiveness of cle-

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aning and disinfection, and various samples from the environment of the farm were taken to estimate its *Salmonella* contamination.

RESULTS

Phase I: The *Salmonella* prevalence in the animals and in the environment of the animals before implementing intervention measures was: day-old chicks from grant parent flock 0%, day-old chicks from parent flocks 1 - 5%, feed 0%, water, straw, tools, vicinity of the broiler houses 20 - 60%, broilers supplied for slaughter 60 - 80%, cut carcasses 60%, and the meat supplied for processing 30 - 50%.

Control measures according to the results of phase I: All persons were intensively informed on the sources and routes of infection. Technical defects on the farms were removed to ensure proper operating conditions. Hygiene plans referring to the risk factors detected were established. Cleaning and disinfection plans were improved. In all herds, stringent hygienic measures were introduced. These included regularly performed cleaning and disinfection of the stable and the surroundings, hygiene barriers and change of clothes for all persons, rodent control and feed control. Positive parent flocks were slaughtered. Restocked parent flocks were vaccinated and fed with competitive exclusion flora to lower the risk of a new *Salmonella* infection.

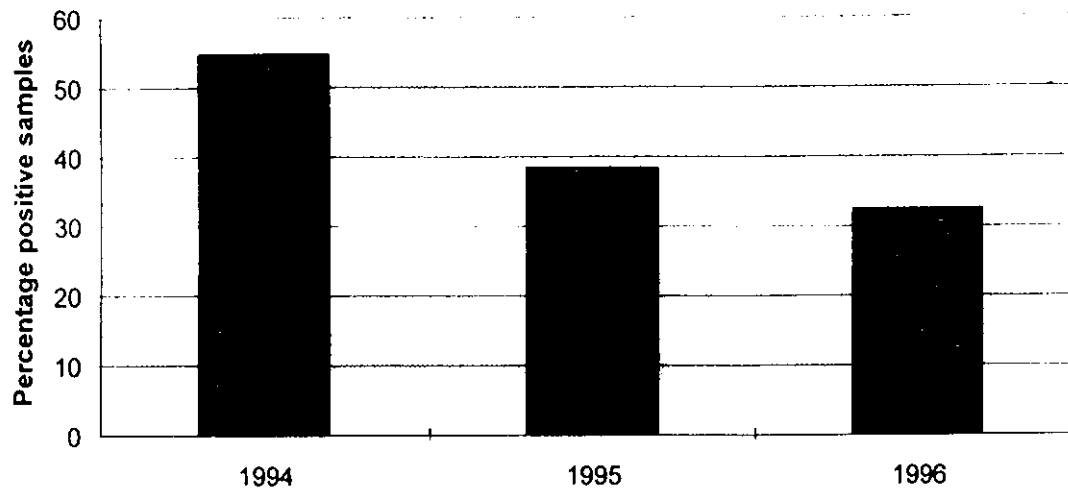
Phase II: The introduction of *Salmonella* via the day-old chicks into the broiler flocks could be reduced to almost 0%. This markedly reduction of the *Salmonella* prevalence in the day-old chicks, however, did not result in the intended reduction of the *Salmonella* prevalence in the broiler flocks at slaughter. Flocks that received *Salmonella* negative day-old chicks showed as high an intra-herd prevalence at 14 days as flocks that introduced *Salmonella* positive chicks.

These experiences made it evident that control measures in the breeders flocks alone were not sufficient enough to reach the aim of the study. Therefore, the following management and hygienic measures were taken at farm level:

- 1) Change of shoes and clothing before entering the house,
- 2) Keeping the vicinity of the houses clear of waste and plants,
- 3) Intensive control of rodents and beetles,
- 4) Storing the litter far away from the flock,
- 5) Use of water from the community water supply,
- 6) Use of straw from low risk areas,
- 7) No use of feedstuffs remained from the preceding fattening period,
- 8) Cleaning and disinfection of the entrance and the surroundings of the hen houses,
- 9) Disinfection of drinking water during the fattening period, and others more.

These control measures led to a significant reduction of the *Salmonella* findings at the farm level and in the animals before slaughter. The effect of these pre-harvest measures on the final meat product is shown in Figure 1 (Kaesbohrer and Blaha, 1997):

Figure 1. *Salmonella* findings in poultry meat



CONCLUSIONS

- 1) For successful pre-harvest food safety programs, the control of the vertical transmission of *Salmonella* is not sufficient enough to get rid of *Salmonella* in meat production chains.
- 2) It is possible to reduce the *Salmonella* load in well-organized production chains, if each production level is taking adequate measures. To reach this aim in the pre-harvest area, producers have to adopt *Salmonella*-reducing working procedures every day over a long period of time to reduce the contamination of the animals' environment and to prevent the horizontal infection of the herd.
- 3) Apart from introducing salmonella-free pigs in salmonella-free sties and assuring salmonella-free feed, investigating the farm environment, reducing its salmonella contamination rate, and preventing the introduction of salmonella into the herd from the environment are important control measures for producing low-salmonella pork (Dahl and Wingstrand, 1997).

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