

EPIDEMIOLOGIC INVESTIGATIONS OF SALMONELLA SPP. IN NEW YORK STATE CULL DAIRY COWS PRIOR TO SLAUGHTER

Westerdahl M.¹, Mohammed H., Rossiter C.

Les salmonelles hébergées par les vaches laitières de réforme peuvent servir de sources potentielles d'infection à l'abattoir des produits d'origine bovine utilisés pour la consommation humaine. Une étude transversale a été réalisée dans un grand abattoir du nord est des Etats-Unis pendant l'été 1996 en vue de déterminer la prévalence des salmonelles dans les fèces et sur les peaux des vaches laitières de réforme avant l'abattage. Les facteurs de risque potentiels de la présence de salmonelles dans ces endroits, comprenant les caractéristiques individuelles des vaches, l'environnement et les facteurs liés au transport ont été également étudiés. La population étudiée incluait les vaches laitières de réforme sélectionnées de façon aléatoire des remorques provenant de marchés aux bestiaux de l'Etat de New-York. Des échantillons de peau de deux sites à haut risque, et les fèces étaient prélevés sur chaque vache. Une technique standardisée de mise en culture de tous les échantillons était utilisée dans le laboratoire de diagnostics vétérinaires de l'Etat de New York. Des données sur les facteurs de risque étaient également recueillies au moment des prélèvements. Les calculs de prévalence ont été effectués. Une analyse de régression logistique a été utilisée pour identifier les facteurs associés de façon significative à la présence de salmonelles sur la peau et dans les fèces. Des salmonelles étaient plus fréquentes sur les peaux que dans les fèces étudiées. Un certain nombre de facteurs de risque étaient associés de manière significative avec la présence de salmonelles sur les peaux des vaches laitières de réforme.

INTRODUCTION

As the safety of foods of animal origin has become an international concern, attention has focused upon the public health hazard of foodborne pathogens, including *Salmonella* spp.. In response to public concern, the United States Department of Agriculture, Food Safety Inspection Service has required abattoirs to establish Hazard and Critical Control Point systems to reduce contamination by *Salmonella* spp.. Epidemiological knowledge regarding potential pathogens in the abattoir environment is necessary for accurate identification of control programs.

Salmonella spp. generally cause a self-limiting illness in humans, but may have severe complications in young, elderly and immunocompromised populations. Approximately two-thirds of the 1993 estimated 3.6 to 7.1 million foodborne pathogen illnesses were attributable to meat or poultry consumption. Beef was the implicated vehicle in 2.5% of reported foodborne disease outbreaks in the United States during 1988 - 1992. In the United States 95.5% of cull dairy cows are intended for beef slaughter, accounting for 18% of domestic ground beef production. *Salmonella* spp. carried by cull dairy cows into the abattoir may serve as potential sources for the infection of beef products for human consumption. New York State, one of the largest dairy states in the country, slaughters 213, 000 cull dairy cows a year.

The purpose of this study was to determine the prevalence of *Salmonella* spp. in feces and upon hides of New York State cull dairy cows prior to slaughter. In addition, potential risk factors for the presence of *Salmonella* spp. at these sites were also investigated. Risk factors considered included individual cow characteristics, environmental factors, and transport associated factors.

STUDY DESIGN

A cross-sectional study design was utilized to collect data at a single large Northeast United States abattoir during the summer of 1996. The study population included a random selection of trailers carrying cull dairy cows originating from New York State livestock markets. Cows may harbor *Salmonella* spp. in their feces or gastrointestinal contents, or externally upon fecal contaminated hide, hooves, and hair. Hide samples from two high risk sites, round and brisket, and feces were collected from each cow. Standard microbiological culture of all samples, and serotyping of all isolated *Salmonella* spp. was performed at the New York State Veterinary Diagnostic Laboratory.

Data on individual cow characteristics considered to be possible risk factors, including ambulatory status, body condition score, hide cleanliness, and manure consistency were all assessed by one individual at the same time as sampling. Transport associated factors investigated included the presence of *Salmonella* spp. on the floor and walls

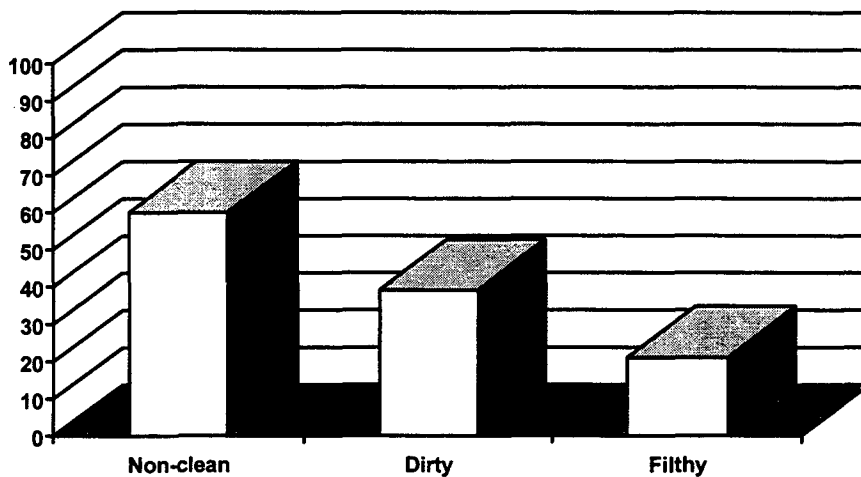
¹ Section of Epidemiology, College of Veterinary Medicine, Cornell University, Ithaca, NY 14853

of trailers. A two-person team collected representative samples from each selected trailer, which were identically cultured. Environmental factors such as temperature and humidity were recorded for each day of sampling. Descriptive statistics and disease prevalence calculations were performed. Logistic regressions analysis was carried out to identify risk factors associated with the presence of *Salmonella* in fecal and hide samples. The results were based on the dichotomous outcome of *Salmonella* spp. culture positive or negative. Categorical variables were collapsed as necessary. In the final analysis, we adjusted for the effect of the trailer by inclusion of a random-effect term in the model.

RESULTS AND DISCUSSION

A total of 302 cows from 10 trailers were sampled over the three month period. The population was 92% Holstein, and 65% had body condition scores less than 2.5. Manure consistency was normal in 97% of the population. Figure 1 shows the frequency distribution of the hide cleanliness among cows in the study population. Non-clean hides were recorded for 60% of the cows; 39% had "dirty" hides – dry and wet manure covering much of the lower half of the body; 21% has "filthy" hides - manure covered much of the hide, no clean areas on the hide. *Salmonella* spp. were recovered from 4 of the 10 trailers.

Figure 1
The distribution of hide cleanliness among animals in the study population



Salmonella spp. were more prevalent upon the hide than in the feces of the cows sampled. A number of risk factors investigated were significantly associated with the presence of *Salmonella* spp. on the hides of cull dairy cattle. Interpretation of these results should be made recognizing the known insensitivity of fecal culture, however at present no feasible alternative method exists.

REFERENCES

Food Safety and Inspection Service, USDA. 1995. Pathogen reduction; hazard analysis and critical control point (HACCP) systems. Fed Register (60). 6774-6889.
 Smith G, et al (ed.). Final Report of the National Non-fed Beef Quality Audit - 1994. Colorado State University. Fort Collins, CO.
 Stolle A. 1981. Spreading of Salmonellas during Cattle Slaughtering. Journal of Applied Bacteriology 50. 239-245.
 Veterinary Services, APHIS, USDA. Economic Opportunities for Dairy Cow Culling Management Operations. 1996. Centers for Epidemiology and Animal Health, Fort Collins, CO.