Experimental intragastric contamination of heifers with Salmonella typhimurium
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Salmonella bredeney infection in cows has frequently been reported in France. The carriage of S bredeney was followed after a spontaneous outbreak in an experimental farm comprising 160 milking cows (average). Animals were housed from September, the beginning of the calving period, to April, the beginning of the grazing season. No obvious source of contamination was established. Other animals housed and fed independently remained free of contamination until introduction in the infected herd. During the first 2 months of the outbreak, cases of fever (68% of cows) dysentery (80%) and abortions (6.9%) were associated with Salmonella isolations in faeces or in products of abortion. S bredeney was recovered from the milk tank, but individual milk sampling was not practicable. From November 1990 to October 1993, the rectal contents of each animal were analysed bacteriologically at intervals of 1 to 3 months. About 5-g portions of faeces from each animal were enriched in 30 ml selenite broth (18 h, 37°C). Subcultures were plated on Salmonella–Shigella agar. From 11 to 13 successive faecal samples taken from 217 milking cows and heifers investigated during the first 13 months of observation, 0–10 (median: 3) samples per animal were positive; 48% (92/193) of the animals were only found twice to be positive. Among 217 animals, 89% excreted S bredeney at least once during the first winter following the outbreak. During the following years, the clinical cases were few or absent and the excretion-rate decreased, being maximal during the calving periods and close to zero during the grazing periods. Most animals did not excrete before the day of calving. Only 5 animals excreted intermittently during at least 2.5 years. Three of these carriers were removed before the 2nd grazing season and slaughtered: Salmonella was detected in the 3 animals, especially in digestive tract and in draining lymph nodes, but also in one of these animals in spleen, liver and one retro-mammary lymph node. Heifers housed at distance from adults were probably contaminated by the distribution of wasted feeds of adults. After observation of the first clinical cases, half of the 90 heifers was vaccinated twice with a S bredeney dead vaccine in adjuvant. Local and general reactions followed vaccinations. No difference in the rise and fall of the excretion rate was observed between the vaccinated group and the control group. Calves were removed as soon as possible after birth and received a stored colostrum (first maternal colostrum and then pooled colostrum). No clinical salmonellosis or faecal excretion of S bredeney were observed in calves. Autumn 1993 was the first calving period without faecal or vaginal Salmonella excretion detectable with our technique, 3 years after the initial isolation. In several respects, these results are similar to those observed with S dublin, a serotype considered as primarily adapted to cattle.

Experimental intragastric contamination of heifers with Salmonella typhimurium. J Marly, P Pardon (Pathologie Infectieuse et Immunologie, INRA Centre de Tours-Nouzilly, 37380 Nouzilly, France)

Salmonella typhimurium has been reported from many countries among the most common serotypes isolated from several animal species and man, the incidence remaining fairly constant over the years. This investigation was undertaken to reproduce an asymptomatic faecal excretion of S typhimurium in cattle by a mucosal route of contamination. A spontaneous mutant strain resistant to streptomycin (500 μg/ml) and nalidixic acid (100 μg/ml) was selected to quantify low concentrations of Salmonella
in faeces using culture media containing these inhibitors. This S typhimurium mutant expressed the same level of virulence in mice as the parental C5 strain (unreported work). The same 5 6-month-old heifers housed in a specialized building were intragastrically contaminated with increasing doses of the mutant strain. The rectal contents were harvested and individually cultivated on Salmonella–Shigella agar plus inhibitors (SSI) or enriched in nutrient broth and subcultured on SSI. No detectable effect was recorded after administration of 1.3 x 10^6 Salmonella and 6 weeks later of 2.3 x 10^7 Salmonella. A low level of faecal excretion was observed during about 2 weeks only after administration of 8 x 10^9 cfu per animal. A more intense but shorter excretion and an increase in agglutinating antibodies were obtained after daily administration of 2 x 10^10 cfu during 3 consecutive days. No animal exhibited fever or other symptoms. Other authors indicated that oral challenge exposure even with large doses could irregularly reproduce a clinical disease. These results would suggest that carriage is unlikely to occur except under extreme conditions of prolonged exposure to heavy contamination, or increased susceptibility of cattle (Hall and Jones, 1978). Observations in normal farming conditions indicate that these conditions are not always necessary. Other hypotheses should and will be tested to study the relationship between contamination, predilection sites of asymptomatic Salmonella carriage and faecal excretion.

Reference


Faecal excretion after oral experimental contamination of sheep with Listeria monocytogenes. J Marly 1, P Pardon 1, S Lhopital 2, P Berche 2 (1 Pathologie Infectieuse et Immunologie, INRA Centre de Tours, 37380 Nouzilly; 2 Laboratoire de Microbiologie, Faculté de Médecine Necker-Enfants Malades, 156, rue de Vaugirard, 75730 Paris Cedex 15, France)

The relationship between the dose of Listeria monocytogenes received by animal hosts and the frequency, intensity, and duration of infection and excretion could give an indication of the role played by these animals in Listeria transmission. To evaluate the oral dose producing either systemic infection or faecal shedding in sheep, 3 groups of 5 100-d-old lambs received orally 6 x 10^6, 6 x 10^8 or 6 x 10^10 cfu of L monocytogenes F13. This spectinomycin-resistant spontaneous mutant expressed the same level of virulence in mice as the parental LO28 strain (Vincente et al, 1985). Rectal temperatures, titers of serum antibodies against listeriolysin O and the presence of Listeria in bacteriological samples (stool, blood, buccal and nasal swabs) were monitored for 128 d, when lambs were sacrificed. Differences in effects were significant only between the lower and higher doses. In all animals, the rectal temperatures and the titers of antibodies against listeriolysin increased without any clinical signs. No faecal excretion was detected from lambs receiving the lower dose. In lambs contaminated with the higher dose, one animal was bacteremic and all lambs excreted intermittently (days 0 to 5) a maximum of 5 x 10^4 cfu/g rectal content. Post-mortem samples were negative for F13. Kinetics of antibody production against listeriolysin O indicated that antilisteriolysin antibodies were constantly produced even with the low infecting dose. Detection of these antibodies could therefore be used to detect sheep and perhaps other ruminants that have been previously exposed to L monocytogenes (Lhopital et al, 1993). Lambs contaminated in our experimental