

1985, issue 7 - Abstracts

EPIDEMIOLOGY AND PREVENTION OF BOVINE SALMONELLOSIS - Meeting of October 25th, 1984

Study of bovine *Salmonella* strains isolated in France (1976-1983)

Corbion (B)

From 1976 to 1983, 5,642 strains of *Salmonella* isolated from cattle have been studied at the "Laboratoire Central d'Hygiène Alimentaire". They represented 63 different serotypes. *S. dublin* and *S. typhimurium* are dominant with 88 per cent of the strains. *S. dublin* is mainly isolated in abortion cases, when *S. typhimurium* mainly comes from birth and after-birth pathology. Many strains show a high level of resistance. The pattern of these strains in time and space is analysed.

Epidemiology of bovine salmonellosis in Belgium from 1960 to 1984

Pohl (P) & Lintermans (P)

Between 1960 and 1984, four types of enzootic *Salmonella* had been observed in Belgium on cattle. First were *S. typhimurium* strains, not discriminated by lyso-type phage and showing few resistances to antibiotics (1960 to 1970). They gave way to lyso-type 207 *S. Typhimurium* strains, resistant to Su STCKA (1970 to 1977). They were replaced themselves by strains of the same serotype, belonging to 49-193-204 phagic group, resistant to Su STCKA Tp. In addition, since 1971, *S. dublin* strains have appeared, belonging to biotype 1 resistant to Su STC, then to Su STCKA (in 1974) and at the end to Su STCKA Tp (1984). These multi-resistant *Salmonella* strains, now widespread in cattle, are also seen in other mammalian species, including man, but at a very low level.

The part of reservoirs and environment in bovine salmonellosis

Gledel (J)

Salmonella are found with significant frequency in the environment, i.e. earth, waters, vegetation as well as wild animals (rodents, birds, insects ...) or domestic animals. This leads to the question of epidemiological link between this broad contamination and the apparition of Salmonellosis outbreaks in farm animals, especially cattle. The bibliographic study confirms the presence and the survival of *Salmonella* in the environment. Special attention is given to urban and farm sewages as important contaminating steps. However, it remains very often difficult to assess any direct relationship between contamination and environment with the lack of any specific trustful marker. In this way, *Salmonella dublin* represents an enigma. With our present knowledges level, it will always be very difficult to tell, between environment and animal, which one is responsible of the contamination. That is why it is so important to go on studying carefully all the strains isolated in bovine pathology. Even more important is the study of all the strains coming from environment, found during the epidemiological surveys that have to be carry out every time bovine salmonellosis occurs, with the hope to find out the real ways followed by contamination.

Bovine *Salmonella* infection

Martel (J-L)

In cattle, clinical salmonellosis appears quite frequently compared to other animal species. They bring serious economic problem in calf fattening unit, adding to the problem facing the sanitary inspector. The most important parts of the epidemiological cycles for *Salmonella Dublin* and *S. typhimurium*, two major serotypes for cattle, are here presented. Cattle are mainly contaminated by cattle. Three kinds of relationships occur between the bacteria and the host, following the serotype and the age of the animals. They are: passive, latent and active carriages giving the level, the length and the rhythm of faecal excretion. Among the other excretion routes, placental (and vaginal) route is very important because of the very high level of excretion, although short in time, during calving (or abortion). This period is a very high sanitary hazard. Contamination through placenta is under discussion. The number of *Salmonella* needed to infect cattle is variable following the penetration route and the age of the animals. The most classical way is through the mouth, but in heavily stocked herds, contamination through aerosol is possible. In face of bacterial infection and aggression, the receptivity of each individual will determine the evolution of infection. This receptivity depends on many internal factors like age (young animals are more sensible), stress, other disease, immunity (gap between mother immunity and active immunity of the calf), use of medicines (like antibiotics). External factors include industrialisation of calves rearing and putting out to pasture of adult cattle.

Sanitary prevention of bovine salmonellosis in dairy herds

Gledel (J)

The brief data here presented are to be linked to the former paper dealing with “reservoirs and environment”. Sanitary prevention of bovine salmonellosis has the aim of protecting *Salmonella* free herds with “fences” able to prevent any animal/*Salmonella* contact, or, at least, to make these contacts non dangerous. This is only possible by following special measures, often restraining and to be used regularly and rigorously (e.g.: protection of animals, hygiene of the food, of stables, of tools of things and of people).

Sanitary prevention of bovine salmonellosis: environmental actions in calves fattening units

Morisse (J-P)

The finding of *Salmonella* in calf through routine copro-culture is quite common. But this does not always mean that a clinical salmonellosis is going to appear soon. Sanitary prevention of salmonellosis must be approached through two complementary slides: calf contamination, conditions leading to *Salmonella* development in the intestine and to the revelation of their pathogenic properties. About contamination: Dairy herds, after recovering from clinical salmonellosis, are very active *Salmonella* scattering agents, in calving time. Sixty per cent of examined calves are *Salmonella* carriers. Contamination occurs through: mothers' faeces, milk (35% of the samples had *Salmonella*) and probably colostrum. About favourable conditions, “Calf quality”, with poor liver metabolism and dehydration, as a consequence of a bad supply network, play a big part in the coming out of clinical salmonellosis, and some others causes: food, husbandry, sanitary, technicality. Every digestive trouble, whatever the origin (food,

environmental, medicinal) increases the risk of multiplication of a potential pathogenic flora, usually under natural control. For each of these situation's examples are given.

Sanitary prevention of bovine salmonellosis: acting on the animals

Martel (J-L)

Salmonellosis infection of cattle cannot be confirmed without an experimental diagnosis. Finding animals excreting bacteria goes through bacteriological examinations. The ways to collect materials are discussed because the quality of the results of the bacteriological researches are linked to them. For the two most important serotypes in bovine pathology the recommended medium is selenite F broth incubated 24, 48 or even 72 h, either at 37°C, either 42°C. The choice of the selective medium is more a question of personal experience. The problem of lactose fermenting strains is discussed. Identification of *Salmonella dublin* and of *S. typhimurium* is in the reach of every veterinary investigation laboratory. They also have to do the susceptibility tests of the strains and to send ever strain to the "Salmonellae National Centre". Bacteriological findings must be interpreted prudently. Evaluation of herd sanitary level may be approach through immunological tests. Intradermic tests are still poorly used, but many other tests can be practised. Agglutination reactions are widely used but they need standardization so that trustful significant answers could be obtained in adult's cattle. These serological methods seem to us uncertain in calves. Sanitary measures directed towards the animals are different in the case of a free from what is to be done during an outbreak. Most important are the measures during calving time a high-risk period. Careful examination of the new animals entering the herd is also a central point in the program. This good choice of the individual's animals is the best way to improve intensive calf fattening units.

Bovine vaccination against salmonellosis

Pardon (P) & Marly (J)

Against salmonellosis the control of immunizing contacts goes through the use of vaccines. Inactivated vaccines are the only allowed in France. Repeated parenteral injections of the best inactivated vaccines nowadays available reduce mortality but not morbidity. A few anaphylactic shocks have been noticed. Different live vaccine strains are nowadays used in man or in cattle in foreign countries, either commercially either experimentally. Simple vaccination programs using the best available strains, give protection against mortality and morbidity. The live vaccines are cheap (fabrication and use). If inactivated vaccines, bacterial fragments or synthetic immunogens had an efficiency and a cost similar to those of live vaccines the opportunity of using live vaccines should not be considered anymore.

Prevention by antibiotics and bovine salmonellosis

Lafont (J-P), Guillot (J-F) & Chaslus-Dangla (E)

Preventive antibiotic treatments of bovine salmonellosis are aimed at a bacterial target on which a therapeutic effect is expected, but they also endowed with undesirable side-effects. The bacterial target is essentially constituted by two sero-vars *S. typhimurium* and *S. dublin*. The majority of these strains are harbouring transferable multiple-resistance plasmids. The pathogeny and epidemiology of bovine salmonellosis are not sufficiently well known to allow the definition of a preventive antibiotic strategy in the bovine species. Moreover, preventive

treatments are likely to exert the undesirable side-effects of antibiotic therapy, particularly the selection of resistance bacteria and the disturbance of the balance between intestinal bacterial populations destroying the protective effect of the normal flora. On the other hand, bovine animals represent a reservoir of antibiotic-resistant *Salmonellae* and their role of human contamination with the pathogenic microorganisms has recently been highlighted by current work in the United States. The preventive distribution of antibiotics must thus be considered as a temporary and hazardous measure which cannot be systematically instituted. This prevention must not utilize antibiotic molecules able to amplify the extension of plasmidic resistance. In particular, antibiotics for which plasmidic resistance has not yet reached a large prevalence, such as trimethoprim, gentamicin or apramycin, must strictly be preserved for curative purpose. An efficient prevention of bovine salmonellosis can only rely upon the conjunction of hygienic and medical procedures, among which antibiotic distribution must play a minor and occasional role. Drastic hygienic improvements of the calf trade and rearing must be obtained in that respect. The prominent importance of a thorough surveillance of the antibiotic resistance of *Salmonella* species must also be underlined.