

MEAT RESEARCH NEWS LETTER

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SALMONELLAE

Some Background Information on Sources and Significance.

WHAT ARE THEY?

Salmonellae are rod shaped bacteria which were named after Dr. D.E. Salmon, an American Veterinarian, who first isolated them from diseased pigs in 1885.

Salmonellae can cause disease in both man and animal. In man, salmonellae, when ingested in sufficient numbers, cause food poisoning with symptoms of nausea, diarrhea, vomiting, and a mild fever.

There are over 1300 known types of Salmonellae which are distinguished from each other by small chemical differences in their surface structures. Serological methods are used to detect these differences, and so different types are referred to as serotypes. A serotype is defined by a particular combination of the surface structures. Interbreeding by salmonellae can give rise to new combinations thus giving new serotypes.

The convention adopted for naming these 1300 serotypes is to name them after the city, town or suburb in which they were first found e.g., S. adelaide, S. brisbane, and S. cannonhill.

The most common serotype is S. typhimurium. It was so named because it was isolated as the cause of mouse typhoid. In fact, S. typhimurium was once used as a commercial preparation to control plagues of rats and mice.

The frequency with which different serotypes are found varies in different countries, and at different times. For instance, S. dublin is commonly isolated from cattle in the U.K. and Europe but is very rare in Australia.

WHY ARE SALMONELLAE IMPORTANT?

One might well ask why there is the present world-wide concern with salmonellae, when presumably salmonellae have been with us since prehistoric time.

The first proven outbreak of salmonella food poisoning occurred in 1888 in Germany when 58 persons became ill after eating beef.

Since that time interest and awareness of the problem of salmonella food poisoning has gradually increased.

Initially most of the problem was thought to be related to diseased animals that were "emergency slaughtered". However, it soon became obvious that a wide variety of foods derived from apparently healthy animals could contain salmonellae and cause illness. By about 1950 the list of incriminated foods included eggs, fish and seafoods, all types of meat (particularly chicken and pork), unpasteurized milk, and coconut. The present list of known products that may contain salmonellae is large and continues to increase e.g. dried milk, yeast, carmine dye, vitamins, pharmaceutical products of animal origin, cocoa and chocolate.

As more information has become available about the increasing magnitude and seriousness of the problem, Public Health authorities have become more concerned. For instance, in the United States there has been a 20 fold increase in known cases of human illness from 1942 to 1964, and it is now estimated that in the United States of America some 2,000,000 cases of human infection occur each year.

A report prepared in 1969 by a United States Committee on Salmonella (1) lists 8 factors that might be involved in the increased incidence of human illness. These include: changes in eating habits from home-prepared to communal meals (e.g. restaurants), mass production of processed foods with subsequent nationwide distribution, increased consumption of poultry and poultry products, increased number of products contaminated, and changes in food production methods that might allow better salmonella growth, or allow its growth without evidence of spoilage.

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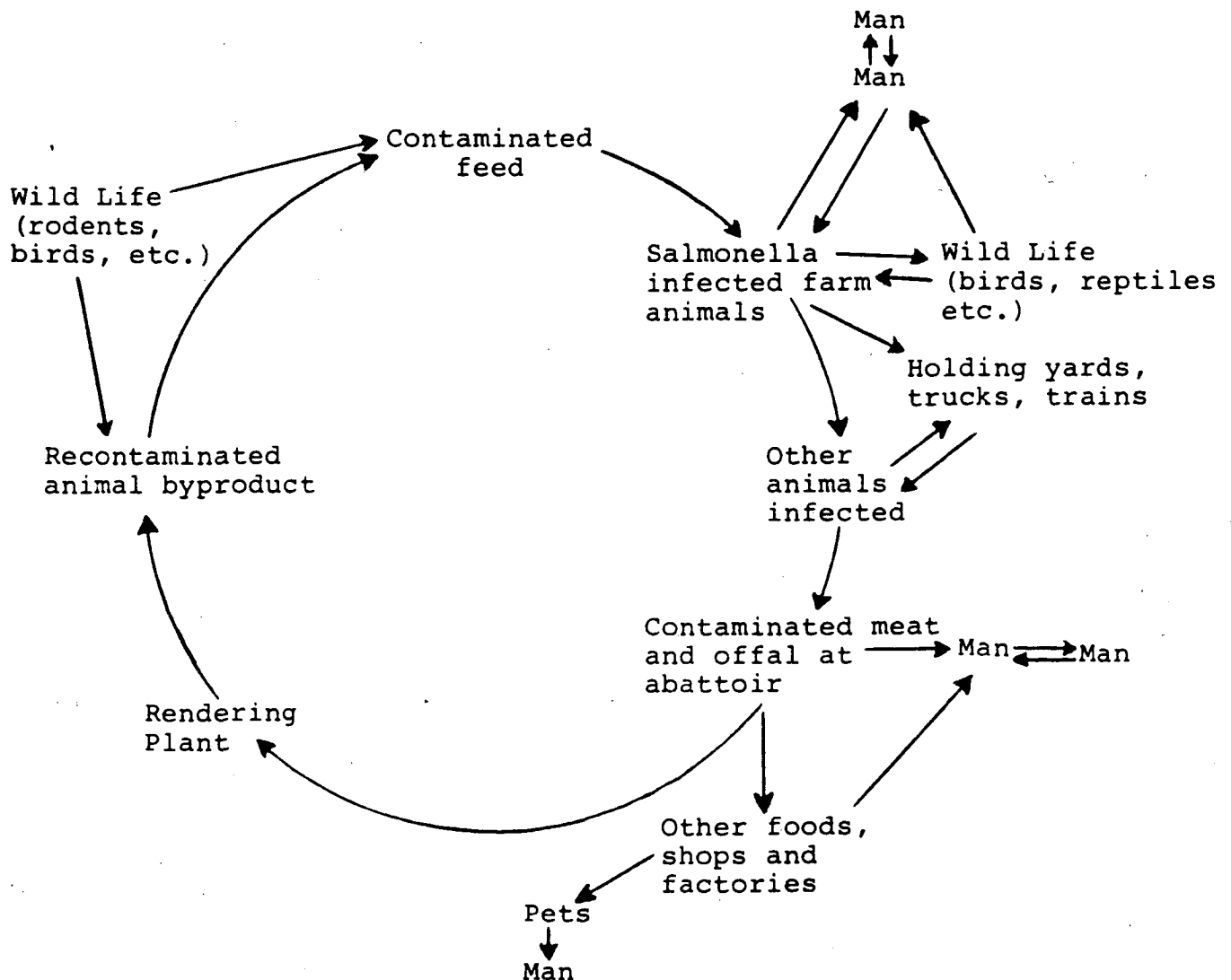
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WHERE DO SALMONELLAE OCCUR?

While we think of salmonellae as normally belonging to the intestinal tract of men and animals, it is obvious from what has already been said that salmonellae can be found in a wide variety of products. As well as in human foods, salmonellae occur in animal feeds (such as meat and bone meal, fish meal and cottonseed cake), in the soil of saleyard and abattoir holding pens, in chicken litter, and in natural water supplies.

HOW ARE SALMONELLAE SPREAD?

There are many sources from which salmonellae can be spread to man and animals. The diagram below shows some of the interlocking cycles by which this can be done. Food products may be contaminated by the animal from which it is prepared, and by equipment, rodents, insects, dust and human carriers.



REQUIREMENTS FOR GROWTH:

Because salmonellae have simple nutritional requirements, and grow both in the presence and absence of oxygen, they can grow both inside animals and in moist environments outside animals (e.g. on food processing equipment).

Salmonellae can grow over a temperature range of 45° to 115°F. At body temperatures numbers may increase 1000 fold in only four hours. Growth can be prevented by holding products below 45°F. Salmonella can survive in frozen foods and growth will occur if the food returns to favourable temperatures.

CONTROL:

Present methods of salmonella control are imperfect in that:

- (1) Raising and marketing animals under salmonella-free conditions is not at present feasible.
- (2) Preventing contamination of foodstuffs is not always successful and multiplication of salmonellae can occur when the food is subsequently handled.

More effective control requires some terminal process to destroy the salmonellae such as canning or pasteurization. However, even such processes are not always successful since faulty processing and post pasteurization contamination can still occur.

The best advice that can be given in the preparation of boneless meat is:-

- (1) Avoid, especially, contamination with intestinal material.
- (2) Minimise contamination by hide, or fleece.
- (3) Remove the possibility of salmonella growth on equipment, particularly in the boning room, by sanitation.
- (4) Prevent salmonella growth on the product by adequate refrigeration during chilling and by holding at temperatures below 45°F.

POST-SCRIPT.UNITED STATES SALMONELLA FOOD POISONING DUE TO IMPORTED BEEF.

The latest issue of Salmonella Surveillance (June 1969) reports an outbreak of food poisoning among 100 persons attending a wedding reception in Maryland, U.S.A., on June 14, 1969. The food concerned was boneless beef, which had been cooked in Washington D.C. on June 6, shipped to the caterer on June 13, sliced and taken to the banquet at 5.45 p.m. June 14, and served from 6 to 11 p.m.

S. welikada was isolated from the patients, the sliced beef, and several unopened packed roasts. This organism had not been isolated in the United States since the salmonella surveillance system started in 1962. It has been isolated in Australia on several occasions and it appears, therefore, that the meat may have been contaminated in Australia.

The report states there were a number of deficiencies in cooking and preparation. Production in the United States plant was stopped for a week while new processing procedures were developed.

References.

- (1) An Evaluation of the Salmonella Problem, National Research Council, Washington - Committee on Salmonella - 1969 - approx. \$5.00 U.S.
- (2) Salmonella Surveillance (Report No. 87) U.S. Dept. of Health, Education and Welfare, June 1969.

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Next Issue will be Ecchymosis (Blood Splash).