SALMONELLOSIS

widespread among man & animal

*by Ned W. Rokey, D.V.M.**

Salmonellosis, caused by a bacterium called *Salmonella* (sal-mon-ella), affects more animals and more people than any other single disease common to man and animals and is the most widespread bacterial environmental pollutant known today. This disease is of major concern to Arizona and this nation's livestock and poultry industries, public health officials, regulatory agencies, and the processors of food items containing livestock and poultry products.

The disease, in both man and animals, is particularly infectious for the extremely young, the old, and the debilitated. East Coast residents were reminded of its seriousness in July of 1970 when 26 deaths due to *Salmonella* infection occurred in a Baltimore, Maryland, nursing home. News accounts called attention to the fact that poultry products are major vehicles for *Salmonella* infections and that livestock and poultry products are major reservoirs for the disease.

During recent years salmonellosis has been diagnosed with increasing frequency. A part of this increase can be attributed to improved methods of detection; however, with the advent of large scale livestock and poultry operations, the disease has become widespread. Substantially large numbers of animals are confined in comparatively small areas in this type of husbandry. These livestock concentrations mimic those of foreign countries where salmonellosis has caused extensive economic losses to livestock and has been a serious public health hazard since the turn of the century.

The disease exacts a serious economic annual toll to livestock and poultry industries in this country. In Arizona the disease is held responsible for an estimated four million dollar annual loss to the livestock feeding industry. Death losses exceeding fifty percent are not uncommon in calves suffering from salmonellosis.

Laboratory studies in central Arizona indicate that *Salmonella* can be isolated from one out of every two calves that die before three weeks of age.

Although the disease may be spread by feeds through the medium of contaminated animal by-products the most common source of infection through continued shedding of *Salmonella* organisms in excretions from animals that have recovered from the disease.

Infection in man can usually be traced to eating contaminated foods such as poultry, pork, milk products, etc., that are improperly cooked or inexpertly handled during preparation, cooking, and subsequent handling prior to consumption. In recognition that contamination of poultry with *Salmonellae* is common, poultry products used for school lunches are accompanied by instructions for proper handling, preparation, cooking, and holding procedures to prevent transmission of salmonellosis.

In October of 1970 the American Animal Health Association Salmonella Committee made the following recommendation:

"The Committee recognizes the work of Dr. Ned Rokey (Dr. Rokey is a member of the AAHA Salmonella Committee) in calling attention to the apparent emergence of variant Salmonellae that ferment lactose and are not recovered by standard procedures and techniques. This Committee directs that the American Association of Veterinary and Laboratory Diagnosticians review 91-68 and develop protocol for conduct and application of flourescent antibody tests for tissues and feed ingredients."

The Committee also called attention to the role that livestock and poultry operations play in environmental pollutions with *Salmonellae*. Wastes from beef cattle, dairy farms, poultry and swine operations are considered major sources of actual or potential pollution of the environment with *Salmonellae*.

Diagnosis of salmonellosis is extremely difficult and is dependent upon demonstration of the "bug" in infected tissues by laboratory examination. The symptoms of salmonellosis may mimic other disease processes.

Salmonella is not only commonly associated with scours (diarrhea) in

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calves, but also occurs as a generalized infection infecting all of the body organs. In the latter form it is commonly known as "enteric fever." This form may result in pneumonia, gastritis, gall bladder infection, or even encephalitis.

Studies carried out by the University of Arizona Animal Pathology Laboratory at Mesa, Arizona, indicate that certain *Salmonella* strains have developed resistance to many of the antibiotics commonly recommended for use.

These studies also indicate that certain *Salmonella* strains have undergone genetic changes and have developed characteristics which resemble other enteric bacteria making their identification extremely difficult. These variant *Salmonellae* cannot be detected by standard microbiologic procedures. University researchers at the Mesa Animal Pathology Laboratory have developed a fluorescent antibody test capable of identifying these variant strains.

Livestock and poultry feeds containing *Salmonellae* are now considered adulterated and are illegal under federal law. The American Renderers Association, in cooperation with the USDA, has undertaken a program to eliminate *Salmonella* from rendered animal by-products. The program has achieved a marked decrease in the number of contaminated samples.

Pasteurization effectively kills *Salmonella* organisms. This procedure is commonly used on food products such as milk, eggs, and products destined for confectionary use that lend themselves to pasteurization. Prevention of contaminated meat products is dependent upon sanitary practices in slaughtering and processing establishments.

Prevention of salmonellosis in livestock and poultry operations is dependent upon strict sanitary procedures: separating animals from their excretions, detection and elimination of carrier animals, and control of flies, rodents, and wild birds that can mechanically transmit the infection, and decentralization of livestock and poultry concentrations.

Immunization with dead *Salmonella* vaccines has not proved to be very satisfactory as a method of prevention.

Damping-off

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environment for the rapid spread of the fungus throughout the entire planting after it was introduced into the beds on infected nursery stock.

Death of transplanted tomato seedlings has been a problem only during the hot summer months. However, the fungus was also isolated from necrotic roots of 'apparently healthy' mature plants grown during the cooler months of the year. This indicates that the fungus, while not causing death of the plants, is capable of retarding root development. In addition, the fungus persists in crop residues remaining in the beds after harvest and therefore poses a threat to future plantings unless corrective measures are taken.

Elimination of the fungus from infested beds can be accomplished by chemical treatment of the beds with methyl bromide, chloropicrin, or sodium N-methyldithiocarbamate dihydrate (Vapam, VPM).** Once the fungus has been eliminated from the beds, reintroduction can be prevented only through a coordinated program of sanitation and the use of pathogen-free nursery stock. Since *P. aphanidermatum* is a common soil-borne fungus found in most agricultural soils throughout the Salt River Valley, the use of steam — or chemically — treated nursery propagating media is of paramount importance in the production of pathogen-free seedlings. Direct seeding into treated propagating media will be effective only if followed by a strict sanitation program. Raised and clean rearing benches, disinfestation of tools and equipment, and a minimum of plant handling are essential to the maintenance of pathogen-free stock. Additional information on the maintenance of pathogen-free stock can be obtained from the following publication: K. F. Baker [ed.]. 1957. The U. C. system for producing healthy container-grown plants. Calif. Agr. Exp. Sta. Ext. Manual 23. 332p.

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