Epidemiological Studies of *Salmonella* sp. In Municipal Sewage Treatment Plant Effluents and Resident Feral Animals with Special Reference to *Salmonella enteritidis*

Hailu Kinde, Mark Adelson, Alex Ardans, Richard L. Walker and Dave Willoughby
School of Veterinary Medicine
Veterinary Diagnostic Laboratory System (C VDLS)
University of California
San Bernardino Branch
P.O. Box 5579
San Bernardino, CA 92408

In the recent years in Southern California human *S. enteritidis* infection has increased by about ten fold. In Los Angeles county alone *50* 1 cases of *S . enteritidis* infections were reported during the period of April through July 1994. Over *90%* of the *Salmonella enteritidis* isolates from these cases were phage type 4. *S. enteritidis,* phage type 4 was a strain rarely isolated in the United States before 1990, and the first food borne outbreak was not reported until April of 1994, in El Paso Texas. The epidemiologic investigations linked many of these outbreaks in humans to the the consumption of fresh grade A eggs. However, it is unknown how much of this increase was actually egg associated. About the same time, in May of 1994, the first documented case of *Senteritidis,* phage type 4 infection occurred in a commercial layer flock in Southern California.

Recent studies in California supports the opinion that rodents and other wild animals may be important in the transmission of *S .enteritidis* to poultry and that human sewage may be a source of infection. *Salmonella enteritidis,* enjoys a multihost system and is well established in the environment.

The objectives of this study were to determine the common serotypes of *Salmonella* sp. found in effluents and resident feral animals and to study the epidemiological association of the *Salmonella* sp. isolates from different sources (effluents and feral animals) with special reference to *S. enteritidis.*

The study revealed that 8 of the 9 (89%) sewage treatment 'plants were positive for *Salmonella* when effluent was examined at the chlorination/dechlorination site, inside the plant and/or outside the plant before the effluent merges with a receiving stream. The negative effluent sample was from a modernized treatment plant which was equipped with computerized filteration chlorination and a UV disinfection system. . The two control sites, a metropolitan drinking water reservoir and a mountain stream were also positive for *Salmonella.* Tissue and intestinal pools from 3 1 of 182 (17%) feral animals were positive for *Salmonella.*

The isolation rate of *S.enteritidis* from both the treatment plant effluents and feral animals was very low; SE was isolated from one treatment plant and from one feral animal (a skunk) at a different location.

It was always thought that the only habitat of *Salmonella* is the intestinal tract of animals. This and previous studies show that *Salmonella* is ubiquitous and may exist as free living organisms multiplying under natural conditions. The wide spread occurrence of these organisms in effluent and other surface waters can be a potential public health risk and warrants a comprehensive epidemiologic study in relation to exposure of humans to polluted waters.