AAI-14

DEPARTMENT OF AGRICULTURE
BUREAU OF ANIMAL INDUSTRY

TO:

Dr. C. F. Hall.

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Charlie,

thought you'd like a copy of this. I also sent copies to Salmonella Committee and the 6 Directors of AHA.

Ed Mallinson.

REPORT: INTERNATIONAL SYMPOSIUM ON SALMONELLA

University of Guelph, Canada

June 8-11, 1977

E.T. Mallinson, V.M.D.

Summary: This report outlines various items that were personally perceived as useful gems on the salmonella problem. The Symposium was especially timely inasmuch as the Canadian counterpart of FDA has proposed that starting in 1978 they will restrict sale of salmonella contaminated raw processed chickens. Meeting highlights are arranged as they relate to the following broad concerns:

1) The epidemiology of transmission from poultry to man and within the poultry production chain,

2) Control rationales, programs, results and monitoring techniques,

3) Stratagems for broad reduction of salmonella.

I. Epidemiology.

A. Poultry To Man

1) Introduction of serotypes from poultry are usually followed by an increase in human incidence of the same serotype. Two good examples of this are S. infantis and S. montevideo. (Dr. J. McCoy--England)

There is a high correlation between human serotypes and poultry serotypes. (Dr. H. Pivnick--Canada)

Poultry salmonella phage types and antibiotypes have been traced through to humans with the same sub-types and strains. (Dr. M. Finlayson--Canada)

2) Correction of poultry plant problems with salmonella often lead to a decrease in human incidence. Evidence was presented of salmonella spread to children from newly hatched chicks as well as a hazard to general farm personnel. (Dr. M. Finlayson)

3) Cross contamination of salmonella from poultry to other raw or cooked products is a very important factor in the total role of poultry in human salmonellosis. (Dr. F. Bryan--USA)

4) Sometimes very small numbers of salmonella, such as S. eastborne (two organisms per gram), can lead to human illness. (Dr. W.E. Edel--Holland)

S. agona reportedly also requires very low numbers to cause infection in man. (ETM)

5) Salmonella food poisoning is basically a food borne disease with introduction basically from raw products. Human carriers are seldom the source of introduction. (Dr. F. Bryan)

B. Poultry and Livestock Production Chain

1) A pilot study in which progeny of infected flocks were followed to the end of processing suggested that plant contamination depends in part of the extent of flock infection at processing. (Dr. M. Finlayson)

Canadian investigators have demonstrated a flow of the same serotypes from the broiler farm to the processing plant and then to the consumer level. (Dr. W. Mitchel--Canada)

The incidence of live poultry carriers entering the plant will affect the success of in-plant chlorination control and other plant sanitation procedures. (Dr. R. Tompkin--USA)

2) A low level of salmonella in incoming birds may lead to a clean processing plant run especially if good sanitation procedures are exercised in the plant. (Dr. M. Finlayson)

The incidence of positive product coming from plants ranged from zero to 30 percent. The number of negative runs was impressive inasmuch as they were more frequent and of longer duration than most would expect. Positve runs were suspected to be related to processing of strongly positive flocks. (Dr. C. Davidson--Canada)

3) Inquiries and a search of past reports revealed that the incidence of detectable salmonellosis in broiler flocks in the USA ranged from 1.4 percent to 52 percent and that an estimate of 75% incidence is not unrealistic. (Dr. G. Snoeyenbos--USA)

4) Salmonellosis in grandparent breeding stock was considered to be one of the main sources of salmonella contamination for broilers. (Dr. M. Finlayson and Dr. J. McCoy)

Some serotypes in breeders, possibly originating from the feed, are replaced in a couple of years by new serotypes. (Dr. J. McCoy)

5) Feed, especially animal protein components, and residual farm contamination were identified as significant sources of broiler flock contamination. (Dr. W. Hacking--Canada)

6) Fluorescent antibody and electron microscopy clearly demonstrate that inoculated salmonella do invade the muscosa and lamina propria of the intestinal tract setting up small micro-colonies in the epithelium. The salmonella are not passively present in the gut lumen - instead an "infection" is actually established. (Dr. G. Snoyenenbos)

II. Control.

A. Rationale

1) Agriculturalists and regulatory people are obligated to reduce the number of salmonella sources and contain the problem. Salmonellosis is one of the most important infectious diseases, especially in developing countries. It is still increasing in importance and spread. (Dr. W. Edel--Holland)

2) Reported outbreaks reveal only 1 percent of the true incidence. (Dr. W. Edel)

Cost benefit ratio calculations may be misleading if they do not consider the iceberg characteristics of human salmonellosis. Better estimates of the cost and prevalence of human salmonellosis would be desirable. (ETM)

3) When new salmonella serotypes enter a country, it is highly advantageous to bring their incidence down to extremely low levels before they become established in the human, bird, and animal populations and the countries environment. (Dr. H. Pivnick--Canada)

4) Denmark has significantly reduced the incidence of salmonella in poultry, food and man and remained competitive in the international market place. (Dr. H. Marthedal--Denmark)

Elimination of salmonella from a particular product may lead to new uses and greatly expanded sales. Liquid whole eggs are a good example. (Dr. M. Houston--USA)

5) Salmonella control in livestock and poultry should be viewed as part of a more far reaching control in connection with continuous vigilance and hygiene, or more shortly expressed it's part of good modern "veterinary preventive medicine." (Dr. J. Almlöff--Sweden)

B. Programs and Results

1) The USDA Salmonella Program for rendering plants demonstrated that 27 percent of the plants could produce a clean product. Additionally, 83 percent of the rendering plants could hold a clean status. There was difficulty, however, with positive plants which had difficulty in maintaining and achieving a clean status consistently. Replacement of old equipment with new may be the only solution for such plants. (Dr. J. Walker--USA)

2) Field studies on the prevalence of salmonella in turkey buildings before and after cleaning and disinfection revealed promising results in attempts to eradicate salmonella from the environment. (Dr. S. Nivas--USA)

3) A six log increase in resistance to S. infantis was observed in experimental broilers previously given intestinal micro-flora cultures from adult healthy chickens. Best results were observed when used in very young birds. (Dr. E. Nurmi--Finland)

   The value of gut flora blocking mechanisms were confirmed by other workers. (E. Idziak--Canada and J. Richmond--England)

4) Although chlorination of the plant water has been adopted by many processors to reduce surface contamination on carcasses, it is not a panacea. Available research shows that at best a reduction of about one log (or 90 percent) may be all that can be achieved by chlorination. (Dr. R. Tompkin)

   Many positive carcasses are contaminated at the rate of one to 30 salmonella per carcass. (Dr. Sirkowitz--USDA Report Cited)

5) The liquid egg pasteurization program in the United States has been very successful in reducing to almost zero the number of cases of human salmonellosis traced to egg products. This has been accompanied by a dramatic rise in the sale and use of liquid egg products. (Dr. M. Houston)

C. Monitoring and Surveillance Techniques

1) Salmonella were isolated from 83 percent of poultry trucking crate litter samples, 67 percent of bulk feather samples, 0.6 percent of cloacal swab samples, 0.4 percent of carcass swab samples, 0.1 percent of environmental samples, and, in addition, 9.1 percent of carcass rinse samples and 3 percent of freshly processed carcasses. (Dr. W. Mitchel)

2) Nest material is one of the best sources from which to monitor for salmonella in breeding flocks. (Dr. W. Mitchel)

3) It is best to examine "infertile clears" to recover salmonella. This can be done with hatching eggs that have only been incubated 6-7 days. (Dr. J. McCoy)

4) Pre-enrichment is a necessity to revive injured salmonella in many products. Forty-two degrees centigrade incubation is very effective technique to isolate salmonella from material containing many competitive contaminants. Brilliant green agar is generally the best plating medium. To save on amount of media utilized it is well to either pool your samples or pool the pre-enrichment media. (Dr. W. Edel)

5) An excellent plating medium is bismuth citrate agar described by Williams and Blair in 1938. This media is an improvement over bismuth sulphite agar. It permits dependable, immediate visual identification of salmonella colonies in quantitative plating studies. (Dr. J. McCoy)

III. Stratagems For Broad Reduction of Salmonella.

A. Enforced regulations governing farm husbandry practices, heat treatment of feeds or certain feed ingredients, and blood testing of breeding flocks. (Dr. H. Marthedal)

Note: A copy of the abstract Dr. Marthedal's presentation at the Symposium is attached.

B. Veterinary tracebacks to uncover sources of positive growing flocks or heards. (Dr. J. Almlof and Dr. H. Marthedal)

C. Current Canadian Approach.

1) Restrict sales of processed chickens found positive as determined by an official method. Initially there would be warnings, later enforcement. (Dr. H. Pivnick)

This approach will do two things: put pressure on U.S. breeders; and test the feasibility of control in a country that already has a high rate of contamination as compared to the low starting levels that the Scandinavian countries had to face. (ETM)

2) As brucellosis and tuberculosis programs wind down, government resources can be applied to the salmonella problem. (Dr. H. Pivnick)

D. Monitoring of suppliers by purchasers all along the entire food chain who then share results, return positive products for further processing or reject them. (Dr. J. McCoy)

E. Microbiologic monitoring versus visual inspection. Processing plants submit programs and objective checks and USDA does the monitoring. (Dr. W. Dubbert--USA)

F. Certified fish meal programs developed between FDA and the Department of Commerce have lead to salmonella reductions and allowed the industry to remain competitive in the international market place. (Dr. Pivnick and Dr. J. Williams--USA)

G. In our free enterprise system government and industry should work together creatively to economically reduce the risks. That's the challenge! (ETM)

Abstract.

International Symposium on Salmonella

H.E. Marthedal*

The Occurrence of Salmonellosis in Poultry in Denmark 1935 - 1976, and the Eradication Programme Established.

The report comprises a survey of the occurrence of Salmonellosis in poultry in Denmark, the possibilities of infection, and preventive measures undertaken in Denmark.

During the period 1946-1962 a considerable number of new types of salmonellabacteria occurred among chicks, the main reason being - with no doubt - import of meat- and bonemeal, which started after 2. World War, and which often was strongly infectious.

Due to order issued in January 1954 mixtures of meat- and bonemeal of foreign origin should be resterilized before use and consequently the main part of these new Salmonellatypes disappeared.

From 1962 to 1973 infections with S.typhi murium became a more serious problem in the broilerproduction. The principal cause was spread of infection from a number of breeding centres via hatcheries and on to the broilerproduction. Contributory factor seemed to be that until December 1964 it was permitted to rear chickens and web-footed birds together.

The order issued on December 1964 put and end to this, i.e. the transmission of infection from web-footed birds (and turkeys) to chickens of all ages was thus prevented.

Another important feature in combating these infections was the voluntary agreement with The Danish Poultry Breeding Committee concerning instructions for intensification of sanctions; this agreement aimed briefly at an arrangement to the effect that all breeding centres should send to The Institute of Poultry Diseases material (dust from hatching machines, dead and diseased chicks, etc.) from each hatching according to a detailed pro-

* Prof., Institute of Poultry Diseases, Royal Veterinary Agricultural College, Copenhagen, Denmark.

gramme. The results of this co-operation with the poultry industry did - within a relatively short time - become very successful. The number of salmonellainfections in poultry decreased year by year reaching a very low level.

In 1976 a slight increase occurred due to two separate sources of infection, but excluding these outbreaks the frequency of salmonellosis is now at a very low level, which is also supported by the fact that discardings on account of salmonellosis are reduced to a minimum. In 1975 only one flock was found to be infected, and none in 1976.

An important element in combating these infections are the veterinary epizootiological examinations and typedeterminations carried out specially concerning S.typhi murium and S.enteritidis.
The report suggests that salmonellosis in pigeons is of no importance for infections caused by S.typhi murium in utility poultry.