Statement Before the Senate Subcommittee on Oversight of Government Management, Restructuring, and the District of Columbia

Testimony presented by

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AEGG SAFETY:
ARE THERE CRACKS IN THE FEDERAL FOOD SAFETY SYSTEM?@

Thank you for inviting the scientific and technical representative of the egg industry to be part of the proceedings that ensure the safety of food. The industry produced 67.3 billion eggs in 1998; seventy percent were sold as shell eggs. There are currently 757 producers in the United States who each have 3,000 or more hens.

My name is Dr. Jill Snowdon and I serve as the Director of Food Safety Programs at the Egg Nutrition Center (ENC). The Egg Nutrition Center serves as a scientific and technical resource on nutrition and food safety and is a joint effort between the American Egg Board (AEB) and the United Egg Producers (UEP). We are part of an industry network that works to ensure the safety of food.

This testimony will: highlight the current situation regarding eggs and *Salmonella* Enteritidis, reference egg industry accomplishments and industry commitment to producing a safe product, and summarize the successes in this challenging situation including the recent decrease in salmonellosis caused by SE.

I. SE AND EGGS CAN BE CONSIDERED A MODEL OF SUCCESS

A. GOOD NEWS FROM RECENT HEALTH STATISTICS

1. MULTIPLE LINES OF DATA FROM THE UNITED STATES

The pursuit of egg safety should be considered a success story and there=s good news from recent health statistics to confirm it. The disease incidence of salmonellosis caused by *Salmonella enterica* subspecies Enteritidis serovar Enteritidis (otherwise known as ASE@) has been on the decline in the United States. Multiple lines of evidence -- taken from data collected over the last three to eight years, from both national and regional levels, including both sporadic cases and outbreaks -- show the same downward trend.

Outbreaks -- where two or more people become ill at the same time -- from all sources of SE have decreased. The decrease has been from a high of 82 outbreaks (2327 cases) in 1990 to 45 outbreaks (666 cases) in 1998 as recorded and reported by the Centers for Disease Control and Prevention (CDC). Both the number of outbreaks and the number of people ill in each outbreak have declined. The decrease in the number of outbreaks is particularly evident in New York. New York is currently free of outbreaks from SE and has one of the lowest rates for SE as measured by another monitoring system called FoodNet. The decreases in outbreaks associated with eggs (some outbreaks are caused by non-food sources or foods other than eggs, see below) are likely due to changes in farm management practices, changes in food preparation practices in health care facilities like nursing homes, and national consumer education campaigns on safe egg handling. Like any perishable food, eggs need to be treated with care. A graphic presentation of this decrease in outbreaks is included in Appendix A.

For several decades, the Centers for Disease Control and Prevention (CDC) has collected data on the incidence of salmonellosis in the U.S. Salmonellosis can be caused by over 2000 sub-types of bacteria; the incidence of these sub-types is also recorded in CDC=s surveillance system. The decline in salmonellosis caused by SE on a regional basis is best presented in the graph appended to this testimony (Appendix B). Rates began to drop in the mid-Atlantic area after 1989 from a high of 10.5 cases per 100,000 population to 5.7 cases per 100,000 in 1997. The New England area dropped from 10 per 100,000 in 1995 to 4 per 100,000 in 1997. Disease incidence in the Pacific area has been declining ever since 1994 dropping to 5 per 100,000 in 1997. This is also reflected in data from five southern California counties which shows a return to low rates (Appendix C).

Perhaps the most compelling line of evidence for the decline of salmonellosis caused by SE is from CDC=s FoodNet program which reported a 44% decline in salmonellosis caused by SE over the last three years. FoodNet collects all reports of salmonellosis (and selected other diseases) from all laboratories in a geographically defined area (a catchment area). Data from these catchment areas are analyzed to detect trends and to estimate disease incidence. The trend in disease from SE is downwards. At the start of the FoodNet program in 1996, the incidence rate for salmonellosis caused by SE was 2.5 per 100,000, which declined to 1.5 per 100,000 by 1998.

FoodNet data can also be used to estimate the incidence, or amount, of disease. Based on several studies specifically designed to improve the accuracy of the estimate, FoodNet data indicate 1.4 million cases of salmonellosis in the U.S. in 1997. Fifteen percent of the reported cases were caused by SE; one could estimate that there are about 210,000 cases of salmonellosis caused by SE in the U.S. in 1997.

FoodNet is the most sophisticated and accurate source of foodborne disease data in the U.S. and perhaps the world because it is based on scientific evidence not theory. But another line of reasoning can be used to corroborate the FoodNet data on SE. The *Salmonella* surveillance system, which is a passive, nationwide data collection system, recorded about 9,500 cases of salmonellosis from SE in 1997. The current thinking is that there are 20 to 40 cases of salmonellosis for every one that is reported; this would estimate total cases of salmonellosis caused by SE between 190,000 to 380,000 per year. This is in keeping with the FoodNet estimate above and confirms the validity of CDC=s surveillance systems.

This general declining trend regarding SE is also seen in the proportion of salmonella isolates from human sources that were SE; the proportion has been dropping since 1994, from 27% to 23% in 1998. A similar decline in the incidence of salmonellosis from SE is also being observed on an international basis.

2. INVOLVEMENT WITH EGGS AND OTHER SOURCES OF SE

It should be pointed out that illness from SE is only a fraction of all cases of salmonellosis and that eggs account for only a portion of all reported cases of SE. A variety of foods and sometimes people can carry SE. The actual extent of the association with eggs is unknown and debatable; the role of the environment and the role of non-food animals has not been studied. The most extensive data on this subject is from the state of New York. Twenty eight percent of the cases from SE outbreaks in New York (from 1980 to 1995) were proven to be from sources other than eggs; that is to say, 72% were associated with eggs. (The three most important factors contributing to the egg outbreaks were inadequate refrigeration of pooled eggs, contaminated ingredients and inadequate cooking. Proper food preparation practices would have prevented these outbreaks.) Using CDC data from 1998, eggs could be involved as little as 33% of the time (83% of the 40% of the outbreaks where food source is known) to 83% of all outbreaks.

The U.S. has the safest food supply in the world, however, there has always been, and always will be, risk associated with eating. There is risk in everything that you do and all foods have a certain amount of risk. Although even one person ill would be one too many, the risk of getting SE from eggs remains because few eggs (an average of one in 20,000) are contaminated with SE and thorough cooking kills SE. Eggs, like all other foods, must be produced, stored and prepared properly. Keeping food refrigerated deters the growth of bacteria and the heat of thorough cooking kills bacteria. Food preparation is the final line of defense in man=s competition against foodborne microorganisms.

3. LOOKING AT ALL FOODBORNE DISEASE

The incidence of disease caused by SE should be put in the context of all foodborne diseases. There are about 50 bacterial pathogens, 20 viruses and 40 parasites known to be associated with foodborne disease. Additionally, there are mycotoxins, other toxins, intolerances and allergies associated with food. The reference for this information is: *Diseases Transmitted by Foods: A Classification and Summary*, second edition, US Dept. of Health and Human Services, Centers for Disease Control, 1982, HHS Publication No. (CDC) 83-8237. In each of these categories there are many sub-species; SE, for example, is one of about two thousand types of *Salmonella*.

The actual extent of all foodborne disease is unknown, published estimates vary widely and are controversial. The classic reference on the subject is the Carter Center study published in 1987 (Appendix D). This study estimated 6.5 million cases in the U.S. each year with up to 9,000 deaths. Most experts believe the number of ill to be in the millions; even 360 million cases of diarrheal diseases was proposed in a 1997 FoodNet report. CDC is in the process of updating these estimates. More funds for surveillance and research to substantiate and refine these figures would minimize the controversy.

Up until recently, salmonellosis has been the most common foodborne illness, and the most studied foodborne disease, in the world. But over half the time the vehicle that is carrying it into the food supply is never determined. Likewise, in over half the cases of foodborne illness, the microbiological agent that caused the illness is unknown; these unknown agents of disease are likely to be found to be caused by viruses and parasites which are expensive, difficult or impossible to detect. The relative importance of an established and well known pathogen like *Salmonella* will diminish as we conduct better investigations of foodborne outbreaks, and as we develop the analytical capability to detect viruses and parasites; more funds are needed for both enhanced epidemiological investigation and research to develop or improve detection techniques.

Perhaps only half of the cases of salmonellosis caused by SE are associated with eggs. At the moment, in 1997, an estimate from FoodNet data is that 15% of 1.4 million cases (or 210,000) of salmonellosis are caused by SE; half (an arbitrary choice selected because it is a mid-point) of that number is 105,000. This is a small fraction of the total incidence of foodborne illness. If there are 105,000 cases of salmonellosis caused by SE and associated with eggs and if there are 100 million cases of foodborne illness each year (again an arbitrary choice for the sake of illustration), then salmonellosis from SE associated with eggs contributes to much less than one percent of all foodborne illness.

Phrases that attribute eggs as Athe single largest source of identifiable foodborne disease@ misrepresent the reality of the situation. This type of statement exaggerates that hazard because it looks at SE out of context. Data on the incidence of foodborne disease, while increasing in accuracy for a few bacterial species, is woefully inadequate. The federal government currently monitors about eight out of several hundred possible foodborne pathogens. Under these circumstances, to make generalizations about the relative importance of one pathogen is like doing a jig saw puzzle with only 10% of the pieces. Salmonellosis and the association with eggs are unique, well-known and studied extensively. For these reasons, this association can look more important than it is. SE occupies a small niche in the scheme of all foodborne diseases which are spread amongst all foodstuffs. Nonetheless, the goal is no foodborne disease and the industry continues to work to this effect.

B. UNIQUE PROPERTIES OF EGGS

There are a number of characteristics which make eggs unique. For example, eggs are the only food I know where the food safety risk is essentially limited to a specialized bacterial pathogen. This is due to the natural antimicrobial properties of eggs and the ability of SE to grow and prosper in the internal organs of the laying hen.

The most distinctive characteristic concerning SE is that it is a foodborne pathogen that is associated with the infection of an internal organ. If the reproductive organs of the hen are infected with SE, they can contaminate the egg as it is being formed. It is currently thought that the SE is deposited in the white of the egg. This is in great contrast to other foodborne pathogens which are typically associated with feces or dust. In this instance, the bacterium adapted itself in such a way as to be able to invade the organs of the laying hen, take Aroot,@ and grow. The discovery of this phenomenon has elicited both disbelief and fascination.

The egg, intended to be new life, has multiple properties that deter or destroy microorganisms. The shell is the first barrier, followed by two membranes around the egg white. The egg white is very viscous which restricts the availability of oxygen and the movement of microorganisms. The white also contains antimicrobial chemicals and has the ability to Atie-up@ nutrients and make them unavailable. The yolk membrane serves as another barrier, segregating the nutrient rich yolk from any invading menace. Like people, microorganisms cannot grow without nourishment.

If the yolk membrane is intact, SE cannot grow. Therefore, the integrity of the yolk membrane determines the ability of SE, in the rare instance that it is present, to multiply. The integrity of the yolk membrane is controlled by time and temperature. Data from the United Kingdom indicate that SE will not grow in eggs for about 28 days if they have been stored at 60 F or less. Cool temperatures can also deter the growth of SE if the bacterium gains access to the nutrient-rich yolk.

However, the security of the intact egg completely vanishes once the egg is broken and its contents mixed together. The delicious, nutritious egg can serve as food for bacteria and certain other microorganisms. The contrast between the relative security in the shell and the utter vulnerability once the shell is broken highlights the importance of proper food handling to ensure safe food. Once the natural antimicrobial properties are destroyed, the liquid egg has to be pasteurized, cooked thoroughly or held chilled to ensure that microorganisms do not grow.

The contamination of an egg with SE is an infrequent occurrence; the current frequency is believed to be one in 20,000. Infected flocks only contaminate eggs on an infrequent and erratic basis (which is one reason it is so difficult to detect suspect eggs). Additionally, the microorganism is present at very low levels; typically 10 or 20 microbes in a 60 gram egg. This is in contrast to other foodborne pathogens which can easily be present at levels of 10,000 per gram. Additionally, foodborne pathogens are found on raw animal carcasses frequently (near 30 % on certain products in recent years) in contrast to the 1 in 20,000 (or 0.005%) in eggs. In both instances, thorough cooking before eating ensures safety.

C. EGG INDUSTRY RESPONDS TO CHALLENGES

On a voluntary basis, the egg industry has addressed the SE issue with a variety of programs and initiatives. Research, the development of control programs, refrigeration and education have been the most effective tools to overcome the challenge of controlling a microorganism. Problems involving the basic biology of the microorganism, the challenge of distributing a fresh product, and the need to protect vulnerable populations have had to be solved.

For biological reasons, it is extremely difficult to find SE when you go to look for it. Very few flocks are infected, not all birds in a flock are infected, there are no visible signs of illness in the birds, only a small number of birds are shedding SE at any given time and an infected bird only occasionally lays an egg contaminated with SE. Currently, the best way to guess that a flock is shedding SE into eggs is to sample manure first, and if the test result is positive, divert the eggs to a pasteurization process while doing more testing. Eggs are tested by pooling 800 eggs into a single sample. Research has been done and is continuing to find a faster and more precise way to identify and divert any egg that is at risk.

Controlling the amount of time before the egg is consumed is as important as controlling the temperature. The egg producer generally ships the egg in a matter of hours or a few days. Eggs are moved rapidly from hen to the retail store, restaurant or further processor. The egg industry provides fresh eggs and has incorporated refrigeration during storage and shipment as one of its control mechanisms. Continued control of time and temperature is also needed after the eggs have been shipped and before they are consumed.

One of the most important challenges is to protect the Avulnerable@ populations. At greatest risk from salmonellosis caused by SE are the very old, the very young and those recovering or sustaining an unrelated illness. The egg industry has long recommended that health care facilities, especially nursing homes, use only pasteurized products. This however, will not address the instances where food preparation is blatantly inappropriate. Employees in a nursing home in New Jersey, for example, were wearing gloves when preparing food. Unfortunately, they didn=t take the gloves off after cutting raw animal products and before tossing the green salad. The production of safe food needs to be accompanied by the safe preparation of food.

II. THE EGG INDUSTRY HAS TAKEN ACTION

A. OVERVIEW

The egg industry became aware of the problem, identified ways to combat it and implemented those actions. Now disease rates are dropping and the egg industry is continuing to look for additional techniques to combat SE. The egg industry remains committed to producing a safe product.

The egg industry=s actions are too numerous to cover in these few minutes, so I have appended a list of industry activities to this testimony (Appendix E). Following are a few highlights of industry programs.

B. EXAMPLES OF EGG INDUSTRY PROGRAMS

1. PARTICIPATION IN QUALITY ASSURANCE PROGRAMS

Participation in industry-generated Quality Assurance (QA) programs continues to increase. These programs are designed to block the entry of SE into the hen house, stop infection of the bird and B in the instances where eggs become contaminated B divert these eggs for breaking and pasteurization. All QA programs in the egg industry have been based on the principles of

Hazard Analysis Critical Control Points (or HACCP), which is the best technique to protect the food supply. The United Egg Producers developed the Five Star Plus program that is applicable across the nation. In a survey of large producers (those having 1 million or more birds) in the US, 38 out of the 41 that responded or 93% produce eggs under the guidelines of a QA program. There are over a dozen states that have formal QA programs. In a survey of representatives of the top six egg producing states (OH, CA, PA, IA, IN, GA -- accounting for 52% of the nations egg production), it is estimated that from 85 to 95% of the eggs in these states are produced under a QA program. Microbiological analysis of manure samples from these states detects SE about 3% of the time or less; further evidence that the presence of SE in laying houses is the exception not the norm.

2. THE AMERICAN EGG BOARD=S EDUCATIONAL PROGRAMS

The American Egg Board (AEB), a research and promotion board funded by the United States egg industry, continues to support and promote food safety. In addition to issuing public service announcements, AEB has been a charter member of the FightBac campaign, and has for many years funded and worked with the National Restaurant Association in developing educational materials for food service training. In addition, AEB has developed consumer education materials, including recipes that replace the traditional use of raw eggs in beverages, sauces, etc. with cooked eggs. AEB provides funds for food safety research and for the food safety program conducted at the Egg Nutrition Center (ENC). An example of the combined AEB-ENC efforts are the food service recommendations in Appendix F. Also, the egg industry has worked closely with the Centers for Disease Control and Prevention, issuing cooperative educational fact sheets.

3. THE EGG NUTRITION CENTER

The ENC is the scientific and technical resource for the egg industry on the subjects of nutrition and food safety. As a source of accurate information on food safety and eggs, ENC procures and disseminates technical information, promotes safe preparation practices, develops programs to reduce outbreaks and sporadic disease caused by SE and guards against the release of misinformation. Current program plans include tracking information on health statistics, collaborating with other scientists, and developing communication networks amongst those that work to protect the food supply. Research activities include analyzing and refining health statistics, collecting descriptive information on egg industry practices, studying factors that influence the presence and concentration of SE in eggs and supporting the development of new detection techniques. ENC recently held a forum on the human epidemiology of SE and production practices that control SE. Future forums are planned on in-shell pasteurization and vaccines.

SUMMARY

The pursuit of egg safety should be considered a success story. The public health community discovered the problem and placed much of the responsibility upon the egg producers. After years of effort B including extensive scientific research, unlimited and un-ending meetings, debate, controversy, education and changes in production and food preparation practices B the trend in disease incidence is downward.

The egg industry has contributed substantively to this success. The recent decline in both outbreaks and sporadic cases has occurred in geographic areas where control measures have been most intense.

But even though the fruits of many labors are beginning to ripen, there is still more work that needs to be done. The egg industry remains committed to continuing to take the steps that continue to make the rates drop. The egg industry intends to solidify their gains and push the disease incidence down even further. The egg industry is working to implement more control methods and to unearth new and better control techniques. We might have to coexist with bacteria, but we don=t have to let them win.

Thank you for inviting us to be part of this hearing and to be part of the process to ensure a safe food supply. Eggs are a nourishing, appealing, economical food that can continued to be enjoyed with assurance. The egg industry is committed to doing its part to keep it that way.