

# An Exploratory Educational Needs Assessment of *E. Coli* O157:H7 Knowledge Held by Petting Zoo Participants

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## ABSTRACT

Attendees at a regional petting zoo completed a needs assessment instrument to determine knowledge levels held in four construct areas related to *E. coli* O157:H7. Results from 382 respondents indicated that while 73% were aware that hand washing was recommended for prevention of illness, participant responses to questions about general knowledge of *E. coli*, implications of contracting and transmission of the bacteria were much lower. Researchers plan to replicate this study on a national level to prepare needed educational materials for distribution to managers and promoters of petting zoos. Recommendations for petting zoo participant safety are included.

## INTRODUCTION

Attending the local fair and stock show represents a long-time tradition for many American families. However, this tradition is being threatened by frightening headlines about the possibility of contracting *Escherichia coli* O157:H7 from animals at the petting zoo. Research by the Centers for Disease Control and Prevention (2005) indicated that infectious disease outbreaks in the previous decade have been attributed to various organisms, including *E. coli* O157:H7; these incidents have substantial medical, public health, legal, and economic implications.

Food-borne illnesses are the cause of 73,500 illnesses, 2000 hospitalizations, and 60 deaths in the United States annually (Mead et al., 1999). Although there are many strains of *E. coli* that are not harmful, *E. coli* O157:H7 is a pathogenic strain of the bacteria that causes serious illness including: hemorrhagic colitis, hemolytic uremic syndrome, and possible death in humans (Kaper, 1994). Recently, outbreaks of *E. coli* O157:H7 have been attributed to the following causes: eating raw or undercooked meat, consumption of contaminated fruits or vegetables, unpasteurized milk and juice, swimming in or drinking contaminated water, and direct contact with animal feces (Bowman & Lindstrom, 2005). Direct animal contact, human contact with animal feces, is the newest recognized route of transmission. In 1996, visiting a farm with cows was identified as a risk factor in contracting *E. coli* O157:H7 (Kassenberg, et al., 1998).

Although *E. coli* O157:H7 infections had been linked to direct animal contact in other countries, the first recorded incident in the United States occurred in May 2000 in Washington (Centers for Disease Control and Prevention, 2001). Approximately 300 school children visited a farm in Washington. Following the visit, patients ranging in age from two to 14 years reported abdominal cramping and diarrhea. Four of the patients reported bloody diarrhea. Three children were hospitalized, and one patient developed hemolytic uremic syndrome also referred to as kidney failure (Centers for Disease Control and Prevention, 2001). Although the farm management recommended that visitors bring antibacterial wipes to disinfect their hands, no signs were posted instructing visitors to wash their hands after contact with the animals; no educational or instructional materials were provided for attendees (Centers for Disease Control and Prevention, 2001).

According to the Centers for Disease Control and Prevention (2001) and Outbreak, Inc. (2005), *E. coli* outbreaks have been steadily occurring across the United States since 2000. The most recently reported outbreaks were at the Florida State Fair, the Central Florida Fair, and the Florida Strawberry Festival. These cases were all associated with visits to the AgVentures Farms, a traveling petting zoo. There were a total of

22 confirmed, 45 suspect, and six secondary cases. Although 12 cases developed hemolytic uremic syndrome, there were no fatalities (Outbreak, Inc., 2005). Jeff Bender, associate professor of veterinary health at the University of Minnesota, stated: "It [incidents of *E. coli* at petting zoos] seems to be an increasing phenomenon. As a result, we need to get some recommendations or guidelines out there (Branom, 2005)."

## PURPOSE AND OBJECTIVE

With the stated need for available guidelines and recommendations, a department of agricultural education and communications, an animal science department, and a college of human sciences at a division I university joined forces with an international food industry center in a multi-phased, inter-disciplinary project. This research represents the first phase of the project. The purpose of this first phase of the project was to assess the public's knowledge in four construct areas and determine how this related to the public's demographic information. The objectives of this phase were:

- (a) To determine public knowledge of *E. coli* issues at petting zoos in terms of: general knowledge, transmission, prevention, and implications
- (b) To determine relationships between knowledge levels of the four construct areas and participant demographic variables.

## METHODOLOGY

This descriptive research was designed to measure participant knowledge about prevention, implications, and transmission of *E. coli* 0157:H7 in the context of the traditional petting zoo. The population of this study included visitors at the 2005 South Plains Fair Petting Zoo in Lubbock, Texas. The county extension office, who sponsored the petting zoo, estimated that 75,000 visitors attended the petting zoo in a 10-day period in 2004. The researchers selected a sample size of 382 based on this estimate (Krejcie & Morgan, 1970). Three-hundred, eighty-two usable surveys were compiled for a 100% response rate. Fair-goers were solicited as they entered the petting zoo building and asked to complete the researcher-developed knowledge test. Survey administrators read the questions to participants when needed. Those who completed the instrument were provided a reward in the form of a battery-powered fan. After completion of the instrument, each participant was given an educational brochure with the correct answers to the survey questions.

This instrument was developed in cooperation with a panel of food safety faculty members to insure construct validity. Reliability was determined by administering the exam to a pilot test group and calculating a KR-20 coefficient (.67). Constructs for the instrument were as follows: 1) general knowledge of *E. coli*, 2) knowledge of *E. coli* prevention, 3) knowledge of the implications of *E. coli*, and 4) knowledge of *E. coli* transmission.

## RESULTS AND DISCUSSION

Three hundred, eighty-two petting zoo participants completed the questionnaire. The respondents in the sample were 63.6 % female, with 66.2 % living in an urban community, operationally defined as a population greater than 10,000. Nearly 78 % of the respondents were currently pet owners although only 19.9 % had been, or were currently members of FFA or 4-H organizations. The average age of the participants was 33.2 with a range of 8 to 83. The standard deviation of the age was 13.5.

Participants were most knowledgeable about how to prevent sickness from *E. coli* (construct II, 73.5 % correct) in response to questions regarding hand washing, the use of sanitizers and avoiding direct contact with animal manure. They were least knowledgeable about how *E. coli* is transmitted (construct IV, 28.8 % correct) from animals to objects in the environment, to humans. Construct III included questions about how to recognize early symptoms of illness for facilitating appropriate medical attention. Participants correctly answered 46 % of the questions in construct III. Construct I asked participants about their general understanding of what *E. coli* is and why they should be concerned when attending petting zoos. The respondents correctly answered 37.3 % of the questions in construct I.

To address objective 2, the researchers computed correlation coefficients among the four construct areas and demographic variables. A *p* value of less than .05 was required for significance. The results of the correlational analyses showed that three of the correlations indicate a significant relationship.

Low positive correlations (Davis, 1971) were detected for current or former 4-H/FFA members and knowledge levels about how *E. coli* is transmitted and how to prevent becoming ill. The positive direction of the correlations indicate that participants who are current or former members of the 4-H and/or FFA have a higher degree of knowledge in these two construct areas than participants who were never members of these two organizations.

A low positive correlation was also detected between construct III (prevention) and the age of the respondent. As the age of the respondent increased, their score about prevention illness from *E. coli* also increased.

## CONCLUSION AND IMPLICATIONS

Recent outbreaks of *E. coli* 0157:H7 at public venues, such as fair petting zoos, have increased the need for administrators of such events to provide appropriate educational information to the petting zoo attendees. Legal liability issues add to the concerns of fair organizers who wish to reduce risk of illness for its patrons. In order to maintain the educational opportunity that these events provide, it is important to reduce the risk involved for those who chose to participate. That can be done through direct educational efforts during the event itself. While most petting zoo attendees were aware that they should wash or sanitize their hands, scores for the remaining construct areas were below 50 %. Organizations that promote and host petting zoos should take an active role in educating their patrons in all four areas.

Future plans for this research include replicating this study on a national scale to identify specific educational needs of petting zoo attendees. Once those detailed needs are identified, educational materials will be developed and disseminated via the Internet to administrators for use during their event. This material will include posters, brochures, signage, traffic flow recommendations and other materials. These educational items will be provided on a website free of charge.

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