

# **E. Coli Outbreak at the North Carolina State Fair**

## **Case Study:**

*Is the Petting Zoo Fair at the Fair?*  
Emerging Leaders in Public Health: Rising Stars



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## **Executive Summary**

In 2004, the North Carolina State Fair, organized and sponsored by the NC Department of Agriculture and Consumer Services (NCDACS), took place from October 15<sup>th</sup> to October 24<sup>th</sup> in Raleigh, the state capital. During the 10 days, over 800,000 people attended the event, themed “Farm.Fresh.Fun”. Following the fair, numerous cases of diarrheal illnesses occurred. After an investigation, it was discovered that the illnesses were caused by E. coli infections affecting individuals who had attended the fair and one of the petting zoo areas.

Due to the large number of individuals that attended the 2004 and 2007 State Fairs and the potential for a devastating outbreak that could harm hundreds of children, the Rising Stars focused on the communication efforts of the NC Division of Public Health (DPH) and the North Carolina Department of Agriculture and Consumer Services (NCDACS). The communication efforts included warning the public through the use of signage, informing at-risk populations to avoid the petting zoo and informing all petting zoo patrons to properly use hand-washing facilities.



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## **E. Coli Outbreak at the North Carolina State Fair**

As North Carolinians think about the Annual N.C. State Fair, most thoughts include Midway Rides, such as the Tea Cups, the Titanic and the Zipper; food and drinks, such as turkey legs, fried Oreos, elephant ears and homemade root beer; competitions related to decorated cakes, horticulture and handicrafts; but for others, their thoughts focus on terms, such as hemolytic uremic syndrome (HUS) and shiga toxin producing E. coli.

### **Public Health Event**

In 2004, the North Carolina State Fair, organized and sponsored by the NC Department of Agriculture and Consumer Services (NCDACS), took place from October 15<sup>th</sup> to October 24<sup>th</sup> in Raleigh, the state capital. During the 10 days, over 800,000 people attended the event, themed “Farm.Fresh.Fun”.<sup>1</sup> Following the fair, the N.C. Health Alert Network (NCHAN) recognized the occurrence of numerous cases of diarrheal illnesses. The NCHAN is an alerting system that provides a constant “flow of critical health information among NC’s state and local health departments, hospital emergency departments and law enforcement officials.”<sup>2</sup> The diarrheal illnesses were caused by E. coli infections affecting individuals who had attended the fair and the petting zoo area. After a complete investigation, 43 fair patrons were confirmed to have E. coli infections and a total of 108 individuals were sick with diarrhea, nausea, abdominal cramps and vomiting within a 23 county area (see Attachment 1). Of the 43 confirmed cases, the age distribution was as follows:

Age 1-5 years old 50.5%

Age 6-17 years old 28.6%

Age 18 years and older 21.0%<sup>3</sup>

### **Public Health Crisis**

Escherichia coli is a bacterium. There are several hundred varieties of E. coli. In this particular outbreak, the focus is on E. coli O157:H7, which produces a toxin that can cause serious illnesses in individuals. This strain can be found in the intestinal area of goats, cattle, deer and sheep; therefore E. coli O157:H7 can also be found in petting zoos. In a petting zoo environment, E. coli can contaminate the area, including the ground near the animals and the railings. If an individual comes into contact with the bacteria, the infected person can become ill and pass the bacteria on to others if thorough hygiene techniques are not used. This type of contamination is more likely to occur amongst small children who are not toilet trained. In most cases, people become ill 2-8 days after coming into contact with E. coli. Symptoms of E. coli infection include severe, bloody diarrhea and abdominal cramps, but some individuals may be asymptomatic. The infection can be particularly severe for small children under the age of 5. E. coli infections can lead to hemolytic uremic syndrome (HUS) which destroys the red blood cells and results in kidney failure. Some individuals with HUS can also suffer from other complications that can



affect them for the remainder of their lives: blindness, paralysis, persistent kidney failure and the removal of a portion of the bowel. It should be noted that “in the United States, HUS is the principal cause of acute kidney failure in children, and most cases of HUS are caused by E. coli O157:H7”.<sup>4</sup>

The North Carolina annual fair, one of the largest agricultural fairs in the United States, attracts people from across the state. There are many attractions for people of all ages, including the animal exhibits, food, family fun, livestock competitions and entertainment.<sup>5</sup> This year (2007), the state fair set a record with attendance of 858,611 for the 10-day event. Previously, the record was 846,724 from 2000.<sup>6</sup> *Due to the large number of individuals that attended the 2004 and 2007 State Fairs and the potential for a devastating outbreak that could harm hundreds of children, the Rising Stars focused on the communication efforts of the NC Division of Public Health (DPH) and the North Carolina Department of Agriculture and Consumer Services (NCDACS).*

- **What communication efforts were in place in 2004 and 2007 to inform and notify the fair’s attendees of the risks associated with the petting zoos and the possibility of zoonotic illnesses?**

The communication efforts include the following issues:

- **Informing the public through the use of warning signs**  
At the NC State Fair in 2004, the petting zoo did not include adequate warning signs to inform the public about the risks associated with the animals. Most attendees do not recall seeing adequate signage and in some cases, they did not recall seeing any signage.
- **Informing certain at-risk populations to avoid the petting zoo area**  
At the NC State Fair in 2004, the at-risk populations were not properly warned of the dangers associated with the petting zoos. The at-risk populations include pregnant women, children under the age of 6, elderly individuals and individuals with autoimmune disorders.
- **Informing the petting zoo patrons to properly use hand-washing facilities**  
At the NC State Fair in 2004, hand sanitizer was available. Hand sanitizer has been shown to kill small amounts of E. coli, but may not be sufficient for large amounts of the bacteria.<sup>7</sup>

The safest alternative would include appropriate warning signs, antibacterial soap and running water.

### **2004 North Carolina State Fair Petting Zoos**

At the 2004 event, there were a variety of exhibits featuring animals, including cows that could be milked, livestock that could be touched by children and 2 commercial petting zoos (Commerford & Sons and Crossroads Farm). The petting zoos were independent of each other and each operated in their own manner. Commerford and Sons Petting Zoo housed the animals on display in pens. Visitors were allowed to reach through and over the railings to touch the animals in the exhibit. Crossroads Petting Zoo housed the animals in pens; and visitors were



allowed to walk amongst the animals and touch and pet the animals. The Crossroads Petting Zoo proved to be more problematic than the other petting zoo (see Attachment 2). Both petting zoos allowed feeding of the animals and the use of hand sanitizers.

It should be noted that:

Facilities with soap and water for patrons to wash their hands were not located nearby and readily available.

**Description of the Public Health Organizations**

Two organizations have a shared responsibility for the E. coli outbreak. The NC State Fair is sponsored by the NC Department of Agriculture and Consumer Services, but as the E. coli incidents occur, the NC Department of Health and Human Services – Division of Public Health, is involved and held accountable for the control of the spread of the illness.

**North Carolina Department of Health and Human Services – Division of Public Health**

“The mission of the Department of Health and Human Services (DHHS) is to provide efficient services that enhance the quality of life of North Carolina individuals and families so that they have opportunities for healthier and safer lives resulting ultimately in the achievement of economic and personal independence.”<sup>8</sup>

The North Carolina DHHS is the largest agency in state government, “responsible for ensuring the health, safety and well being of all North Carolinians, providing the human service needs for fragile populations like the mentally ill, deaf, blind and developmentally disabled, and helping poor North Carolinians achieve economic independence.”<sup>9</sup>

The NC DHHS includes 19,000 employees and the following divisions, in addition to several Administrative Divisions<sup>10</sup>:

Aging and Adult Services	Services for the Blind	Child Development
Citizen Services	Services for the Deaf and Hard of Hearing	Council on Developmental Disabilities
Economic Opportunity	Education Services	Environmental Health
Health Service Regulation	Long Term Services and Supports	Medical Assistance
Mental Health, Developmental Disabilities and Substance Abuse Services	Minority Health and Health Disparities	Public Health



Rural Health and Community Care	Secretary's Office	Social Services
State Center for Health Statistics	Vital Records	Vocational Rehabilitation

In North Carolina, the Division of Public Health's Director is Dr. Leah Devlin.

For a complete Organizational Chart of the NC Division of Public Health, see Attachment 3.

**North Carolina Department of Agriculture and Consumer Services**

The mission of the North Carolina Department of Agriculture and Consumer Services is to "improve the state of agriculture in North Carolina by providing services to farmers and agribusinesses, and to serve the citizens of North Carolina by providing services and enforcing laws to protect consumers."<sup>11</sup>

"The North Carolina Department of Agriculture and Consumer Services are responsible for a broad range of duties that concentrate on a variety of public issues, including crop and livestock statistics, state farm operations, food, drug and cosmetic testing for purity, agricultural marketing and promotion, operation of the North Carolina State Fair, agricultural environmental issues and federal agricultural legislation."<sup>12</sup> In addition to the NC State Fair, the NCDACS includes several divisions<sup>13</sup>:

Agricultural Statistics	Agronomic Services	Budget and Finance	Emergency Programs
Food Distribution	Food and Drug Protection	Human Resources Office	Marketing
Meat and Poultry Inspection	Plant Industry	Property and Construction	Public Affairs
Research Stations	Standards	Structural Pest Control and Pesticides	Veterinary

The entire department includes an estimated 1300 employees.<sup>14</sup>

For a complete Organizational Chart of the NC Department of Agriculture and Consumer Services, see Attachment 4.



## Events Unfold

**October 15-24, 2004:** The annual North Carolina State Fair was held in Raleigh, North Carolina.

**October 30, 2004:** North Carolina's Health Alert Network (NCHAN) issued an alert to the Wake County Community Health Director detailing information about three cases of hemolytic uremic syndrome (HUS). All 3 cases involved visits to the North Carolina State Fair. All local health departments, hospitals and key stakeholders and partners were alerted. The NCHAN alert requested that individuals alert their local clinical providers of cases of diarrheal illnesses. The North Carolina Division of Public Health (DPH) began active surveillance for diarrheal illness.<sup>15</sup>

**October 31, 2004:** The North Carolina Department of Health and Human Services released a news release titled "Health Officials Confirm E. coli Outbreak in North Carolina." The news release stated that the 7 confirmed cases included two from Lee County, two from Mecklenburg County, two from Wake County and one from Wilson County. In addition, the news release summarized the symptoms of E. coli infection, advised parents to avoid sending sick children to school because the illness is contagious and that "most outbreaks in the United States have been associated with ground beef, unpasteurized milk and apple cider and other food products." The news release informed the public that "Health officials are in the process of interviewing patients and families to see if there are any common routes of exposure. The State Fair is one of the possible sources under investigation as several of the people who are ill did attend the fair, but the investigation is not complete and no definite source has yet been identified."<sup>16</sup>

**November 1, 2004:** The NC Department of Health and Human Services (DHHS) reports 15 cases of confirmed E. coli infections to the CDC.

**November 2, 2004:** The NC DHHS Epidemiology section asked for assistance due to the increasing number of hemolytic uremic syndrome cases.<sup>17</sup>

A news release from the NC DHHS stated that there were 18 confirmed cases in Wake, Mecklenburg, Union, Wilson, Lee, Cleveland, Chatham, Durham, Forsyth and Nash Counties. State Epidemiologist, Jeff Engle, stated, "Although the illness is often associated with eating undercooked ground beef, we suspect these cases may have been contracted through direct contact with live animals. Outbreaks are often associated with fairs and petting farms; however we are still exploring every possible source." The release warned, "anyone with symptoms should contact their doctor or health care provider immediately."<sup>18</sup>

The news releases from October 31<sup>st</sup> and November 2<sup>nd</sup> advised the public that good hygiene and proper hand-washing techniques is the best way to reduce the spread of the disease.

**November 3, 2004:** Epidemic Intelligence Service (EIS) Officers, a Surveillance epidemiologist in the Foodborne and Diarrheal Branch, an epidemiology elective medical student and an EIS Officer assigned to the General Communicable Disease Control Branch, NC DPH assisted on the



investigation.

The outbreak investigation involved working together to determine the following:

- The magnitude of the outbreak
- The risk factors involved with E. coli O157:H7 infection
- And of course, how to prevent more cases and protect the public's health

The State Epidemiologist activated the North Carolina Public Health Command Center (NCPHCC) to organize the outbreak investigation and control.<sup>19</sup>

The NCPHCC had several purposes and consistent contact with key public health officials. Daily conference calls with health departments across the state were held to provide briefs on the progress of the outbreak and the investigation. Additional information was shared regarding the following:

- Childcare
- Control measures
- Potential cases
- Reporting time
- Alerting and informing medical providers
- Mailings and website postings to family practitioners and pediatric physicians across the state

**November 14-21, 2004:** A case-control study of fair attendees was completed to test a potential source of the E. coli outbreak. The study focused on human and animal interaction and human exposure to the animal areas. The controls were selected from over 23,000 individuals who purchased their Fair tickets on-line, at kiosks or at malls. Almost 15,000 names were selected to participate in the study.

Assistance was provided by the following agencies/individuals:

- CDC's Epidemiology Program Office
- Epidemiology elective students
- Foodborne and Diarrheal Diseases Branch staff
- CDC
- Faculty, staff and students from Team Epi-Aid at the UNC-CH's Center for Public Health Preparedness
- Epidemiologists in NC's hospital-based Public Health Epidemiology program
- Public Health Preparedness and Response Teams
- Occupational and Environmental Epidemiology Branch, NC DPH

**November 23, 2004:** 42 outbreak-related patients had been reported to the NC Division of Public Health:

- 41 had laboratory confirmed E. coli O157:H7 infection
- 1 had clinically diagnosed HUS and laboratory confirmed E. coli O157:H7 infection



## **Other Organizations Involved**

### **1. Wake County Human Services/Environmental Services Department**

The Division of Public Health in North Carolina includes 85 local health departments. These local health departments include single county health departments, districts, a public health authority, a human services agency and a hospital authority. The North Carolina State Fair annual event, held in Raleigh, is in Wake County. The Wake County Human Services Department (Wake County Community Health Department) and the Wake County Environmental Services Department, were involved in the State Fair outbreak to help rule out food vendors as a source of contamination.

Role:

- The Environmental Services Department focuses on serving the public by educating the public and enforcing regulations related to water quality, food protection (state fair food vendors), animal control, environmental hazards, etc.

### **2. Food borne and Diarrheal Diseases Branch, the Centers for Disease Control and Prevention**

Role:

- Organized efforts to work with NCDHHS to determine the magnitude of the outbreak, identify risk factors for E coli infection and prevent additional cases
- Conducted investigation by handing out questionnaires to fair goers from NC who bought advance tickets or paid by credit card
- Interviewed fair officials, fairgrounds manager, and Wake County sanitarian supervisor, as well as collected samples from the fair goers to assess environmental factors

### **3. NC State Epidemiologist –**

Role:

- Activated the NC Public Health Command Center (NCPHCC) to provide structure to the ongoing disease surveillance

### **4. NCPHCC – North Carolina Public Health Command Center (NCPHCC)**

Role:

- Ten days after the fair ended, the NCPHCC organized an outbreak investigation and control. NCPHCC conducted daily conference calls, which focused on briefing the Local Health Department staff on the outbreak and control measures associated with Shiga-toxin producing E. coli



## **Conclusion**

Based on the NC investigation, the E. coli outbreak was associated with the Crossroads Farm Petting Zoo. The outbreak was associated with several factors:

1. “Animals shedding E. coli O157:H7
2. **Intensive and extensive contact with animals and**
3. **Behaviors associated with very young ages”<sup>20</sup>**

The behaviors associated with young children include the likelihood of children placing objects into their mouths and their reduced resistance to infections.

In addition, there were communication related factors.

### **Communication Related Factors:**

#### **Inadequate hand-washing techniques**

Hand sanitizing gel was available, but the exposure that caused the infection may have taken place prior to the use of hand sanitizer.

Children may have been contaminated in areas other than their hands that were cleansed with the hand sanitizers.

Hand sanitizer can kill small amounts of E. coli, but may not be sufficient for large amounts of bacteria.

#### **Awareness of disease risk**

Individuals with a lower knowledge of the risk of infection may have spent more time and had more contact with animals in the petting zoo.<sup>21</sup> If individuals had received adequate warnings related to the risks of zoonotic illnesses, they may have had less contact with the petting zoo animals.

### **Non-Communication Related Factors:**

#### **A large number of animals in an enclosed area**

Greater than 100 sheep or goats were inside the enclosed area, measuring 40 x 60 feet.

Due to the overcrowding, some of the animals were stressed, thus causing loose stools.

#### **Fomite transmission**

Inanimate surfaces, such as contaminated bedding, shoes and baby strollers could have caused contamination and infection in children.

The list above includes the majority of the factors that led to the E. coli outbreak at the NC State Fair. The Rising Stars, focused on communication efforts aimed at reducing the risk of future outbreaks. For North Carolina, this means that the NC Department of Agriculture and Consumer Services and the Division of Public Health must work together to educate the public.



### **Lessons Learned: Communication Challenges Faced**

The communication efforts of the public health organizations to the general public are critical for preventing future E. coli outbreaks. When the general public is not provided with information, they may participate in high-risk behaviors. Studies have shown that high-risk behaviors are common among petting zoo visitors. An article in the Journal of the American Veterinary Medicine states, “venue operators and public health authorities must work together on targeted education to improve implementation of existing prevention guidelines” to reduce the prevalence of high-risk behaviors.<sup>22</sup> These behaviors include the following actions:

- “Contact with animals – Touching the animal with any part of the body
- Contact with the environment – Touching any potentially contaminated environmental surface in the animal contact area (e.g., handrails, animal pens or the ground) with the hand
- Eating or drinking – Having food or drink in their hands or putting any inanimate object, such as a cigarette, pacifier or gum into the mouth, while in the animal contact area.
- Hand-to-Face contact – Touching the mouth, nose or eyes or being touched there by another visitor”<sup>23</sup>

In addition to direct observations made at the 2007 NC State Fair, the Rising Stars also reviewed data on high-risk behaviors at a petting zoo in Tennessee to understand the magnitude of the high-risk behaviors. In 2005, an observational study was completed on 991 visitors at a petting zoo. Of the 991 visitors, 731 (74%) touched the animals, 858 (87%) had contact with potentially contaminated environmental surfaces, 484 (49%) had hand-to-face contact and 217 (22%) ate or drank in the animal contact areas. The authors of the journal article noted that these actions were “disturbing” and that these actions could lead to E. coli infections.<sup>24</sup>

- a. At the 2004 State Fair, petting zoo patrons did not have an adequate amount of information about the risks associated with petting animals. (There were not sufficient signs, posters or other educational information regarding potential diseases associated with animal contact).
- b. In 2004, North Carolina had not adopted legislation, guidelines, or rules to regulate petting zoo operations. Although the contract between petting zoo exhibitors and the State Fair required exhibitors to comply with NC state law, the law did not include specific regulations for petting zoos.
- c. In 2004, petting zoo operating procedures created a potentially unsafe environment. Petting zoo management problems may have contributed to the E. Coli outbreak.
  - a. Petting zoos often lacked adequate hand washing facilities. At the 2004 NC State Fair, hand sanitizer was used instead of soap. Sanitizer is effective in killing small amounts of E. coli; but does not necessarily remove gross fecal matter from a person’s hands. Sufficient hand washing facilities would include running water and antibacterial soap
  - b. Petting zoos failed to provide adequate signage. Signs were not sufficiently



- visible or cautionary.
- c. The Crossroads Farm exhibit permitted full contact between animals and humans.
  - d. Petting zoos often included animal feed vending machines that provided patrons with feed to give the animals. When feed spilled on the floor of the pen, where fecal matter collected, children often touched the feed or put the feed into their mouths.
  - e. The presence of human food in or near petting zoos increased the chances of contracting *E. coli*. At the NC State Fair, a food vendor was positioned near the exit of the Crossroads Farm petting zoo.
  - f. Petting zoo owners were not aware which, if any, animals were shedding *E. coli*.

### **Lessons Learned from other states dealing with *E. coli* outbreak (Pennsylvania)<sup>25</sup>**

In 2002, Pennsylvania became the first state to pass a statute that particularly governs petting zoos. In partnering with the Pennsylvania Department of Health, the Pennsylvania Department of Agriculture (PADOA) is responsible for encouraging public education and alerting physicians on the hygiene standards that are essential to reducing the risk of becoming infected with a zoonotic disease. In addition, the PADOA is required to fine fair operators up to \$500 for each violation. Under the provisions of the Animal Exhibition Sanitation Law (Act 211), fair operators must adhere to the following:

- Make certain that individuals who desire to bring animals to the fair have a “veterinary-client-patient relationship”
- Display proper notices with information regarding the public’s risk of “contracting zoonotic diseases at the fair”
- Offer suitable and appropriate hand-washing stations for children and adults
- Display notices indicating the locations of the hand-washing stations
- Display notices that promote washing of hands after handling animals, using the bathroom and prior to eating

### **Recommendations**

In North Carolina, agriculture is important. According to the NC Department of Agriculture and Consumer Services, North Carolina ranks in the top 3 states in the following categories: Annual Pig Crop, hogs and pigs and turkeys. Livestock, dairy and poultry provide 64.3% of Farm Cash Receipts in the state compared to 35.7% of crops.<sup>26</sup> Petting zoos help the general public understand the importance of animals and lead to an appreciation of the animals. So even though, there were 108 cases of *E. coli* O157:H7 affected children and adults and 15 cases that resulted in hemolytic uremic syndrome (HUS), the team recommends maintaining the petting zoo with several suggestions. The following recommendations encourage agencies, petting zoos, fairs and other animal exhibit operators to offer visitors pertinent information and tools to allow them to make sound choices regarding their health, prior to visiting a petting zoo, fair and other animal exhibits:



### ***A. Govern Community Contact with Animals<sup>27</sup>***

1. ***Remove “feed vending machines”.*** This alternative would prevent petting zoos, fairs and other animal exhibit operators from selling animal feed to visitors. Removing the “feed vending machines” could decrease the contact between children and animals. This could avoid children from coming in contact or consuming feed that came into contact with animal feces.
2. ***Enforce petting zoos, fairs and other animal exhibits to offer “child supervision”.*** This alternative will compel petting zoos, fairs and other animal exhibits to oversee the youth who are less than six years of age while visiting animals. This alternative would require at least two child supervisors to be available during hours of operation.
3. ***Enforce “barriers” to separate animals from visitors.*** This alternative would compel petting zoos, fairs and other animal exhibits to fence in the animals and prohibit visitors from entering the fenced in area. Visitors would have an opportunity to touch animals, but the fenced in area would prevent visitors from having contact with animal feces.

### ***B. Notify Visitors***

4. ***Compel visitors to “sign waiver” forms.*** This alternative would compel visitors to complete and sign a “waiver” form, which states that they comprehend the health risks that may be associated when visiting a petting zoo, fair or other animal exhibits, thus placing the liability on the visitors.
5. ***Enforce caution signs***
  - a) ***Enforce caution signs that notify visitors of potential health risks.*** This alternative would compel petting zoos and other animal exhibitors to display caution signs at entryways that explains the potential “health risks” of visiting the petting zoo, fair or other animal exhibits. In addition, the caution sign would encourage visitors not to have contact with “animal feces”, to abstain from transporting any “human food or drink” around the any areas where animals are located and to clean hands after having contact with animal.
  - b) ***Discourage “at-risk populations” from visiting the petting zoos fairs and other animal exhibits.*** This alternative would compel petting zoos, fairs and other animal exhibits to display signs at the entry ways that state that the Department of Health and Human Services “strongly discourages children under the age of six, pregnant women, the elderly, and those with autoimmune” deficiencies from



visiting petting zoos, fairs or other animal exhibits.

### ***C. Enforce Suitable “Transition” Locations***

6. ***Enforce adequate hand cleaning stations.*** This alternative would compel petting zoos, fairs and other animal exhibits to offer “hand washing facilities” at the exit area. The hand washing stations would include information on appropriate hand cleansing methods, soap and running water.
7. ***Require dining places to be designated away from animal locations.*** This alternative would enforce animal locations to be at least 60 yards away from dining locations. This alternative could possibly reduce the likelihood of dining areas being exposed to E.coli.

### ***D. Govern “Animal Care”***

8. ***Require animal areas to be sanitized daily.*** This alternative would compel animal exhibit, fair or petting zoo operators to sanitize animal areas prior to working hours. Sanitizing the animal area may include replacing hay regularly and eliminating “fecal matter” from the area. This would aide in immunizing visitors’ contact with “animal fecal matter”.
9. ***Require animals to be tested for E.coli on a regular basis at petting zoos, fairs and other animal exhibits.*** Animals that test positive for E.coli should be removed from the facility immediately.

### ***E. Permitting Petting Zoos, Fairs and other Animal Exhibits***

10. ***Permitting petting zoos, fairs and other animal exhibits.*** This alternative will compel all petting zoos, fairs and other animal exhibits to acquire a “license from the NC Department of Agriculture and Consumer Services (DOA)” to function as a business entity.

### **Recommendations for the Education of the Parties Involved<sup>28</sup>**

Venue operations should:

1. be familiar with risk-reduction recommendations
2. consult with state and local agencies and county agents on implementation of recommendations
3. assure that staff are appropriately trained on risk reduction
4. assure that visitors and exhibitors receive education related to prevention

Venue staff should:

1. be trained and able to explain risk reduction recommendations to visitors



2. encourage compliance with risk-reduction recommendations, especially hand-washing
3. comply with local and state requirements for reporting animal bites, scratches, or other injuries.
4. Assure that visitors receive educational messages

Visitors knowledgeable about potential risks are less likely to become ill.

To educate visitors, venue operators and staff should:

1. provide information about disease risks and appropriate measures to reduce risk
2. inform visitors which groups of people are at high risk and the precautions visitors should take
3. provide information before the event, and at the animal contact area entrances and exits
4. provide information in a simple to understand format that is age- and language appropriate
5. provide information in multiple formats ( e.g., signs, stickers, handouts)



## Attachment 1

### E. coli Cases - Patients' County of Residence<sup>29</sup>

County	Confirmed Cases	Probable Cases	Suspect Cases	Total Cases
Alamance	1	0	4	5
Buncombe	1	0	0	1
Caswell	0	0	4	4
Chatham	1	0	3	4
Cumberland	0	0	1	1
Durham	5	0	3	8
Forsyth	1	0	0	1
Granville	0	0	1	1
Guilford	0	0	2	2
Harnett	1	0	0	1
Johnston	1	0	5	6
Lee	1	0	0	1
Mecklenburg	1	0	0	1
Moore	1	0	0	1
Orange	4	1	7	12
Pasquotank	0	0	1	1
Person	2	2	3	7
Randolph	0	0	2	2
Robeson	0	0	2	2
Rockingham	1	1	1	3
Scotland	0	0	5	5
Wake	19	2	14	35
Wilson	3	0	1	4
<b>TOTAL CASES</b>	<b>43</b>	<b>6</b>	<b>59</b>	<b>108</b>



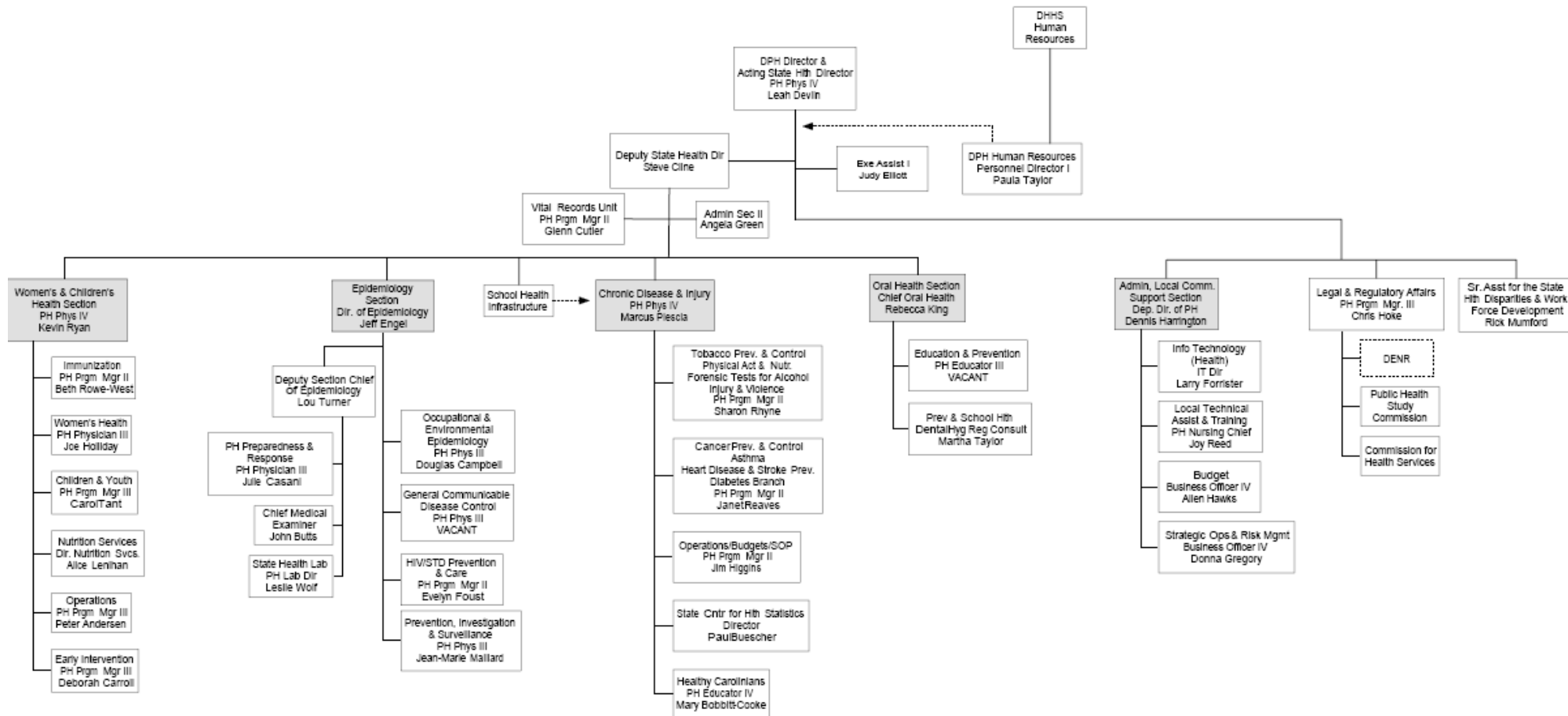


**Attachment 2**  
**Results of Environmental Testing from the NC State Fairgrounds,**  
**November 3-9, 2004<sup>30</sup>**

	<b># Samples 11 03 04</b>	<b># Positive for E. coli O157:H7</b>	<b># Samples 11 09 04</b>	<b># Positive for E. coli O157:H7</b>
<b>Crossroads Farm Petting Zoo Composite Ground Samples (Feces, Shavings, Soil)</b>	11	10	30	19



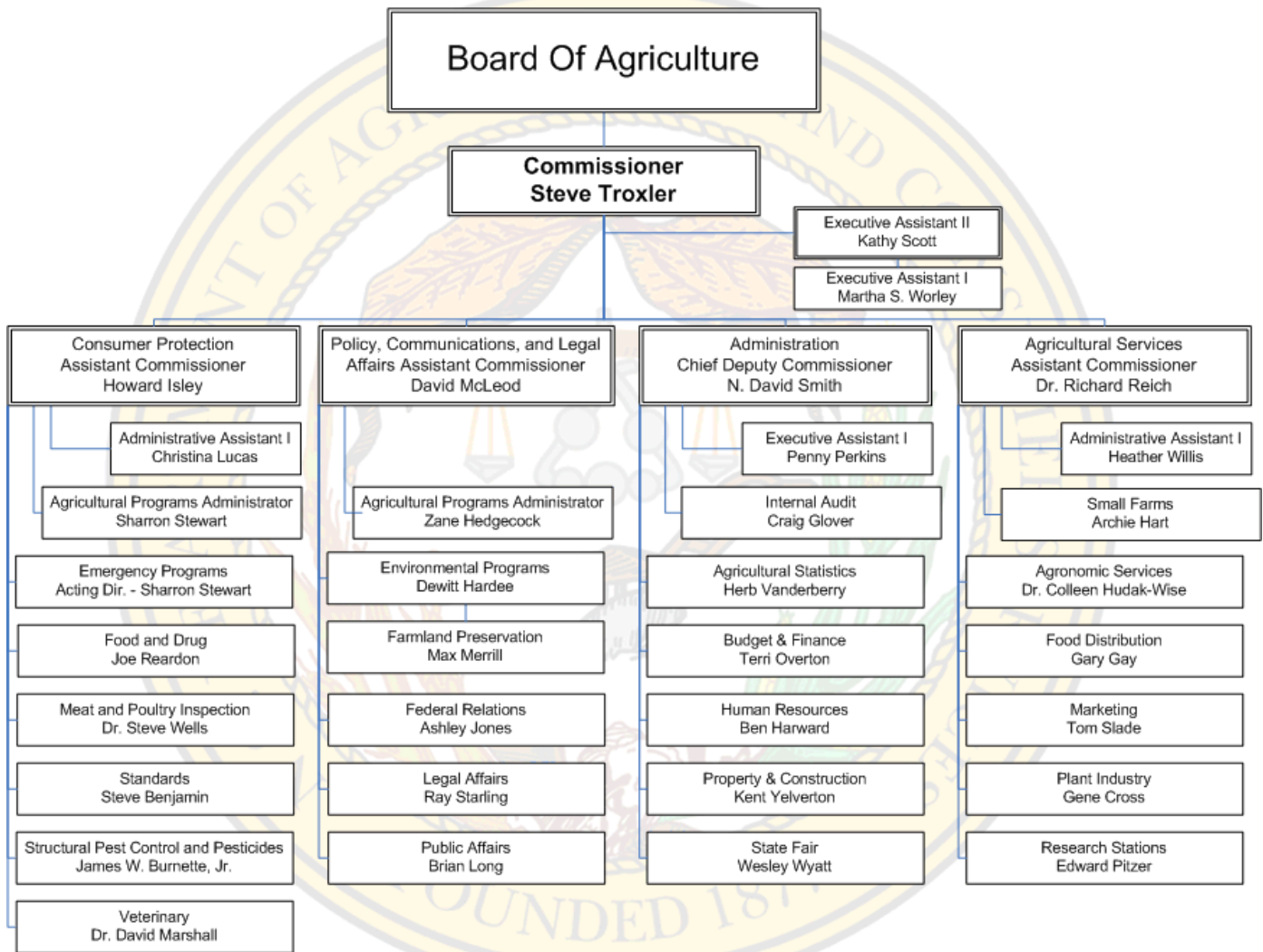
**Attachment 3**  
**Division of Public Health Organizational**  
**Chart<sup>31</sup>**



## Attachment 4

# North Carolina Department of Agriculture and Consumer Services Organizational Chart<sup>32</sup>

### NORTH CAROLINA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES



October 12, 2007



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