

***E. Coli* Outbreak Creates Need for Government Regulation**

A Report for the
North Carolina Department of Health and Human Services

Dustyn Baker
Tugba Gurcanlar
Emily Hildebrand
Matthew Perault
Kuangzhen Wu

May 2005

***Terry Sanford Institute Of Public Policy
Duke University
Box 90245, Durham, NC 27708-0245
919-613-7370***

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	i
I. INTRODUCTION.....	1
Background.....	1
Outbreaks and regulations in other states.....	1
Policy question and scope.....	3
Methodology.....	3
II. PROBLEM.....	4
III. SIX CRITERIA.....	6
IV. ELEVEN POLICY OPTIONS.....	8
Control public contact with animals.....	8
Inform the public.....	9
Require transition areas.....	9
Regulate animal care.....	10
License petting zoos.....	10
V. ANALYSIS.....	11
Outcomes matrix.....	16
VI. SEVEN POLICY RECOMMENDATIONS.....	17
VII. IMPLEMENTATION OPTIONS, ANALYSIS AND RECOMMENDATIONS.....	18
Two implementation recommendations.....	20
BIBLIOGRAPHY.....	21
APPENDIX A: <i>E. COLI</i> BACKGROUND INFORMATION.....	24
APPENDIX B: WASHINGTON STATE RECOMMENDATIONS.....	26
APPENDIX C: PENNSYLVANIA PETTING ZOO STATUTES.....	30
APPENDIX D: PICTURES.....	34
APPENDIX E: METHODOLOGY.....	35
APPENDIX F: HEALTH RISKS SIGN.....	37
APPENDIX G: DISCOURAGING AT-RISK POPULATION SIGN.....	38
APPENDIX H: HAND WASHING SIGN.....	39
APPENDIX I: TRANSITION AREA DIAGRAMS.....	40
APPENDIX J: STATE AND LOCAL REGULATIONS AT THE NC STATE FAIR.....	41

EXECUTIVE SUMMARY

In response to the largest outbreak of *Escherichia coli* (*E. coli*) in North Carolina history, we recommend that the North Carolina Department of Health and Human Services (DHHS) issue guidelines and pursue legislation that will control public contact with animals, inform the public of risks related to animal contact, provide transition areas, regulate animal care, and license petting zoos. These recommendations respond to DHHS's request for analysis on the following policy question: should North Carolina regulate petting exhibits to prevent transmission of disease; and if so, how?

This question arose from the October 2004 State Fair, when DHHS linked 108 documented cases of *E. coli* to animals at the Crossroads Farm Petting Zoo.

Problem

The primary problem is that as a result of visiting petting zoos, patrons contracted *E. coli* O157:H7, an otherwise preventable infection. There are four components to this problem: (1) petting zoo patrons do not have an adequate amount of information about the risks associated with petting animals, (2) North Carolina has not adopted legislation or guidelines to regulate petting zoo operations, (3) petting zoos and the state government face a relatively minimal amount of financial and political risk, and (4) flawed operating procedures of the petting zoos create a potentially unsafe environment.

Six Criteria

Given the interests of relevant stakeholders, we identified one threshold criterion to analyze our options:

1. Protect public health and safety

We used five additional criteria for our analysis: (2) ensure prompt implementation, (3) minimize cost to the state, (4) maximize political feasibility, (5) maintain socio-cultural benefits of petting exhibits, and (6) maximize ease of enforcement.

Eleven Options

Based on our research, we considered 11 options in five categories:

1. *Control public contact with animals.* This category contains four options: eliminate feed vending machines, ban at-risk populations from petting zoos, require petting zoos to provide child supervision, and require barriers to separate patrons from the animals.
2. *Inform the public.* This category contains two options: require patrons (parents/guardians would sign for children) to sign waivers and require warning

signs. The option to require warning signs has two variants: require warnings signs that inform the public of the health risk and strongly discourage the at-risk population from attending petting zoos.

3. *Require Transition Areas.* This category contains two options: require hand washing facilities and require a minimum distance between petting zoos and food services.
4. *Regulate Animal Care.* This category contains two options: require daily cleaning of the animal pens and require daily *E. coli* testing of the animals in the zoo.
5. *License Petting Zoos.*

Seven Policy Recommendations

Upon evaluating these options with respect to our criteria, we recommend that DHHS pursue the following seven policies:

1. Require barriers to separate patrons from the animals.
2. Require warning signs that inform the public of health risks.
3. Strongly discourage at-risk populations from attending petting zoos.
4. Require hand washing facilities.
5. Require a minimum distance between petting zoos and food services.
6. Require daily cleaning of the animal pens.
7. License petting zoos.

Three Implementation Options

We analyzed three options that DHHS may consider for implementing our seven recommendations: (1) prepare guidelines, (2) write rules and (3) recommend legislative action.

Two Implementation Recommendations

We recommend that DHHS pursue the following actions.

1. *Short-term:* We recommend that DHHS prepare and issue guidelines to govern petting zoo management. These guidelines would include all our recommendations, except for licensing petting zoos.

-
2. *Long-term:* We recommend that DHHS propose legislative action to adopt our policy recommendations as state law. A state law would be enforceable and legally binding.

CHAPTER I: INTRODUCTION

Background

The need to consider petting zoo regulation stems from the October 2004 outbreak of enterohemorrhagic *Escherichia coli* (*E. coli*) at the North Carolina State Fair. In the month after the fair, 108 pediatric cases of *E. coli* O157:H7 were reported. Fifteen of the children developed hemolytic uremic syndrome (HUS), a potentially deadly complication related to *E. coli*. On December 16, DHHS released an outbreak report linking the Crossroads Farm Petting Zoo to the illness, using genetic fingerprinting to match specifics from the petting zoo to the human cases.¹

Petting zoos may be sites of transmission of enteric pathogens, including *E. coli* and *Salmonella*.² According to the Centers for Disease Control and Prevention (CDC), cases of *E. coli* result from casual animal contact. Zoonotic *E. coli* transmission is a result of human contact with infected animal fecal matter; the bacterium lives in the guts of the animals, including cattle, sheep and goats. *E. coli* O157:H7, the virulent strain of the bacterium that infected the children at the NC State Fair, is the leading cause of hemolytic uremic syndrome (HUS) in children and has caused a number of zoonotic outbreaks in the United States (see Appendix A).

Outbreaks and regulations in other states

In the spring and fall of 2000, outbreaks of *E. coli* in Pennsylvania and the state of Washington infected 56 children, 19 of whom were hospitalized. In response to the outbreaks, the Washington Department of Health issued "Recommendations to Reduce the Risk of Disease Transmission from Animals to Humans at Petting Zoos, Fairs and Other Animal Exhibits" in July 2001 (see Appendix B). These recommendations address the need for several measures to reduce the likelihood of *E. coli* transmission: requiring sufficient hand washing facilities, informing visitors about potential risks, cleaning and disinfecting animal areas and providing adult supervision. As a result, local health departments have worked with fairs in their counties to establish adequate hand washing facilities, though no state laws specifically govern public health at petting zoos.

In December 2002, Pennsylvania became the first state to pass a law to regulate petting zoos specifically (see Appendix C).³ This animal exhibition sanitation law imposed three primary petting zoo requirements: (1) establishing adequate hand washing stations, (2) clearly notifying the public about the potential dangers of petting animals and (3) promoting "public awareness of the risk of contracting a zoonotic disease at the animal exhibition and of the

¹ Information in this paragraph is from Avery, Sarah. "E. coli traced to Chatham; A petting zoo is blamed for an outbreak among 108 people who went to the N.C. State Fair." *Raleigh News & Observer*, 17 Dec 2004.

² Enteric pathogens are pathogens that affect the intestines

³ According to the National Association of State Public Health Veterinarians, Pennsylvania is the only state with laws regarding petting exhibits, though a few states including Massachusetts and Washington have issued guidelines.

measures necessary to minimize the risk of contraction by posting appropriate notices at the animal exhibition.”⁴ In working with the Pennsylvania Department of Health, the responsibilities of the Pennsylvania Department of Agriculture (PADOA) include promoting public education and physician awareness of the sanitation standards necessary to minimize the risk of contracting a zoonotic disease. Furthermore, the PADOA may assess an administrative penalty of up to \$500 for each violation of the law.⁵

Following these outbreaks in Washington and Pennsylvania, the CDC issued guidelines for petting exhibits in an effort to reduce zoonotic transmission of enteric pathogens. The guidelines suggested that petting exhibits include hand washing stations, post signage warning patrons of potential dangers associated with petting zoos and restrict human food and drink from entering the animal pens. The CDC released additional guidelines in 2005, encouraging transition areas and prompt removal of manure from animal pens.⁶ These guidelines also discourage at-risk individuals – especially children, pregnant women and those with “waning immunity” – from visiting petting zoos.⁷

To ensure compliance with the Animal Welfare Act, the United States Department of Agriculture (USDA) requires licensing and inspections for petting exhibits.⁸ The licensing process focuses on humane treatment of the animals, not on disease transmission or public health considerations. Despite the CDC guidelines and USDA licensing requirements, no federal laws govern petting exhibits specifically.

An outbreak in Florida in March 2005 – one quite similar to North Carolina’s – has raised the issue of petting zoo safety to the national public health agenda once more. Fifteen people, including 11 children, contracted *E. coli*. Though state health officials had not confirmed the link between petting zoos and the outbreak as of the March 26 *New York Times* report, nine of the children with HUS had visited petting zoos at either the Central Florida Fair in Orlando or the Florida Strawberry Festival in Plant City. With the media spotlight focused on petting zoo safety, now is the time to address this issue.

⁴ One component of our research methodology involved contacting states that have policies for petting zoo management, such as Washington and Pennsylvania. However, these states do not have official data on the effectiveness of their policies. Even if they did have this data, establishing a causal relationship between the policy and improved health at petting zoos would be nearly impossible; not having an outbreak in a five-year period should not suggest that one will not happen in the near future.

⁵ 3 PA C.S. Pennsylvania Agriculture Code. “Amend Animal Exhibition Sanitation and Penalties.” No. 2002-211. 2002.

⁶ National Association of State Public Health Veterinarians, Inc. “Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2005.” Department of Health and Human Services, Centers for Disease Control and Prevention. *Morbidity and Mortality Weekly Report*, 54 (RR04) 25 Mar. 2005. <<http://www.cdc.gov/mmwr//preview/mmwrhtml/rr5404a1.htm>>

⁷ National Association of State Public Health Veterinarians.

⁸ National Association of State Public Health Veterinarians. Also see “Marler Clark calls for legislation to protect visitors at petting zoos.” Press release. 8 April 2005. <<http://www.emediawire.com/releases/2005/4/prweb226707.htm>>

Policy question and scope

Our client, the Epidemiology Section of the Division of Public Health in the North Carolina Department of Health and Human Services (DHHS), seeks assistance in analyzing the following policy question:

Should the state of North Carolina regulate petting zoos to prevent transmission of disease, and if so, how?

In an effort to narrow the scope of the project, we focused on petting exhibits in zoos, county fairs and state fairs. We do not consider regulation of pet stores, humane societies or non-commercial farms. Furthermore, our research concentrated on the NC State Fair, state agencies, state employees and state regulatory enforcement, but we believe our findings apply to county fairs and commercial petting exhibits. Though some costs and state enforcement mechanisms may shift depending on the venue, we believe our recommendations guide a wide variety of petting zoo operations. Finally, though we focus on *E. coli*, our options and recommendations apply to all other zoonotic enteric pathogens, such as *Salmonella*.

Methodology

We used four principle research strategies – a literature review, media analysis, site visits, and interviews – in an attempt to understand the diversity of perspectives on the issue (see Appendix E). This multidimensional strategy has provided quantitative, qualitative and epidemiological data about the damage caused by the outbreak and about options that might address the problem.

We had several research objectives:

- To learn about the extent of the 2004 outbreak and the damage it caused.
- To compare the NC outbreak to other outbreaks throughout the country.
- To identify relevant actions taken in other states to address similar concerns and to assess the strengths and weaknesses of these actions.
- To develop familiarity with relevant government institutions and their political, legal and personnel capacities.
- To form relationships with key stakeholders, whose perspectives would assist in weighing competing values.
- To understand the feasibility and implications of our options.

CHAPTER II: PROBLEM

We identified one primary problem: as a result of visiting petting zoos, patrons contracted *E. coli* 0157:H7,⁹ an otherwise preventable zoonotic bacterial infection.

We identified four components of this problem:

1. *Petting zoo patrons do not have an adequate amount of information about the risks associated with petting animals.* Petting zoo operators, the state government and the NC State Fair failed to inform petting zoo visitors about potential dangers, particularly for at-risk populations: children under the age of six, pregnant women, the elderly and people with autoimmune disorders.
2. *North Carolina has not adopted legislation, guidelines, or rules to regulate petting zoo operations.* Although the contract between petting exhibitors and the State Fair requires exhibitors to comply with NC state law, the law does not include specific regulations for petting zoos.
3. *Petting zoos and the state government face a minimal amount of financial and political risk, despite the disastrous effect that *E. coli* infection could have on petting zoo patrons.* Without a substantial victims' lobby to put pressure on elected officials, or the threat of extraordinarily expensive lawsuits,¹⁰ petting zoo owners and the state government have been slow to enact measures to prevent future outbreaks. This limited financial and political risk has created a disincentive for prompt, assertive action to address the problem.¹¹
4. *Current petting zoo operating procedures create a potentially unsafe environment.* Six problematic aspects of petting zoo management could have contributed to the *E. coli* outbreak.
 - Petting zoos often lack 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

⁹ There are many strains of *E. coli*, but the 0157:H7 strain is the one of concern here. Throughout this report, *E. coli* and *E. coli* prevention throughout this report refer to this particular strain.

¹⁰ North Carolina limits punitive damages to \$250,000 per person or three times compensatory damages, whichever is greater. Thomas, Dave. "NC Supreme Court backs punitive damages cap." *Insurance Journal* 3 May 2004. <<<http://www.insurancejournal.com/magazines/southeast/2004/05/03/features/42275.htm>>

¹¹ According to Bill Marler – an attorney with the Seattle-based law firm Marler Clark that led the *E. coli* lawsuit against the fast food chain Jack in the Box – capping damages allows the government to "price" risk. For example, if the government estimated that an *E. coli* outbreak would result in settlements for four families, it could use the damage cap to determine exactly how much that outbreak would cost (\$1 million in NC). By comparing this value to the cost of implementing changes in petting zoo operations, the government could determine whether such safety precautions were cost-effective. Marler suggested that such a system presents many ethical problems that may be detrimental to society and human welfare.

remove gross fecal matter from a person's hands. Sufficient hand washing facilities would include running water and antibacterial soap.

- Petting zoos failed to provide adequate signage. Signs were not sufficiently visible or cautionary: several of the victims' families do not remember seeing the signs at all.
- The Crossroads Farm exhibit permitted full contact between animals and humans. Some of the goats knocked children over, potentially putting them in contact with fecal matter (see Appendix D).
- Petting zoos often include animal feed vending machines that provide patrons with feed to give the animals. These feed vending machines operate like coin-operated bubble gum machines and are an important source of revenue for petting zoos. When feed spills on the floor of the pen, where fecal matter may collect, children often touch the feed or put the feed into their mouths. This practice may encourage fecal-oral contact.
- The presence of human food in or near petting zoos increases 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 (see Appendix D), a management error that may have facilitated fecal-oral contact.
- Petting zoo owners were not aware which, if any, animals were shedding *E. coli*.

CHAPTER III: SIX CRITERIA

We used six criteria to evaluate the outcomes of our options. Because of its importance, we identified one threshold criterion:

1. *Protect public health and safety.* Public health and safety should be DHHS' paramount concern. All recommendations must meet this threshold criterion. Meeting this threshold, however, is not sufficient to guarantee that we would recommend an option.

We also evaluated our options against the following five additional criteria:

2. *Ensure prompt implementation.* This criterion underscores the importance of having guidelines in place for the 2005 NC State Fair.¹² An option that meets this criterion would not exceed the Fair's implementation capacity.
3. *Minimize cost to the state.* Feasible, effective options must fit reasonably within the parameters of the state budget. Extremely expensive options would create budgetary difficulties and might come under attack in the long term because of the opportunity costs associated with devoting relatively large expenditures to this single issue.¹³
4. *Maximize political feasibility.* Options that are not politically feasible might hinder the implementation process or create more public controversy than necessary. If such options required a large investment of political capital, they would be less likely to successfully improve the safety of petting exhibits. Politically unpopular provisions might not be obeyed.
5. *Maintain socio-cultural benefits of petting exhibits.* The interviews we conducted revealed widespread support for petting zoos.¹⁴ Petting zoos make a unique contribution to North Carolina, bringing members of urban and rural communities together to develop an appreciation for the state's farm industry. They play an important role in a state moving away from a predominantly agricultural history toward an economy based increasingly on the services and technology industries. Any viable recommendation should respect the importance of this role and maintain some level of petting zoo benefits. This criterion takes into account the

¹² According to State Fair Manager Wesley Wyatt, May 2005 is the deadline date for notifying the NC Department of Agriculture and Consumer Services (DOA) and the State Fair of any measure that would go into effect by the Fair's opening day on October 14. In North Carolina, the state fair office is located within the DOA. Wyatt, Wesley. Personal interview. 3 Mar. 2005.

¹³ We intentionally excluded costs to petting zoos from this criterion. We consider these costs in the fifth criterion, since high petting zoo expenses could limit their socio-cultural benefits.

¹⁴ Nearly all interviews highlighted the support for petting zoos, including our discussions with Bill Faison, Dave Marshall, Wesley Wyatt, our client and even the victims' parents. Our interviews also suggested that petting zoo support comes from a very diverse group of North Carolinians.

costs imposed on petting zoo operators. High costs might force some petting zoos to close, dramatically reducing their benefits to North Carolina.

6. *Maximize ease of enforcement.* Some options may be difficult to enforce, even if they are not necessarily costly to the state. Banning petting zoos, for example, would meet our third criterion, but would be extremely difficult to enforce because it would require extensive oversight at the town, county and state level. “Ease of enforcement” would include options with institutional and personnel capacity for oversight.¹⁵

¹⁵ The issue of jurisdiction is key to institutional capacity. An enforceable option must fall under the jurisdiction of an institution – typically at the state government level – that has oversight responsibility. Options without clear jurisdiction could lead to tension among government agencies, or among the legislative, judicial and executive branches.

CHAPTER IV: ELEVEN POLICY OPTIONS

We considered 11 options in five categories: (1) control public contact with animals, (2) inform the public, (3) provide transition areas, (4) regulate animal care and (5) license petting zoos. We shaped the majority of our options to create an environment where patrons have the opportunity to protect themselves from contracting *E. coli*. If the state and petting zoo operators take reasonable steps to provide petting zoo visitors with the opportunity to make good decisions about their own health and safety, the burden of responsibility shifts to the visitor.¹⁶ The goal of our options is simply to ensure that the opportunity for healthy behavior exists.

Control Public Contact with Animals

These four options would regulate a patron's interaction with the animals in the petting zoo:

1. *Eliminate feed vending machines.* This option would make it unlawful for petting zoos to sell animal feed to patrons. Eliminating the vending machines would reduce the amount of contact a child would have with the animals in the zoos and would prevent children from touching or eating feed that came into contact with fecal matter.
2. *Ban at-risk populations from petting zoos.* This option would make it unlawful for petting zoo owners to allow children under age six, pregnant women, the elderly, and those with autoimmune disorders to enter. For this option to be effective, at-risk populations would have to identify themselves.
3. *Require petting zoos to provide child supervision.* This option would require petting zoos to supervise children under the age of six when they are in the zoo. The option would mandate that one child supervisor be present at the petting zoo during all working hours. The supervisor would attempt to prevent children from interacting with animal fecal matter.
4. *Require barriers to separate patrons from the animals.* This option would require petting zoos to pen the animals and not allow the patrons into the pens. The patrons would be able to pet the animals through the barrier, but the barrier would prevent the patrons from walking through animal fecal matter.

¹⁶ Monitoring or controlling every aspect of patron behavior was not our goal. We recognize that many people distrust government regulation and resent a paternalistic government that makes decisions for them. Our analytical strategy matched this aspect of North Carolina's conservative tradition.

Inform the Public

These two options would require that the petting zoos inform patrons of the health risks of attending the zoo before they enter it.

5. *Require patrons/children's guardians to sign waivers.* This option would require all patrons to sign a waiver (parents/guardians would sign for minors; all minors would need to be accompanied by an adult) showing that they have read and understood the dangers inherent in attending a petting zoo. The waiver would detail the health risks of attending the zoo. The waiver would also state that neither the petting zoo nor the state government would be liable for any illness or injury contracted from visiting the zoo. The option would not necessarily prevent illness, but it would transfer liability from the state to the patrons.¹⁷
6. *Require warning signs.* This option has two variants.
 - a. *Require warning signs that inform the public of the health risk.* This variant would require zoos to post warning signs at their entrances that would detail the health risks of attending the zoo. The sign would also urge the public to avoid interaction with animal feces, to refrain from bringing human food or drink into the animal area and to wash their hands after interacting with the animals. The signs would be clear, large, and provided in both English and Spanish (see Appendix F).
 - b. *Strongly discourage at-risk populations from attending petting zoos.* This variant would require zoos to post signs at the entrances that DHHS strongly discourages children under the age of six, pregnant women, the elderly, and those with autoimmune disorders from attending the petting zoo. The signs would be clear, large, and provided in both English and Spanish (see Appendix G).

Require Transition Areas

These two options would require transition areas between petting zoos and the rest of the fair.

7. *Require hand washing facilities.* This option would require the petting zoo to provide hand washing facilities at the zoo's exit. The hand washing facilities would include running water and soap, not simply hand sanitizer. A sign placed near the facility would catch patrons' attention and ask them to wash their hands (see Appendix H). These facilities would also include instructions on proper hand washing technique.

¹⁷ Our introduction to this chapter clarifies our position on transferring liability. We believe patrons who sign a waiver stating that they acknowledge the risks of attending the exhibit should be allowed to enter the exhibit at their own risk.

8. *Require a minimum distance between petting zoos and food services.* This option would require a minimum distance of 50 yards between food service areas and the petting zoo.¹⁸ This option would help minimize the possibility of *E. coli* contamination of food service areas, the likelihood of bringing human food into the petting zoo and the opportunity for fecal-oral contact (see Appendix I).

Regulate Animal Care

These two options would require standards for animal care.

9. *Require daily cleaning of the animal pens.* This option would require the petting zoo operator to clean the animal pens before the beginning of operating hours. Cleaning would include laying down fresh hay and removing animal fecal matter from the premises. This option would help minimize patrons' interactions with animal fecal matter.
10. *Require daily E. coli testing of the animals in the zoo.* Petting zoo operators would need to remove from the zoo any animal that tests positive for *E. coli*.

License Petting Zoos

11. *License petting zoos.* This option would require that all petting zoos obtain a license from the NC Department of Agriculture and Consumer Services (DOA) to operate as a commercial petting zoo. The licensing process would enable the state to track the number of petting zoos and enforce our recommendations.

¹⁸ While we do not have conclusive evidence that a distance of 50 yards would be advantageous relative to a slightly greater or lesser distance, we do believe it would act as a deterrent to bringing human food into the exhibit or buying food immediately after exiting the petting zoo.

CHAPTER V: ANALYSIS

We analyzed the 11 options against our six criteria. Any recommended option must meet the threshold criterion, protecting public health and safety. For a graphical representation of our analysis, please see the outcomes matrix on page 16.

1. Eliminate feed vending machines

Threshold criterion: This option does not significantly improve the protection of public health and safety. There is no medical evidence to show that feeding animals increases the likelihood of contracting *E. coli*.

Additional criteria: Eliminating feed vending machines would significantly reduce profits for many petting zoos.¹⁹ This option also fails to satisfy the criterion to maintain the socio-cultural benefits of petting zoos because it may make it unprofitable to run a petting zoo. Elected officials, especially representatives of districts that depend heavily on agriculture, might oppose this option because it could reduce petting zoo profits.²⁰ However, the State Fair could implement this option promptly, and it would impose minimal costs on the state.

Recommendation: Since eliminating feed vending machines does not satisfy our threshold criterion and does not maintain the socio-cultural benefits of petting zoos, we do not recommend it.

2. Ban at-risk populations from petting zoos

Threshold criterion: This option satisfies our threshold criterion by eliminating the interaction between animals and the at-risk population.

Additional criteria: Banning at-risk populations from petting zoos would not maintain the socio-cultural benefits of petting zoos because it would significantly reduce the number of children visiting them. Children are a substantial portion of petting zoo patrons; therefore, the number of patrons overall would be reduced.²¹ It would also be costly for the government to enforce because it would take constant supervision to prevent at-risk visitors from entering the petting zoos. Enforcement of the option may also be infeasible due to the difficulty of identifying visitors with autoimmune disorders.

¹⁹ Bender, Jeff. Phone interview. 21 Feb. 2005.

²⁰ Bender, Jeff. Phone interview. 21 Feb. 2005 and Wyatt, Wesley. Personal interview. 3 Mar. 2005.

²¹ National Association of State Public Health Veterinarians, Inc. "Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2005." Department of Health and Human Services, Centers for Disease Control and Prevention. *Morbidity and Mortality Weekly Report*, 54 (RR04) 25 Mar. 2005. <<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5404a1.htm>>

Recommendation: We do not recommend this option. While it does meet our threshold criterion, it does not meet any of our additional criteria.

3. *Require child supervision*

Threshold criterion: Requiring petting zoos to provide a supervisor for child patrons meets our threshold criterion because the zoo supervisor would encourage the children to wash their hands properly and would minimize their contact with animal fecal matter.

Additional criteria: This option would be costly for the state to enforce because it would require frequent site visits to ensure adequate supervision. This option may also be too costly for petting zoos, and therefore might force many to close.

Recommendation: We do not recommend this option because it would be costly to both the state and the petting zoos, and would be difficult for the state to enforce.

4. *Require barriers to separate patrons from the animals*

Threshold criterion: This option satisfies our threshold criterion by separating patrons from animal fecal matter.

Additional criteria: This option would not be costly to the state or difficult to enforce because it would only require one site visit at the beginning of the fair to ensure that petting zoo owners erected separation barriers. These barriers could be temporary, inexpensive wooden fences that would allow patrons to continue petting animals. This option would be politically feasible because it would allow all patrons to attend petting zoos. Petting zoos would bear the costs of constructing the barriers, but these costs would be minimal.

Recommendation: We recommend this option because it satisfies all of our criteria.

5. *Require patrons/children's guardians to sign waivers*

Threshold criterion: This option satisfies our threshold criterion because waivers will inform patrons of the dangers in attending a petting zoo, and patrons could alter their behavior to avoid the health risk.²²

Additional criteria: This option would be costly to both the state and to the petting zoos due to high administrative costs. A waiver policy would include extensive processing and monitoring responsibilities for both the petting zoos and the state. This option may also be politically infeasible because a substantial administrative burden would consume government capacity, possibly at the expense of other

²² This option assumes that at least some potential visitors will choose not to enter the petting zoo once they read about the health risks. To achieve maximum success in meeting the threshold criterion, the deterrent effect of waivers would work for all-patrons, including at-risk populations.

important tasks. Finally, lawyers would need to draft a legally-binding waiver, which would delay implementation.

Recommendation: We do not recommend this option. While it meets our threshold criterion, it does not meet any of our additional criteria.

6a. Require warning signs that inform the public of health risks at petting zoos

Threshold criterion: This option satisfies our threshold criterion because warning signs will alert patrons of the dangers of attending a petting zoo, allowing them to alter their behavior to avoid the health risk. An informed public will be able to make better decisions about whether or not to engage in unhealthy behavior.

Additional criteria: This option requires low costs, could be implemented promptly, and would encounter few political hurdles since it is not costly and does not impose a significant burden on petting zoo owners.

Recommendation: We recommend this option because it meets our threshold criterion and all of our additional criteria.

6b. Strongly discourage at-risk populations from attending petting zoos

Threshold criterion: This option satisfies our threshold criterion because at-risk populations will become aware of the health risks and therefore will be less likely to attend petting exhibits.

Additional criteria: Unlike banning the at-risk population from petting zoos, this option would meet all of our additional criteria. Since this option targets only at-risk populations, it would not reduce overall petting zoo attendance as dramatically as a ban. Furthermore, it would not be politically difficult to implement since signage leaves decision-making power in the hands of the patrons, rather than placing it under government control.²³ This option is easy to enforce because it imposes few costs and would require only minimal oversight. One signage check at the beginning of the fair by DOA could sufficiently enforce this option.

Recommendation: We recommend this option because it meets our threshold criterion and all of the additional criteria.

²³ This option would therefore avoid provoking the anti-regulation constituency that would make a banning option so politically infeasible.

7. *Require hand washing facilities*

Threshold criterion: According to health professionals, hand washing is the single most important preventive step to decrease the transmission of *E. coli*²⁴ and therefore satisfies our threshold criterion.

Additional criteria: Installing hand washing facilities could be financially costly for petting zoo owners, but State Fair Manager Wesley Wyatt stated that the Fair could install these facilities.²⁵ This option would not be difficult to enforce because it would only require one inspection at the beginning of the fair.

Recommendation: We recommend this option because it effectively prevents *E. coli* transmission and meets most of our additional criteria.

8. *Require a minimum distance between petting zoos and food services*

Threshold criterion: Requiring a minimum distance of 50 yards between petting zoos and food services protects public health because it decreases the risk of transmitting fecal matter from petting zoos to food areas. It also may deter visitors from bringing human food into the petting zoo. Finally, this option decreases the incidence of oral contact immediately after interacting with animals and fecal matter.

Additional criteria: This option can be easily enforced at the beginning of the Fair because it would only take one inspection by the State Fair, DOA or Wake County Department of Public Health.²⁶ Additionally, this option would require minimal costs to the state and the petting zoo owners. The State Fair could quickly implement minimum distance standards when it designs the layout of the fair.²⁷

Recommendation: We recommend this option because it satisfies all of our criteria.

9. *Require a daily cleaning of the animal pens*

Threshold criterion: Cleaning the animal pens every morning before the opening of the petting zoo decreases animal and human contact with animal fecal matter; therefore it protects public health.

²⁴ National Association of State Public Health Veterinarians, Inc. "Compendium of Measures to Prevent Disease and Injury Associated with Animals in Public Settings, 2003." 5 Feb. 2005. <http://www.aaav.org/comp_prevent_injury_2003.htm>

²⁵ Wyatt, Wesley. Personal interview. 3 Mar. 2005.

²⁶ The State Fair, DOA and the Wake County Department of Public Health all have inspectors at the Fair and could assist with the enforcement of this option. Consistent enforcement would depend, however, on establishing clear jurisdiction and enforcement responsibility. For example, Wake County Department of Public Health expressed reservations about their institutional ability to assist with the enforcement of petting zoo regulation. Wagner, Rick. Phone Interview. 1 Apr. 2005.

²⁷ Wagner, Rick. Phone Interview. 1 Apr. 2005.

Additional criteria: This option would be easy for the state to implement and enforce because inspectors already at the State Fair could check on zoo cleanliness daily (see Appendix J). Cleaner petting zoos also may attract more patrons, which would help to maintain the zoos' socio-cultural benefits.

Recommendation: We recommend this option because it satisfies our threshold criterion, and several of our additional criteria.

10. Require daily E. coli testing of the animals

Threshold criterion: Requiring daily animal testing for *E. coli* does not satisfy our threshold criterion, since daily animal testing would likely result in false negatives due to intermittent shedding of *E. coli*. Furthermore, there are no immediate lab tests for *E. coli*; fecal specimens must be cultured, which can delay *E. coli* test results. When the results are delayed, a number of individuals might become infected with the disease before the tests confirm that animals are shedding *E. coli*.

Additional criteria: This option would be very costly to petting zoos and would present political problems for many legislators.

Recommendation: We do not recommend this option since it does not meet any of our criteria.

11. License petting zoos

Threshold criterion: This option satisfies our threshold criterion because licensing would allow the state to require petting zoo owners to comply with our recommendations.

Additional criteria: This option will impose some costs on the state since administrators will need to license the petting zoos. However, requiring licenses would enable the state to enforce the petting zoo regulations.

Recommendation: We recommend this option because it would enable the state to enforce petting zoo provisions that improve public health.

ANALYSIS: OUTCOMES MATRIX

	Protect Public Health	Implement Promptly	Cost to the State	Political Feasibility	Socio-Cultural Benefits	Ease of Enforcement
<i>Control Public Contact with Animals</i>						
1. Eliminate feed vending machines		✓	✓			✓
2. Ban at-risk population	✓					
3. Require child supervision	✓				✓	
4. Prohibit entrance into pens*	✓	✓	✓	✓	✓	✓
<i>Inform the Public</i>						
5. Require patrons to sign waivers						
6a. Require signs	✓	✓	✓	✓	✓	✓
6b. Strongly discourage at-risk population	✓	✓	✓	✓	✓	✓
<i>Require Transition Areas</i>						
7. Require hand washing facilities	✓	✓	✓		✓	✓
8. Require minimum distance	✓	✓	✓	✓	✓	✓
<i>Regulate Animal Care</i>						
9. Require daily cleanings of animal pens	✓	✓	✓	✓	✓	
10. Require daily animal testing for <i>E. coli</i>					✓	
11. Licensing	✓				✓	✓

*BOLD TEXT INDICATES AN OPTION THAT WE RECOMMEND.

CHAPTER VI: SEVEN POLICY RECOMMENDATIONS

We recommend that the state pursue the following seven policies:

1. Require barriers to separate patrons from the animals.
2. Require warning signs that inform the public of health risks.
3. Strongly discourage at-risk populations from attending petting zoos.
4. Require hand washing facilities.
5. Require a minimum distance between petting zoos and food services.
6. Require daily cleaning of the animal pens.
7. License petting zoos.

CHAPTER VII: THREE IMPLEMENTATION OPTIONS, ANALYSIS, AND RECOMMENDATIONS

We analyzed three options that DHHS could consider for implementing our recommendations: (1) prepare guidelines, (2) write rules and (3) pursue legislative action.

1. *Prepare Guidelines.*

DHHS could publish our recommendations as guidelines, except for licensing petting zoos. These guidelines would be non-enforceable recommendations for petting zoo owners, fair operators and other interested parties on how to prevent public health hazards related to petting zoos. Guidelines would not be legally binding, and thus would not carry the same regulatory power as rules or legislation. These guidelines would be symbolic suggestions, with implementation left to the discretion of petting zoo owners. However, compliance with these guidelines would improve petting zoo management and increase the public's trust in petting zoos.

In the short term, the NC State Fair *E. coli* outbreak, the ongoing lawsuit against the Crossroads Farm petting zoo and the recent outbreak in Florida²⁸ will provide strong incentives for petting zoo owners and the NC State Fair to follow the DHHS guidelines. In our interview with the NC State Fair Manager Wesley Wyatt, his willingness to cooperate with DHHS to prevent future outbreaks convinced us that guidelines could serve as an effective policy tool for the near future. In the long term, however, as the petting zoo issue moves out of the public spotlight, guidelines might become less effective.

2. *Write Rules.*

DHHS could write rules to implement our recommendations, except for licensing petting zoos. Since rules would be legally binding, they would remain effective in the long term. However, rules are enforceable on a complaint-only basis, and thus the state cannot independently enforce them.²⁹ This limitation may be problematic since a majority of our recommendations would be most effective with active enforcement.

Writing rules within DHHS's jurisdiction could be faster and easier than adopting legislation since it would not require following the legislative process. However, enactment of the rules still provides for a public participation process. If 10 or more citizens complain in writing about these rules during the public comment period, they

²⁸ McNeil, Donald G. Jr. "Florida Officials Seek a Link in 15 Cases of a Kidney Illness." *New York Times* 26 March 2005.

²⁹ Under complaint-only enforcement, the state government could only take action against the violation of a rule if a citizen registers a complaint. If no citizen registers a complaint, the state could not take independent enforcement action. Hoke, Chris. Personal interview. 31 Mar. 2005 and "Bylaw enforcement." City of Vernon, British Columbia. <http://www.vernon.ca/services/bylaw_enforcement/>

may delay the rules' enactment up to 18 months.³⁰ Although the legislative process may be lengthy, the public review requirement of the rule-writing process may make that a lengthy process as well.

DHHS may write rules as long as they serve as control measures for an immediate health hazard.³¹ In contrast, preventative measures fall outside of DHHS's jurisdiction and necessitate legislative action. It could be argued that some of our recommendations, such as requiring hand-washing facilities, are prevention, rather than control, measures. The boundaries between control and prevention could be debated by those on either side of the issue. However, in light of the recent *E. coli* outbreaks, DHHS could make a strong argument that these rules are control measures.

3. Pursue Legislative Action.

DHHS could pursue legislative enactment of our recommendations. DHHS could attempt to put these on the agenda either for this year's legislative session, if time permits, or wait until 2006.

We believe that most of our options would be much more effective if they are actively enforced rather than overseen on a complaint-only basis.³² Although rules or guidelines may be easier and faster to implement, there is a risk of another *E. coli* outbreak because they are not sufficiently enforceable. In contrast, legislation would be legally binding and the state government would enforce it.

Within the state government, DOA might represent the most appropriate agency to enforce the law. The law would fall under DOA's jurisdiction for two reasons: 1) the State Fair is under the jurisdiction of DOA and 2) DOA could add enforcement of the petting zoo law to its current obligations at the State Fair (see Appendix J).

Adopting legislation could take a long time, especially because it is unlikely to be enacted during the 2005 legislative session.³³ Moreover, passing legislation could involve more political considerations: compared to guidelines or rule-making, the government would need to accommodate a wider diversity of interests.

³⁰ Although such extensive delays do not characterize every rule-writing process, they often occur when rules contain provisions to which the regulated community objects. Hoke, Chris. Personal interview. 31 Mar. 2005.

³¹ Hoke, Chris. Personal interview. 31 Mar. 2005.

³² Complaint-only enforcement could be problematic for recommendations like "requiring warning signs." Patrons may not realize the importance of warning signs or the fact that petting zoo owners should post them. Without awareness of the role that signs should play in proper petting zoo management, citizens may not file complaints. Thus, in this scenario, relying on official complaints as the enforcement mechanism may make it unlikely that negligent petting zoo owners would actually be encouraged to change their behavior. Several of our other recommendations would face similar challenges.

³³ Due to the number of bills under consideration during this legislative session, we are skeptical that appropriate legislative action could occur in time to be implemented at the 2005 State Fair in October. The State Fair office requested a May deadline for any recommendations for the 2005 Fair.

Pursuing legislative action involves certain risks. The legislature may not enact our recommendations, and a vote against this legislation may restrict DHHS' future ability to act on this issue, jeopardizing the viability of other implementation options.³⁴ Moreover, the legislature might not pass our recommendations as a whole, amending or eliminating some of our proposals.

Two implementation recommendations

We recommend two of our implementation options: (1) issuing guidelines and (2) pursuing legislative action. These recommendations address both short-term and long-term needs. We propose considering these two recommendations as a single implementation package, since neither would sufficiently address the issue on its own.³⁵ We do not recommend writing rules because they are enforced on a complaint-only basis.

1. *Short-term recommendation.*

For 2005 and 2006, we recommend that DHHS issue guidelines to implement those recommendations that regulate petting zoo management (except for licensing petting zoos). We recommend issuing guidelines since legislative action or rule writing may take a long time, and we believe it is important that the state take action for implementation at the 2005 State Fair.

2. *Long-term recommendation.*

In the long term, we suggest that DHHS recommend legislative enactment of our recommendations. We recommend this strategy despite the risks associated with it. Our goal with these recommendations is to prevent future *E. coli* outbreaks, and we believe enforceable laws are the best implementation option for achieving this goal.

Since we recommend both short and long-term options, we must strive to prevent confusion during the period in between. When DHHS distributes its guidelines to fairs and petting zoos, it could communicate to fair managers and petting zoo operators that the state government is concurrently pursuing a legislative package that mirrors the guidelines. This clarification would reduce confusion that may result from simultaneously pursuing guidelines and legislation.

³⁴ Enforcing guidelines would be particularly challenging if the legislature rejects a petting zoo law that features most, if not all, of the recommendations included in the guidelines. Petting zoo owners and the public might question the viability of guidelines that failed to receive legislative support.

³⁵ Issuing guidelines is not sufficient because guidelines are not enforceable. Pursuing legislation could be problematic because the legislative process may be too slow to enact changes applicable for the 2005 State Fair.