

# Tennessee Fair and Animal Exhibition Safety: Reducing Disease Risks for Visitors

## *Survey of Tennessee Fairs*



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 **Extension**



It's About Time!

# Overview

- **3 Surveys:**
  - *E. coli* O157 and *Salmonella* at TN fairs
  - Human behaviors and hand hygiene practices
  - Recent survey of TN fairs: Facilities and educational practices

**Disease outbreaks  
associated with fairs and  
animal exhibits**



### Outbreaks of *Escherichia coli* O157:H7 Associated with Petting Zoos — North Carolina, Florida, and Arizona, 2004 and 2005

During 2004–2005, three outbreaks of *Escherichia coli* O157:H7 infections occurred among agricultural fair, festival, and petting zoo visitors in North Carolina, Florida, and Arizona. One hundred eight cases, including 15 cases of hemolytic uremic syndrome\* (HUS), were reported in the North Carolina outbreak; 63 cases, including seven HUS cases, were reported in the Florida outbreak; and two cases were reported in Arizona. No fatalities occurred. Illnesses primarily affected children who visited petting zoos at these events. This report summarizes findings from these outbreak investigations, which indicated the need for adequate control measures to reduce zoonotic transmission of *E. coli* O157:H7.

#### North Carolina

On October 29, 2004, the North Carolina Division of Public Health (NCDPH) received a report of a cluster of three HUS cases among children who visited a petting zoo at the North Carolina State Fair (Figure). Approximately 800,000 visitors attended this fair during October 15–24, 2004. The fair had two petting zoos (petting zoos A and B).

NCDPH notified all local health departments to report cases of HUS and other STEC O157 infections. The first case was

FIGURE. A child stands near goats and goat droppings in a petting zoo at the 2004 North Carolina State Fair



Photo/North Carolina Division of Public Health

electrophoresis (PFGE). Twenty patients (19%) were hospitalized, and 15 (14%) had HUS diagnosed.

Systematic environmental sampling of the fairgrounds iden-

**How common are *E. coli* O157  
and *Salmonella* at fairs?**

# **Shiga-toxigenic *Escherichia coli* O157 in Agricultural Fair Livestock, United States**

James E. Keen,\* Thomas E. Wittum,† John R. Dunn,‡ James L. Bono,\* and Lisa M. Durso\*

**Emerging Infectious Diseases, Vol. 12, No. 5, May 2006**

- **USDA State & county fair survey, Summer 2002**
- **Goal: estimate the prevalence of enteric pathogens in livestock at fairs**

# ***E. coli* O157 & *Salmonella* prevalence**

## ***Salmonella:***

- 29 (91%) of 32 fairs
- 558/2914 = 19.1% of livestock

## ***E. coli* O157:**

- 31 (96.9%) of 32 fairs
- 233/2914 = 8.0% of livestock
  - 11.4% of 1,407 cattle
  - 1.2% of 1,102 swine
  - 3.6% of 364 sheep / goats
  - 5.2% of 154 fly pools



**Are *E. coli* O157 and  
*Salmonella* common at  
Tennessee fairs?**



# Animal Fecal and Environmental Sampling at 3 TN Fairs

- Used same protocol as published study, August - September 2005
- **Samples:**
  - Animal fecal samples
  - Environmental samples: bedding, swabs, soil
- **Samples from:**
  - Primary petting zoo
  - Other animal areas, exhibits, barns
- **Cultures:** *E. coli* O157 and *Salmonella*

# *E. coli* O157

	Fair A		Fair B		Fair C	
	Pos / Total	% Pos	Pos / Total	% Pos	Pos / Total	% Pos
Petting Zoo	2/32	6 %	0/9	0	0/13	0
Animal Exhibits	12/35	34%	4/27	15%	9/29	31%

# *Salmonella*

	Fair A		Fair B		Fair C	
	Pos / Total	% Pos	Pos / Total	% Pos	Pos / Total	% Pos
Petting Zoo	20/32	63 %	0/9	0	0/13	0
Animal Exhibits	8/35	23%	5/27	19%	10/29	34%

# Conclusions: TN Fairs

- *E. coli* O157 and *Salmonella*
  - Isolated from one of three petting zoos
  - Common at animal exhibits
- Consistent with national study

**What human behaviors and hand hygiene practices contribute to transmission?**

# **Tennessee Department of Health study focusing on human behavior and hand hygiene (McMillian *et. al.*, ICEID 2006)**

- **Hypothesis– Human behavior contributes to transmission**
- **Observational study**
- **6 Middle Tennessee petting zoos**
- **August – September 2005**

- **Observed visitors to petting zoos to determine if the following occurred:**
  - **Direct animal contact**
  - **Contact with environmental surfaces**
  - **Hand-to-face contact (*i.e.* mouth, nose, eyes)**
  - **Eating or drinking**
  - **Hand sanitizer use**

**Results:**

**Human behavior and hand hygiene**



## Observed 991 persons:

- 733 (74%) had direct animal contact



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- 486 (49%) with Hand-to-face contact



## Observed 991 persons:

- 733 (74%) had direct animal contact
- 862 (87%) contacted environmental surfaces
- 486 (49%) with Hand-to-face contact
- 218 (22%) ate or drank

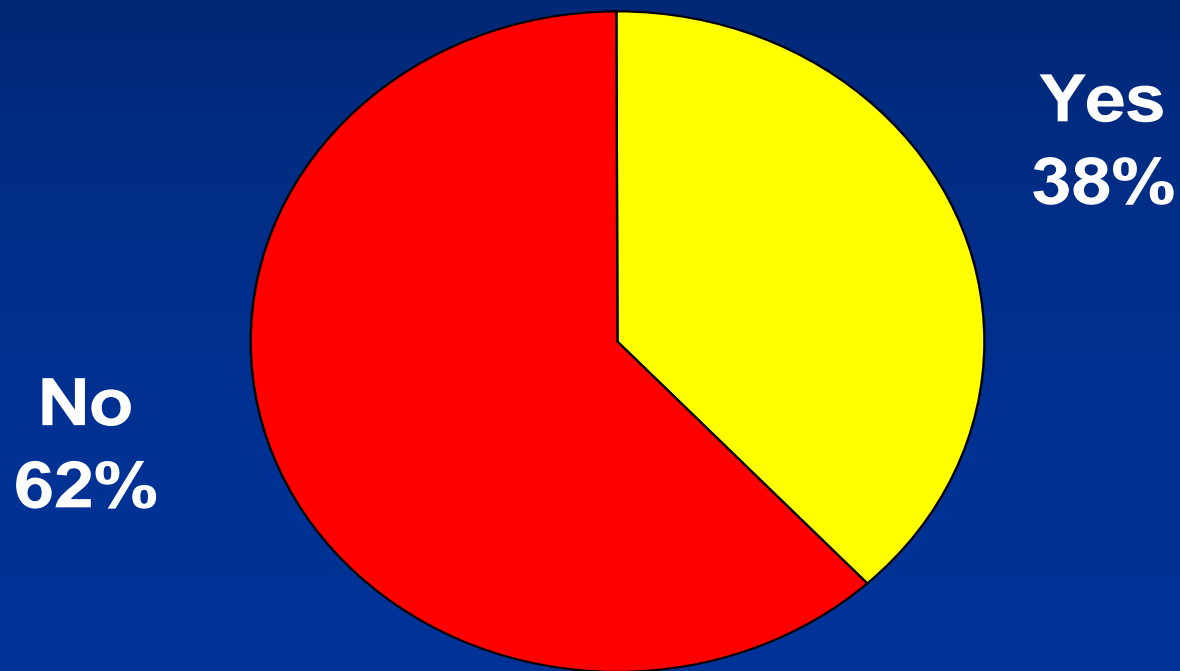


# Hand Sanitizer Stations available at 5 (83%) of 6 fairs



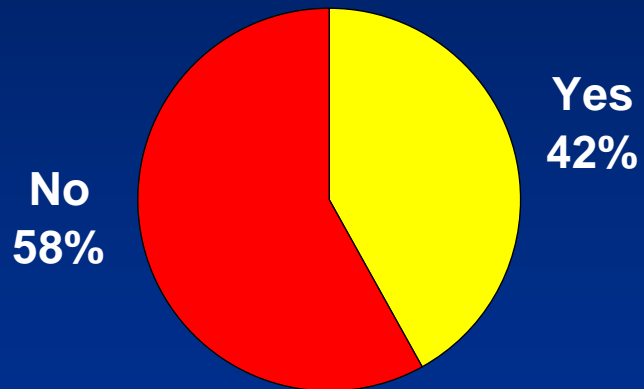
# Hand Sanitizer Use by Visitors Exiting Petting Zoos

Observed 1700 visitors exiting: 1054 (62%)  
did NOT use the available hand sanitizer

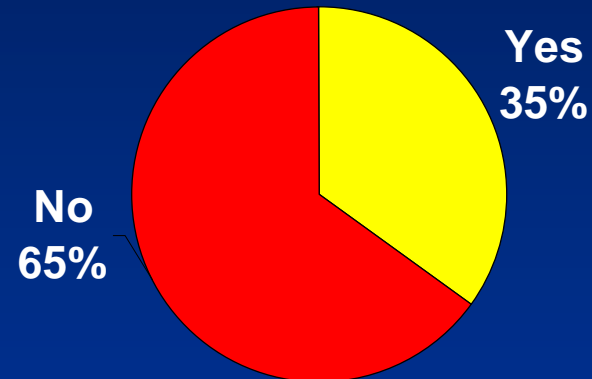


# Hand Sanitizer Use differed by age group

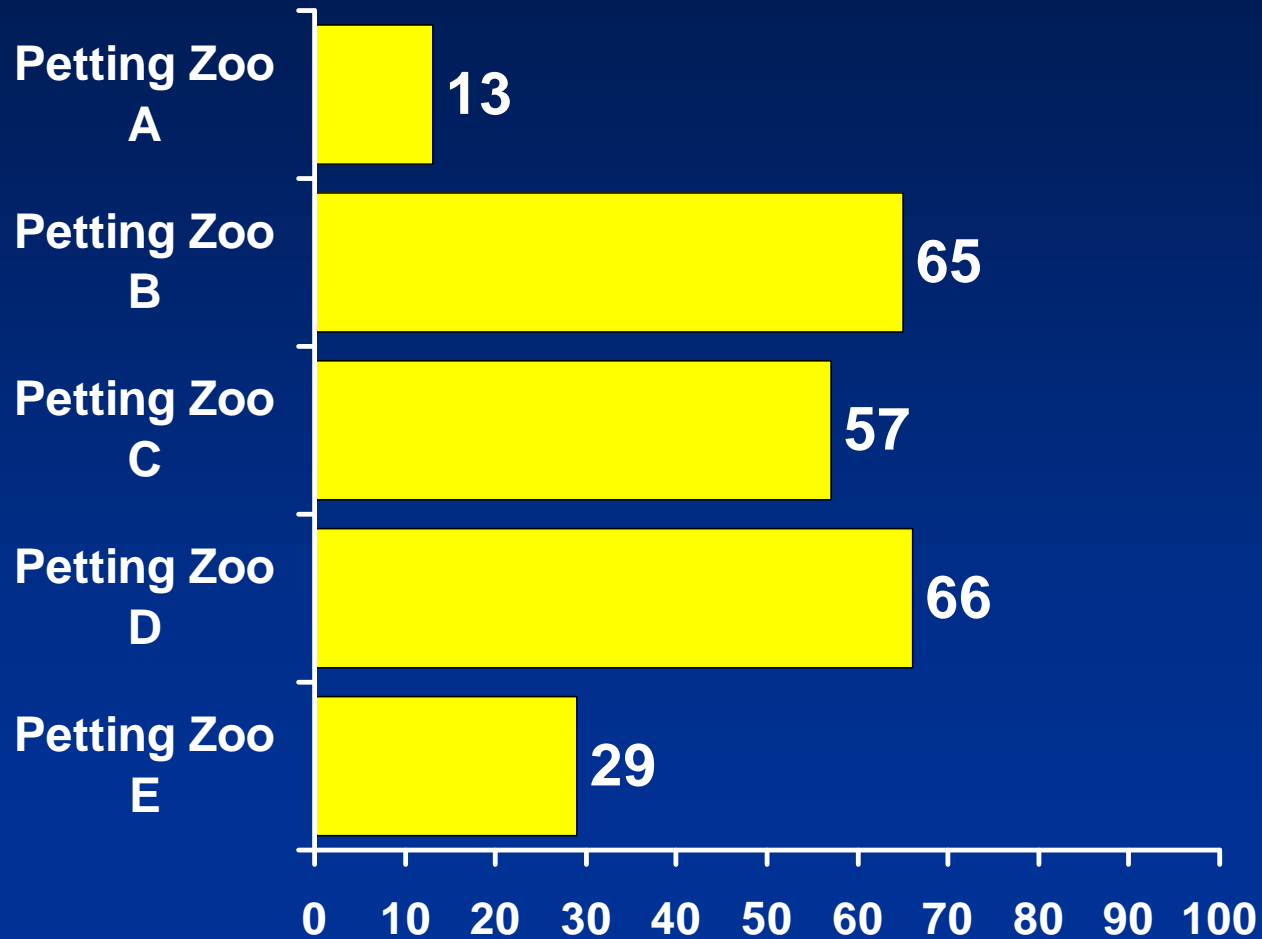
## Children



## Adults



# Hand Sanitizer Use in Visitors by Petting Zoo





# Factors influencing hand sanitizer use:

- Presence and visibility of signage
- Visibility / location of hand sanitizer stations
- Number of hand sanitizer stations available
- Verbal hand hygiene reminders by petting zoo operators



# Conclusions of observational study

- **Risky human behaviors and inadequate hygiene place persons at risk of transmission**
- **Physical layout of facilities appears to contribute to hand hygiene compliance**
- **Venue layout is modifiable**
- **Preventive measures modifying risky human behaviors might reduce disease risks to visitors**

**What types of facilities and educational efforts are currently reported by TN fairs?**

# Public health and animals survey

## Public Health and Animals Survey

1. How would you describe your facility or business?

- County Fair     State Fair     Agritourism / Farm     Festival  
 Other: \_\_\_\_\_

2. Does your facility have any of the following animals? (Check all that apply)

	Yes	No	If yes, how many?		Yes	No	If yes, how many?
Cattle/Calves	<input type="checkbox"/>	<input type="checkbox"/>	_____	Horses	<input type="checkbox"/>	<input type="checkbox"/>	_____
Goats	<input type="checkbox"/>	<input type="checkbox"/>	_____	Sheep	<input type="checkbox"/>	<input type="checkbox"/>	_____
Llamas	<input type="checkbox"/>	<input type="checkbox"/>	_____	Chickens	<input type="checkbox"/>	<input type="checkbox"/>	_____
Ducks	<input type="checkbox"/>	<input type="checkbox"/>	_____	Turkeys	<input type="checkbox"/>	<input type="checkbox"/>	_____
Rabbits	<input type="checkbox"/>	<input type="checkbox"/>	_____	Other	<input type="checkbox"/>	<input type="checkbox"/>	_____
Swine	<input type="checkbox"/>	<input type="checkbox"/>	_____	If Other, Specify _____			

3. Does your facility have animal exhibits where the public is encouraged or allowed to have direct contact with animals, e.g., a petting zoo?  Yes  No  Don't Know

IF YES, Please answer 3A and 3B, otherwise go to Question 4

3A. Are hand washing facilities available to the public after direct contact with the animals?

- Yes  No  Don't Know

If YES, Where are the hand washing facilities located? Check all that apply.

- Within the exhibit area  
 At the exit of the exhibit  
 Located elsewhere on grounds, not associated with the exhibit  
 Only near eating facilities or picnic area  
 Other, Specify \_\_\_\_\_

3B. What type of hand washing facilities are available to the public?

	Yes	No	Don't Know
Running water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disposable towels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hand sanitizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Does your facility have areas where animals are on a exhibit or are shown that are accessible to the public, e.g., a blue lock exhibit barn?  Yes  No  Don't Know

IF YES, please answer 4A and 4B, otherwise go to Question 5

4A. Are hand washing facilities available to the public in animal areas accessible to the public?

- No  Don't Know

If YES, Where are the hand washing facilities located? Check all that apply.

- Within the exhibit area  
 At the exit of the exhibit  
 Located elsewhere on grounds, not associated with the exhibit  
 Only near eating facilities or picnic area  
 Other, Specify \_\_\_\_\_

4B. What type of hand washing facilities are available to the public?

	Yes	No	Don't Know
Running water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disposable towels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hand sanitizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Are visitors instructed to wash their hands after touching animals?  Yes  No  Don't Know

If YES, How are visitors instructed?

- Verbally  Leaflets/brochures  Other: \_\_\_\_\_

6. Are visitors instructed about risks of illness following contact with animals?

- Don't Know; IF YES, How are visitors instructed?

- Verbally  Leaflets/brochures  Other: \_\_\_\_\_

7. Are visitors instructed about not eating or drinking in the animal area?

- Don't Know; IF YES, How are visitors instructed?

- Verbally  Leaflets/brochures  Other: \_\_\_\_\_

8. Are eating and drinking areas separate from areas where food or beverages are prepared, served, or consumed?

- Yes  No  Don't Know

9. Are visitors instructed to avoid contact with animal manure or bedding?  Yes  No  Don't Know

10. Are visitors given recommendations for reducing the risk of disease transmission at venues where the public is present?

- Yes  No  Don't Know

11. Have you received any formal or informal training regarding reduction of disease risks at venues where the public is present for your facility or business?

- Yes  No  Don't Know

*Thank you for your help with this important survey.*

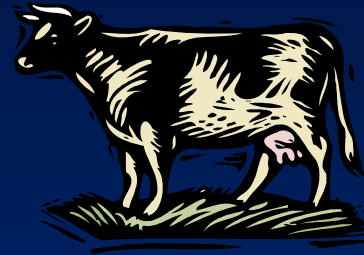
# Who completed the survey?

- Tennessee Department of Agriculture / Market Development Division mailed 2-page survey to 56 facilities
- 20 (36%) of 56 completed
  - 17 County fairs
  - 1 State fair
  - 2 Regional fairs

# Results of survey



- 16 (**80%**) of 20 reported having ruminant livestock (sheep, goats, cattle)



- 15 (**75%**) of 20 reported having exhibits where the public is encouraged or allowed to have direct contact with animals (e.g., a petting zoo)

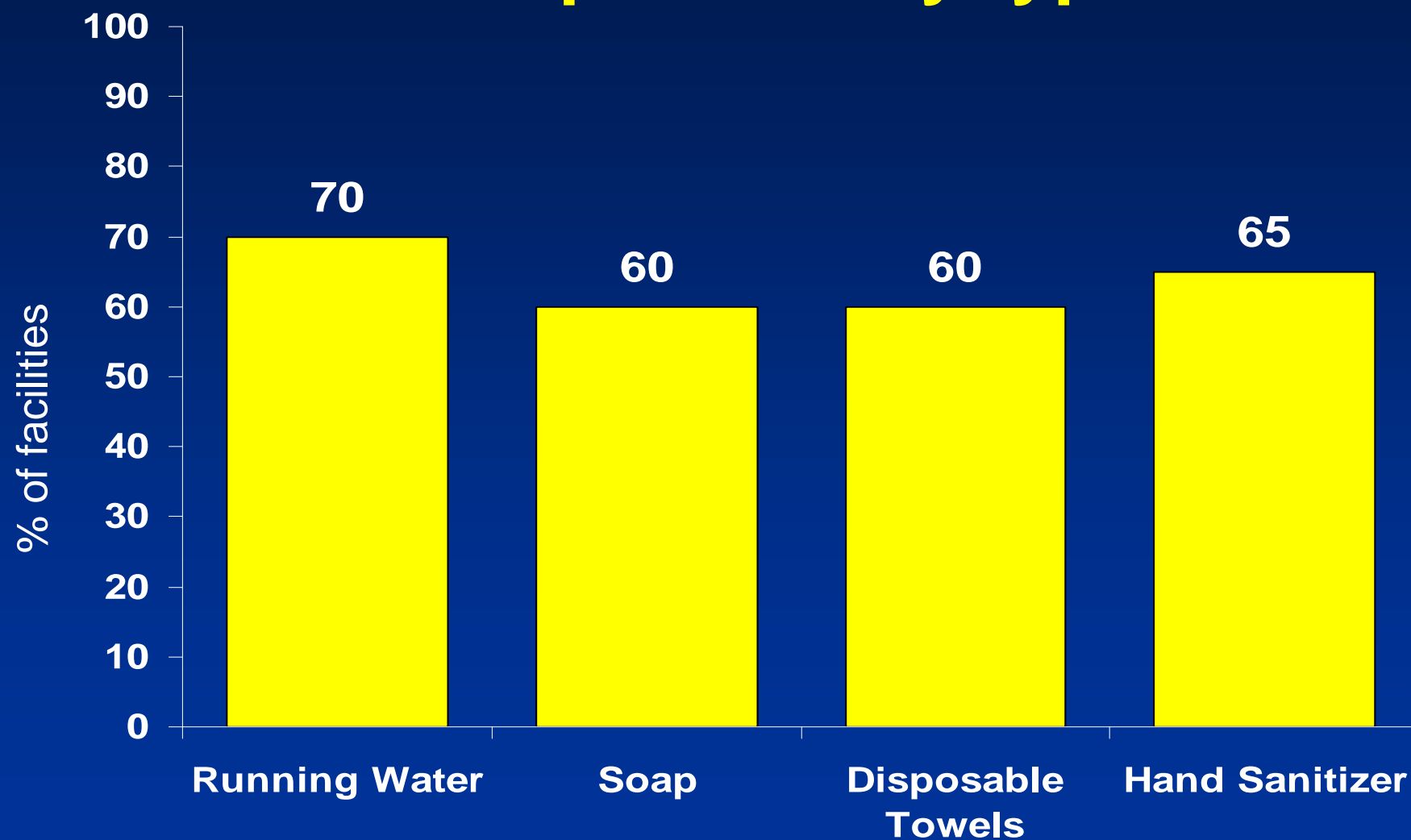


**18 (90%) of 20 facilities reported that hand washing facilities are available to the public after direct contact with the animals**

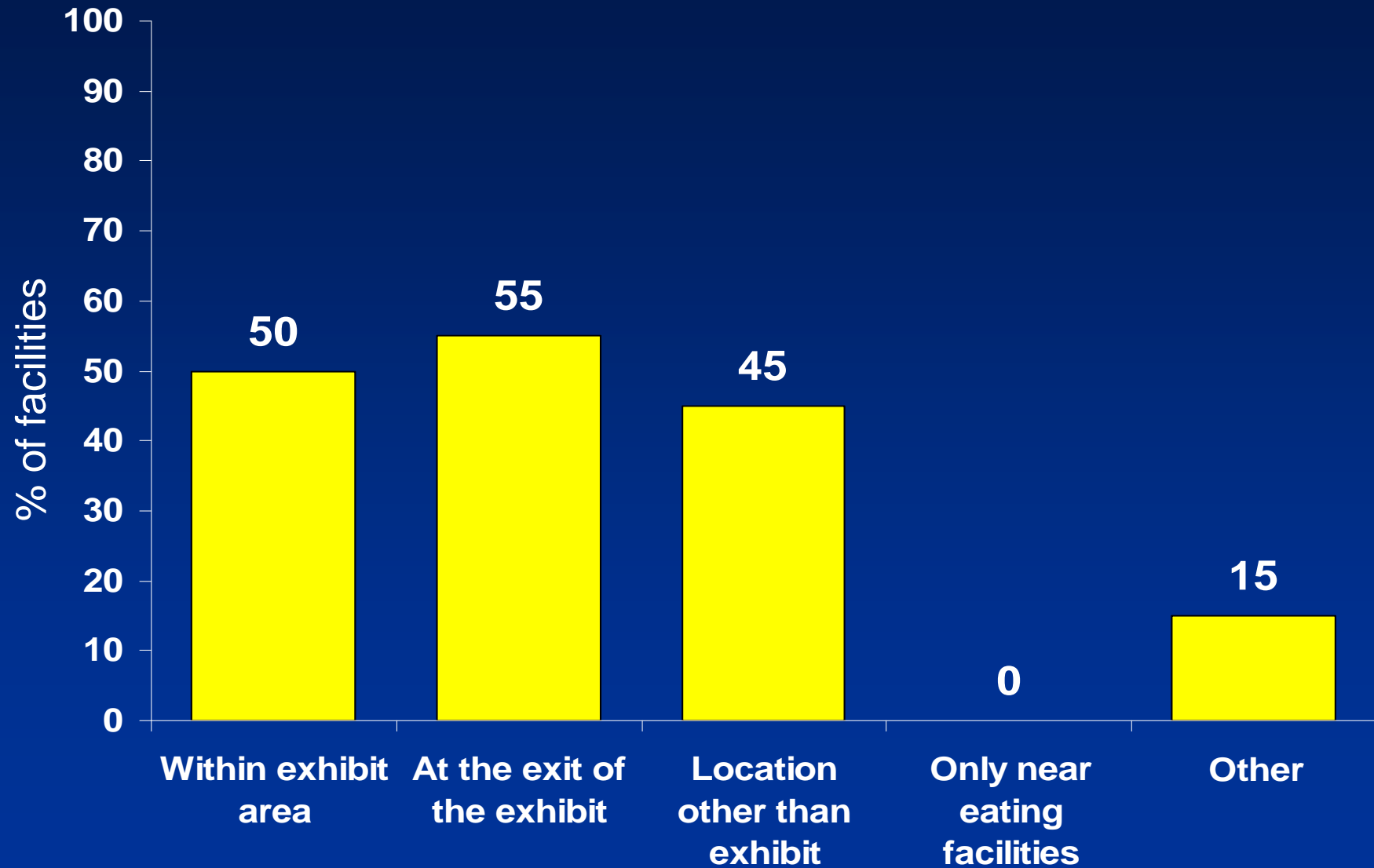




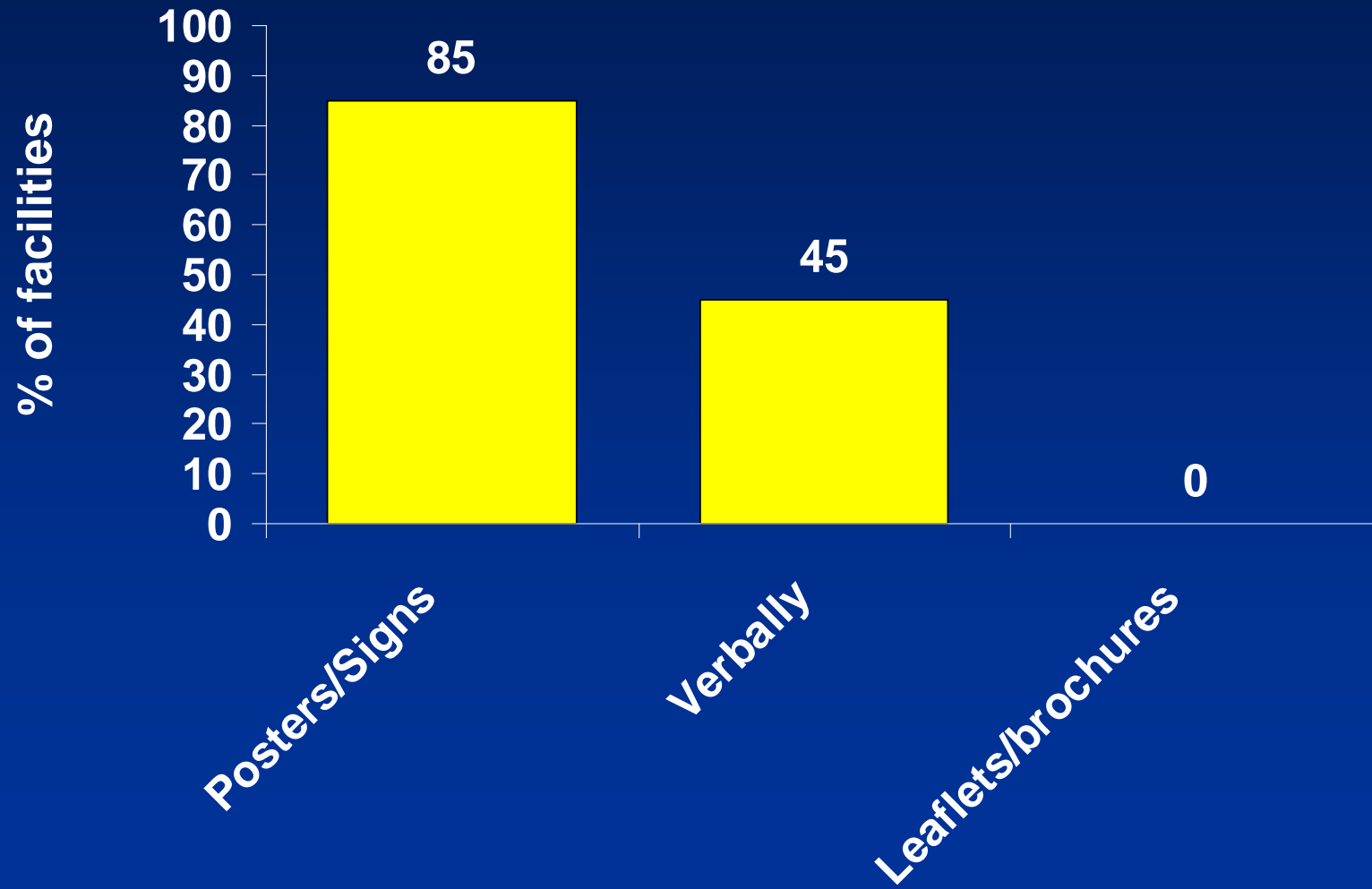
# Hand washing facilities available to the public – by type



# Location of hand washing facilities



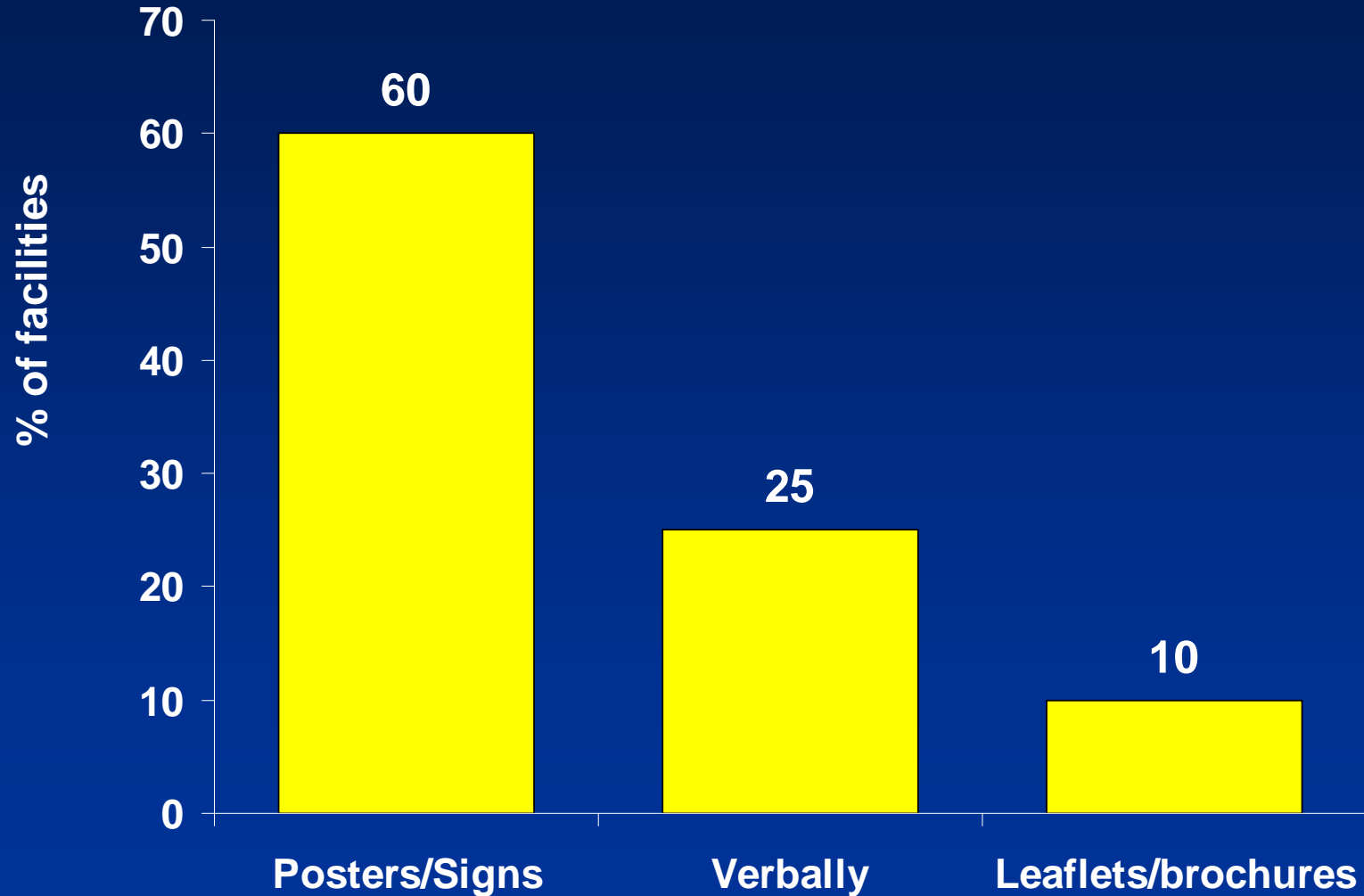
# 85% reported instructing visitors with signage to wash hands after touching animals



**65%** of facilities reported instructing visitors about the risks of illness following contact with animals



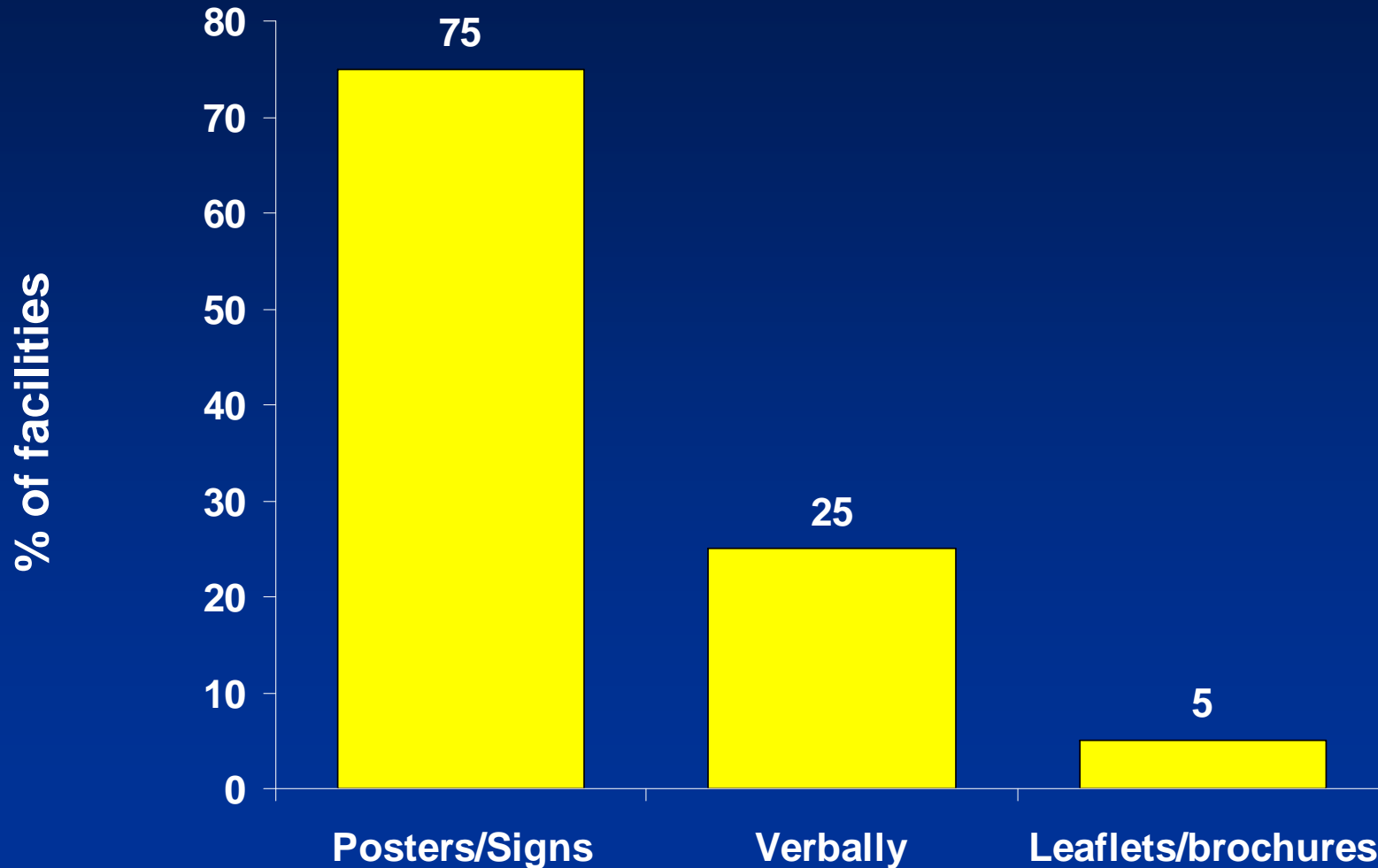
# Methods reported for instructing visitors about the **risks of illness** following animal contact



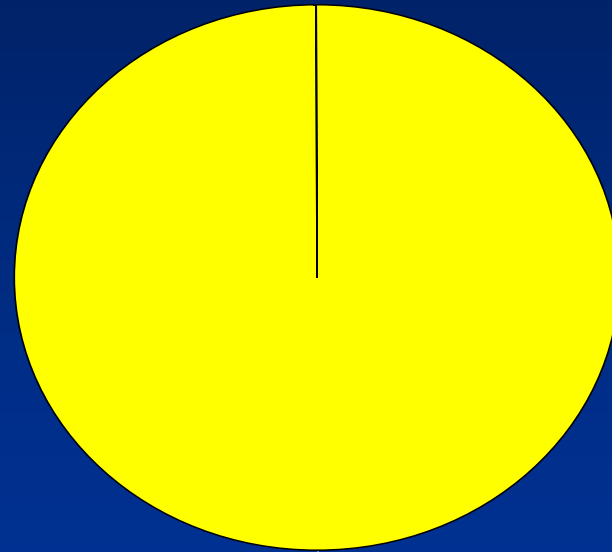
**80%** of facilities reported instructing visitors not to eat or drink in the animal area



## Methods reported for instructing of visitors **not to eat or drink** in the animal area



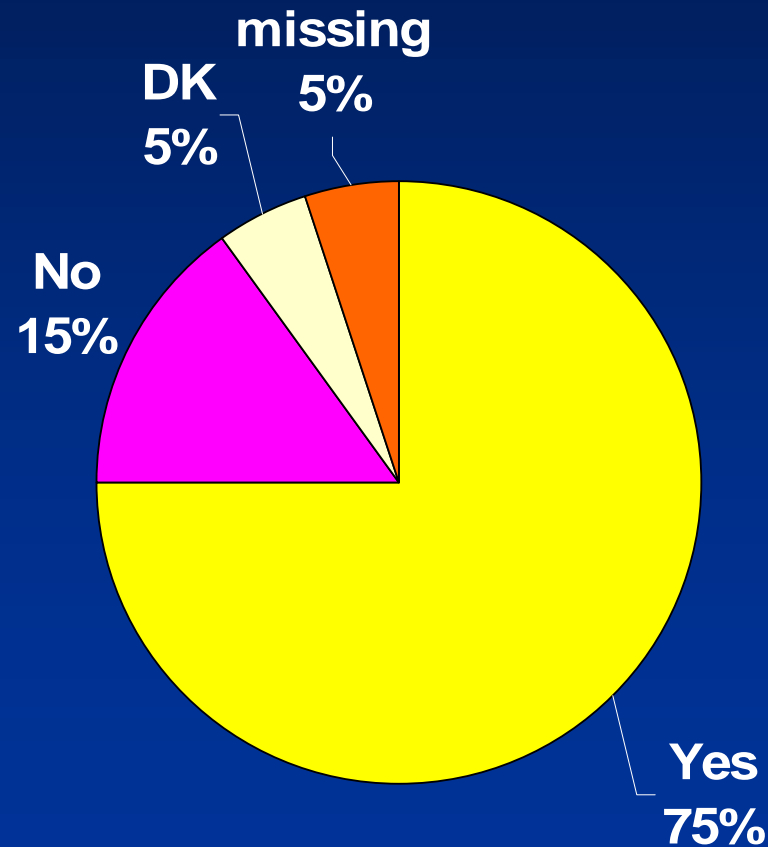
Are **animal areas** designed to be separate from areas where food or beverages are prepared, served, or consumed?



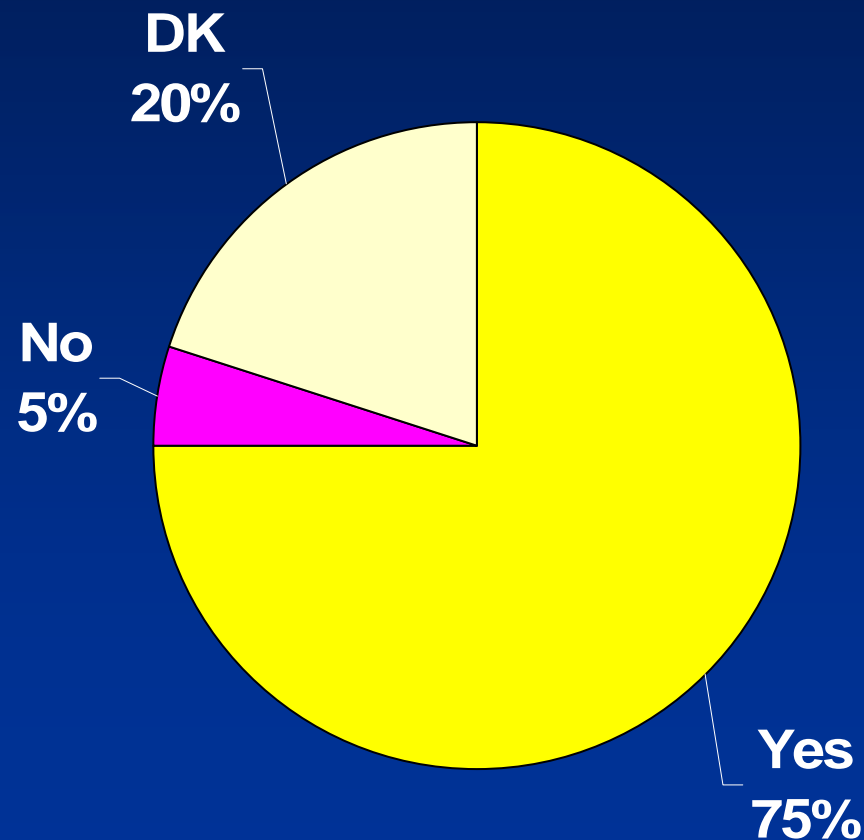
Yes, 100%



# Are exhibits designed to reduce visitor contact with **animal manure or bedding**?



Aware of the **CDC recommendations** for reducing the risk of disease transmission at venues where the public has contact with animals?



# Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2005

**MMWR**<sup>TM</sup>

**Morbidity and Mortality Weekly Report**

Recommendations and Reports

March 25, 2005 / Vol. 54 / No. RR-4

## Compendium of Measures To Prevent Disease Associated with Animals in Public Settings, 2005

National Association of State Public Health Veterinarians, Inc.  
(NASPHV)



**INSIDE: Continuing Education Examination**

**DEPARTMENT OF HEALTH AND HUMAN SERVICES  
CENTERS FOR DISEASE CONTROL AND PREVENTION**

# Recommendations

- **Provide training for staff; information / education for visitors about risks**
- **Venue design- minimize risk**
- **Handwashing**
- **Special populations**

# Conclusions: Surveys in Tennessee

## 1. Prevalence of pathogens:

- Tennessee fairs are comparable to fairs nationally, *E. coli* O157 and *Salmonella* common
- Colonize livestock and contaminate environment

## 2. Observational study:

- Visitors to Tennessee petting zoos engage in modifiable behavioral risk factors:
  - Touching face
  - Eating and drinking while in petting zoo
  - Verbal cues to practice hand hygiene
- Venue layout is modifiable
  - Location of signage, food vendors and hand sanitizer stations

# Conclusions: Surveys in Tennessee

## 3. Tennessee fairs report that :

- Most have ruminant livestock and direct contact exhibits
- Hand hygiene is accessible, could be better located at exit of animal exhibit
- Visitors are advised to practice hand hygiene, education with signs rather than verbal cues
- Food and animal exhibits separate, most manage manure to keep it away from public
- Good awareness that recommendations exist

**Questions?**

