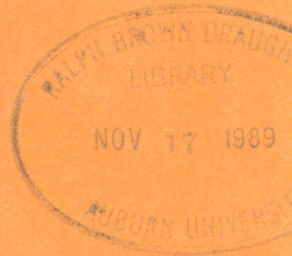
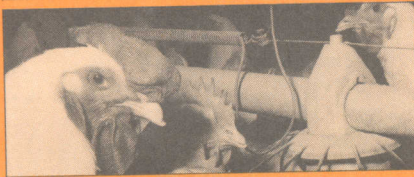
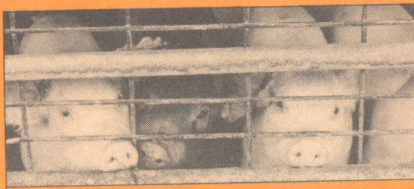


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## nvironmental Consequences of Animal Waste Disposal



## Farm Operator Perspectives and Practices



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## CONTENTS

	<i>Page</i>
INTRODUCTION .....	3
OBJECTIVES .....	4
DATA AND METHOD .....	5
FINDINGS .....	6
Animal Waste Issues .....	6
Waste Treatment Practices and Facilities .....	7
Facilities .....	7
Utilization of Animal Waste .....	8
Land Application Practices .....	9
Animal Waste Analysis .....	10
Animal Management .....	11
Animal Waste Management Systems .....	12
Presence of System .....	12
Adequacy of System .....	13
System Impact Ratings .....	14
Improving Waste Management Systems .....	15
Previous Assistance .....	15
Need for Technical Assistance .....	16
Anticipated Impacts of Environmental Regulation .....	17
SUMMARY AND CONCLUSIONS .....	18
LITERATURE CITED .....	19

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*Information contained herein is available to all  
without regard to race, color, sex, or national origin.*

# ENVIRONMENTAL CONSEQUENCES OF ANIMAL WASTE DISPOSAL: Farm Operator Perspectives and Practices<sup>1</sup>

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## INTRODUCTION

**F**ARMERS FACE an increasingly critical public as the environmental consequences of many present-day farm practices are measured and recognized (3). One issue of public concern is the treatment and disposal of animal wastes. New regulations for drinking water, waste treatment, and water quality protection are causing significant new costs for animal producers. Concerns about groundwater pollution and runoff into streams from animal housing and confinement areas, as well as overloaded waste treatment and storage facilities, are causing greater scrutiny of the way farmers manage their animal wastes (5).

In the past, most attention has been directed to runoff from croplands and the entry of agricultural chemicals and eroding soils into the environment. However, animal wastes now present a mounting challenge to agricultural producers who must alter traditional practices and disposal methods to achieve and maintain fishable and swimmable rivers, streams, and lakes. Animal wastes also represent a recoverable resource that can be used to augment soil fertility, burned as fuel to generate energy, or processed for sale to the home gardener (6).

Public concerns about the health and environmental consequences of farming are beginning to focus on animal waste disposal. The disposal of such waste as manure, flushwater, and dead animals is of growing importance because the potential impact of agricultural firms on the environment is receiving increased attention. Until recently, relatively few regulations constrained waste disposal practices on Alabama farms in comparison to the pollution control efforts required of nonagricultural industries.

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There are a number of environmental and health hazards that may be associated with agricultural production (5). These include surface water pollution, groundwater pollution, air pollution, worker exposure, threats to endangered species, and dietary risks.

Pesticides play a role in most of these hazard pathways and are a critical focus of the environmental regulations that affect agriculture. The U.S. Environmental Protection Agency issues regulations controlling the runoff of waters from agricultural lands, the operation and repair of underground storage tanks, and many other agricultural activities that may present environmental hazards (2). The Alabama Department of Environmental Management has further responsibilities with respect to State laws and regulations governing the impacts of animal production on ground and surface waters in the State.

## **OBJECTIVES**

The purpose of the research reported here was to describe the attitudes and practices of animal producers relative to the treatment and disposal of animal wastes. The results should provide a statistical profile of the central methods, facilities, and problems characterizing waste disposal in the study area.

One objective was to develop a comparative perspective on the ways farmers involved in various animal enterprises view waste disposal problems, particularly in view of the technical imperatives associated with each specific type of animal production. This study compares beef, dairy, hog, layer, and broiler operations in terms of the facilities found on these farms and the perspectives of the farm operators.

A second objective was to profile the experiences and expectations that animal producers have for public agencies that provide technical assistance relative to the design and operation of waste disposal facilities. It has not been clearly established what different sources of advice farmers are utilizing in assessing the environmental consequences of their operations.

A third objective was to identify the impediments perceived by farmers relative to the installation of new facilities, alteration of existing practices, and commitment to improved environmental performance. Although the need for changes may be relatively clear to technical personnel and environmentally concerned individuals, the impetus for change rests in a felt need for improvement on the part of farm operators. It is clear that the costs associated with these improvements also are a consideration.

## DATA AND METHOD

Data were obtained from a mail survey of animal producers in five watersheds in two north Alabama counties, Cullman and Blount. The study locale is significant because the two counties contain over 5,000 farms, they have a dense population of poultry and beef production, and the area is vulnerable to environmental problems associated with many small streams and limestone aquifers. Cullman is the number one broiler county in the Nation, as well as the top agricultural county in the State. The adjacent Blount County is similar in agricultural character, but is a recent addition to the Birmingham Metropolitan Statistical Area.

A sample of 753 farm operators was drawn from lists maintained by various agencies and organizations serving the State. In June 1988, a 10-page questionnaire and a cover letter explaining the purpose and intent of the study were mailed to each individual in the sample (1). The questionnaire was designed to inventory animal waste disposal facilities, practices, and experiences, as well as assess attitudes toward the severity of environmental problems associated with farming. One week later, a reminder postcard was sent. Two weeks later, a replacement questionnaire was mailed to nonrespondents. In another 3 weeks, a third questionnaire was sent to the remaining nonrespondents.

One last questionnaire was received in October. Bad addresses, refusals, and returned questionnaires accounted for 55 percent of original sample. Data from 357 completed, usable questionnaires (a 52 percent return rate) were used in the analysis (1).

Respondents were asked to indicate their major animal enterprises, including beef cattle, dairy cattle, layers, broilers, and hogs. Farms often have multiple enterprises so respondents were given the opportunity to check as many as applied. Given that respondents often indicated more than one animal enterprise, a tabulation technique known as multiple response analysis was employed to summarize the data.

Multiple response items are questions that can have more than one value for an individual case. In this report, farm enterprise is the column heading in the tables. Various farm characteristics and attitudinal items are then tabulated within each enterprise category. The total number of cases reported in the tables is greater than the sample size because an individual case may be tabulated in more than one column if the farm had more than one enterprise

To achieve greater clarity and data reduction, the percentages in the tables often summarize one dimension of a multiple dimensional variable (i.e., only the percent agreeing with the statement is presented;

the undecided and disagree responses are omitted). The base for the percentages, however, is always the number of respondents in the enterprise category. The narrative portion of the findings endeavors to identify the overall pattern of practices and situations, as well as noting important differences among the various enterprise categories.

## FINDINGS

### Animal Waste Issues

Table 1 reports the percent of respondents agreeing with selected statements about animal waste issues by farm enterprise. Many

TABLE 1. PERCENT AGREEING WITH SELECTED STATEMENTS ABOUT ANIMAL WASTE MANAGEMENT BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Statement	Agree, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. Animal waste is a valuable fertilizer . . .	97.6	100	100	100	96.9
b. Farmers in this county generally do a good job of managing their animal waste . . . . .	73.4	85.7	85.2	81.5	71.9
c. Most of my neighbors properly dispose of their animal waste . . . . .	69.7	71.4	66.7	87.0	67.7
d. Recycling manure as a cattle feed is a useful practice . . . . .	55.1	42.9	70.4	72.2	45.2
e. Farmers who pollute streams should be financially penalized . . . . .	65.0	46.2	44.4	61.5	68.8
f. Given the economic realities, concern with pollution control is often carried too far . . . . .	45.3	61.5	51.9	55.6	43.8
g. Environmental controls are making it harder for me to run my farm . . . . .	34.0	50.0	48.1	42.6	43.8
h. Laws regulating water pollution from farm animals are badly needed . . . . .	31.7	14.3	22.2	27.8	43.8
i. Farm animal waste is a serious water quality problem . . . . .	18.8	21.4	14.8	14.8	28.1
j. The government should pay farmers to practice pollution control . . . . .	16.3	42.9	25.9	16.7	31.3
k. Farm animal waste is a major source of pollution in this county's rivers and streams . . . . .	14.3	28.6	7.4	11.1	25.0
l. I know I must make some changes in the way animal waste is handled on my farm . . . . .	6.7	28.6	19.2	1.9	21.9
<i>Number</i> . . . . .	<i>250</i>	<i>14</i>	<i>27</i>	<i>54</i>	<i>32</i>

operators reported more than one enterprise and their responses are tabulated within each activity indicated as taking place on their farms.

Farmers nearly unanimously regarded animal waste as a valuable fertilizer (item a). Around three-quarters felt that farmers in the county generally do a good job of managing their animal waste (item b). Slightly lower proportions thought their neighbors properly disposed of animal waste (item c). There was less consensus, however, over the usefulness of recycling broiler litter as a cattle feed. This idea was endorsed by more than two-thirds of poultry operators, slightly more than half the beef operators, and around 45 percent of the dairy and hog operators (item d).

About two-thirds of beef, broiler, and hog operators thought that farmers who pollute streams should be financially penalized, but only 45 percent of the dairy and layer operators agreed (item e). Over 61 percent of the dairy operators thought concern for pollution control is often carried too far; more than 50 percent of the poultry farmers agreed, but only 45 percent of beef and hog operators felt that way (item f). Similarly, half the dairy and layer operators felt that environmental controls are making it harder to run a farm, whereas lower proportions of farmers in other enterprise categories tended to agree (item g).

Less than a third of respondents felt that laws regulating water pollution from farm animals are badly needed, although hog farmers were somewhat more receptive to the idea and dairy farmers least favorable (item h). Less than a third of the sample felt that animal waste is a serious water quality problem (item i). Similar proportions thought that the government should pay farmers to practice pollution control, although dairy and hog farmers were somewhat more willing to entertain the idea (item j).

The respondents did not see farm animal waste as a major pollution problem in their county's streams and rivers, although dairy and hog farmers again were somewhat more sensitive to the issue (item k). Broiler and beef operators were least likely to perceive a need for change in the way animal waste is handled on the farm, although more than a quarter of the dairy farmers acknowledged the need for some action (item l).

## **Waste Treatment Practices and Facilities**

**FACILITIES.** The data in table 2 profile waste treatment facilities on the respondent farms by enterprise categories. Almost 80 percent of the beef operators reported no facilities. About half the poultry operators had no system. Hog and dairy operators were most likely

TABLE 2. PROFILE OF ANIMAL WASTE TREATMENT FACILITIES BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Waste treatment facility	Present on farm, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
None on farm .....	79.7	30.8	50.0	53.7	43.8
Lagoon system					
Single cell/no recycle .....	3.1	33.3	0	0	21.9
Single cell/recycle .....	0	0	0	0	3.1
Two cell/no recycle .....	1.8	16.7	3.6	1.9	6.3
Two cell/recycle .....	1.8	8.3	10.7	0	3.1
Storage pond system					
Storage pond only .....	3.5	8.3	7.1	3.7	12.5
Storage pond/lagoon without recycle .....	.9	0	0	0	9.4
Storage pond/lagoon with recycle ..	.4	8.3	3.6	0	3.1
In-house storage <sup>1</sup>					
Broiler waste on floor .....	9.3	8.3	21.4	42.6	12.5
Layer waste under high rise .....	2.6	0	25.0	1.9	3.1
Other systems					
Concrete or block pit .....	5.3	33.3	14.3	14.8	9.4
Other types .....	7.9	16.7	25.0	13.0	9.4
Condition of facilities					
Beyond capacity .....	7.9	9.1	4.5	2.9	8.3
At capacity .....	27.6	36.4	36.4	20.6	25.0
Below capacity .....	64.5	54.5	59.1	76.5	66.7
<i>Number</i> .....	<i>250</i>	<i>14</i>	<i>27</i>	<i>54</i>	<i>32</i>

<sup>1</sup>Some poultry operators also have other animal enterprises.

to have some kind of facility for storing and treating animal waste.

Lagoon and storage pond systems were commonly found on dairy and hog farms. Dairy farms were more likely to use lagoon complexes, whereas hog farmers were more likely to employ some type of storage pond arrangement (4). Broiler operators were more likely to store chicken waste within the building where the animals are confined. Almost half the dairy farmers reported other kinds of systems, often some type of concrete or block pit.

Regardless of the type of system they reported, if any, respondents were asked to rate the relative condition of their on-farm animal waste disposal facilities. A majority of all respondents reported that their facilities were not fully utilized. Over a third of dairy and layer operators indicated that their facilities were at capacity. Dairy and hog farmers were most likely to report facilities receiving more waste than they were designed to handle.

**UTILIZATION OF ANIMAL WASTE.** Table 3 profiles the utilization of animal waste by enterprise. Most of the farmers in these



TABLE 3. UTILIZATION OF ANIMAL WASTE BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Use of animal waste	Response, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
<i>Used on the farm for refeeding</i> . . . . .	8.5	7.1	13.3	20.3	0
<i>Spread<sup>1</sup> on pasture or hayland</i> . . . . .	63.1	78.6	86.7	93.2	60.7
<i>Spread on cropland</i> . . . . .	8.9	50.0	16.7	16.9	20.0
<i>Sold for refeeding</i> . . . . .	1.3	0	0	3.4	0
<i>Sold for fertilizer</i> . . . . .	4.4	7.1	13.3	10.2	3.3
<i>Given to others without charge</i> . . . . .	9.4	28.6	26.7	27.1	6.7
<i>Number</i> . . . . .	250	14	27	54	32

<sup>1</sup>The survey item did not distinguish mechanical spreading from natural dispersal.

two counties spread animal waste on pasture or hayland. About half the dairy operators spread on cropland. About a quarter of the dairy and poultry operators gave animal waste to others without charge. Compared to other enterprises, broiler operators were the only ones to recycle chicken manure as a component of a cattle ration.

**LAND APPLICATION PRACTICES.** Land application practices are detailed in table 4. Dairy operators were most likely to spread manure on crop acres and to spread on more acres than farmers in other enterprise categories (item a). Most other types of enterprises did not spread manure on crop land. Poultry and dairy operators were most likely to spread waste on pasture land and to apply manure to more acres (item b).

Manure is most often applied to land in solid form with a spreader (item c). Dairy farms disperse waste in liquid form more often than other types of operation. Two of the 14 dairy farms reported using irrigation as a method for applying waste to land.

All the layer operations in the study applied animal waste at least once a year, although around 16 percent of beef and hog operations rarely or never spread manure (item d). About 62 percent of the broiler operators applied animal waste to land two or more times a year. Beef operations applied manure least frequently of all the enterprise categories.

Animal waste spread on hilly land is vulnerable to erosion and subsequent pollution of rivers and streams. Given the terrain characterizing the two north Alabama counties, about two-thirds of the

TABLE 4. PROFILE OF ANIMAL WASTE LAND APPLICATION PRACTICES BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Practice	Present on farm, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. Crop land treated with animal waste:					
None .....	84.1	42.9	80.0	74.1	74.3
Less than 50 acres .....	9.1	14.3	0	15.5	14.3
50 to 100 acres .....	3.8	14.3	10.0	5.2	8.6
More than 100 acres .....	3.0	28.6	10.0	5.2	2.9
b. Pasture/hayland treated with animal waste:					
None .....	27.7	14.3	6.7	3.5	38.2
Less than 50 acres .....	33.5	28.6	30.0	43.9	38.2
50 to 100 acres .....	21.9	28.6	33.3	28.1	17.6
More than 100 acres .....	16.9	28.6	30.0	24.6	5.9
c. Method of application to land:					
Do not apply to land .....	20.3	0	3.6	1.7	25.0
Dry/solid spreader .....	70.4	85.7	79.3	98.3	56.3
Tank wagon/liquid spread .....	7.0	42.9	27.6	3.4	9.4
Irrigation .....	.8	21.4	3.6	0	6.3
Pile in field .....	1.2	7.1	0	0	3.1
Other technique .....	7.1	0	0	1.7	3.1
d. Annual frequency of land application:					
Rarely or never .....	18.2	7.1	0	1.7	15.4
Once .....	48.1	35.7	41.4	36.2	53.8
Twice .....	25.2	28.6	37.9	48.3	11.5
Three or more times .....	8.4	28.6	20.7	13.8	19.2
e. Nature of terrain where animal waste is applied:					
Mostly flat .....	10.4	7.7	6.7	13.6	24.0
Mostly flat, some hilly .....	40.3	30.8	50.0	45.8	48.0
Mostly hilly, some flat .....	37.9	38.5	40.0	32.2	16.0
Mostly hilly .....	11.4	23.1	3.3	8.5	12.0
<i>Number</i> .....	<i>250</i>	<i>14</i>	<i>27</i>	<i>54</i>	<i>32</i>

respondents reported spreading animal waste on land that is some combination of hilly and flat (item e.). Almost a quarter of the dairy operators spread on land they described as mostly hilly, while a similar proportion of hog farmers indicated they applied animal waste to land that was mostly flat.

**ANIMAL WASTE ANALYSIS.** Table 5 describes procedures utilized to analyze the nutrient content of animal waste. This information is useful for gauging the utilization of animal waste in feeding regimes, for judging the adequacy of sites for land application, and for assessing the subsequent need for other soil amendments.

About a third of dairy and layer operators said they obtained

nutrient analysis of animal waste in advance of utilization. A majority of all respondents obtained soil tests for the animal waste application site, but 84 percent of layer operators did so, the largest segment to report this.

Few respondents obtained recent calibrations of their manure spreaders to more accurately gauge the quantity of nutrients being applied. No dairy respondent reported a calibration, and only 20 percent of the broiler operators did so.

TABLE 5. ANIMAL WASTE ANALYSIS PROCEDURES BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Waste analysis procedure	Used on farm, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
Nutrient analysis (N-P-K) . . . . .	14.8	33.3	31.6	15.4	18.2
Crude protein analysis (nitrogen) . . . . .	8.3	33.3	26.3	7.7	9.1
Soil test for application site . . . . .	69.4	77.8	84.2	57.7	54.5
Calibration of manure spreader . . . . .	14.8	0	5.3	19.2	18.2
<i>Number</i> . . . . .	<i>250</i>	<i>14</i>	<i>27</i>	<i>54</i>	<i>32</i>

**ANIMAL MANAGEMENT.** Table 6 reports how the respondents confine, water, and dispose of their animals. Poultry were mainly kept in buildings, whereas the larger animals were confined in pasture or open lots (item a).

About two-thirds reported that animals had access to a stream on at least an occasional basis. The large proportion of poultry operators reporting such access is primarily due to the presence of multiple enterprises on farms, as the survey question was not asked for each animal enterprise.

Most operators disposed of their dead animals in an excavated pit, while poultry operators were somewhat more likely to use incineration (item c).

Springs, streams, and rivers were cited as water sources by many large animal producers, whereas about 80 percent of the poultry growers utilized public systems as water sources for their livestock. The proximity of animal herds to surface water can be a source of pollution if wastes are not managed properly.

TABLE 6. ANIMAL MANAGEMENT PRACTICES AND ARRANGEMENTS BY ENTERPRISE,  
BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Practice	Present on farm, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. Animal confinement:					
Building <i>only</i> .....	0.4	0	92.3	98.2	7.4
Open lot/pasture <i>only</i> .....	77.3	45.5	0	0	25.9
Both building and pasture .....	22.3	54.5	7.7	1.8	66.7
b. Livestock have access to a stream:					
No .....	24.5	30.8	23.3	29.8	34.3
Yes, sometimes .....	29.5	23.1	26.7	29.8	40.0
Yes, on a regular basis .....	46.0	46.2	50.0	40.4	25.7
c. Dead animals disposal method:					
Excavated pit .....	55.8	64.3	50.0	47.5	47.1
Constructed pit .....	16.1	21.4	20.0	42.4	26.5
Incinerator .....	7.6	7.1	16.7	13.6	11.8
Rendering plant .....	3.2	7.1	6.7	1.7	5.9
Other .....	30.9	21.4	23.3	16.9	35.3
d. Source of water for livestock:					
Well .....	32.0	64.3	30.0	34.5	45.5
Spring .....	44.8	35.7	36.7	29.3	48.5
Public system .....	49.2	50.0	80.0	83.1	54.5
Stream or river .....	51.2	42.9	33.3	32.2	36.4
<i>Number</i> .....	250	14	27	54	32

## Animal Waste Management Systems

**PRESENCE OF SYSTEM.** Table 7 profiles the presence of five key components of on-farm animal waste management systems. Only 55 percent of the beef operators reported a method for collecting waste on their farms, whereas more than 82 percent of the other enterprise categories did so.

About 86 percent of dairy operators had some mechanism for transferring manure to storage or treatment, as did 71 percent of the hog operators. Less than 45 percent of broiler and beef farms had such facilities.

Over half of the dairy and hog operations had waste storage systems for later use on the land, but less than half the other enterprise categories did so (item c). Almost two-thirds of the dairy operators had treatment facilities, as did 39 percent of the hog operations, but less than 19 percent of the others (item d).

Over three-quarters of all the animal enterprises except beef reported a land application disposal component of their animal waste manage-

TABLE 7. PERCENT REPORTING PRESENCE OF WASTE MANAGEMENT SYSTEM ELEMENT ON FARM BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

System element	Present on farm, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. <i>Collection</i> of animal waste from pens, lots, or houses .....	54.7	100	89.7	83.0	89.7
b. <i>Transfer</i> of manure to storage or treatment .....	36.5	85.7	69.2	44.2	71.4
c. <i>Storage</i> of waste for later use .....	30.3	71.4	40.0	28.9	58.9
d. <i>Treatment</i> to reduce the concentration of nutrients .....	11.1	61.5	18.2	5.4	39.1
e. <i>Application</i> for land disposal .....	46.4	78.6	80.0	76.7	76.9
<i>Number</i> .....	250	14	27	54	32

ment systems. Less than half the beef operators reported a land application system, largely because most beef herds are pastured and farmers rely on natural dispersion in the confined areas.

**ADEQUACY OF SYSTEM.** Table 8 summarizes the ratings farmers gave of the five components of their animal waste management system. The percent rating each element as good or better is reported.

The collection components of the systems were rated highly by most of the sample. Over 90 percent of broiler operators gave high ratings

TABLE 8. RATINGS OF ADEQUACY OF SPECIFIC WASTE MANAGEMENT SYSTEM BY FARM ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

System element	Rated good or better, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. <i>Collection</i> of animal waste from pens, lots, or houses .....	71.4	64.3	88.5	93.2	61.5
b. <i>Transfer</i> of manure to storage or treatment .....	67.2	66.7	77.8	89.5	70.0
c. <i>Storage</i> of waste for later use .....	62.0	40.0	80.0	72.7	71.4
d. <i>Treatment</i> to reduce the concentration of nutrients .....	47.1	50.0	50.0	100	55.6
e. <i>Application</i> for land disposal .....	77.9	90.9	80.0	90.9	80.0
<i>Number</i> .....	250	14	27	54	32

to this aspect of their system, but only slightly more than 60 percent of the dairy and hog operators did so (item a).

More than two-thirds of the respondents gave high ratings to the transfer aspect of their systems (item b). Almost 90 percent of the broiler operators gave good or better ratings.

Dairy farmers were most concerned about the storage of animal waste for later use, as only 40 percent rated this part of their facilities as good or better (item c). About two-thirds of the remainder of the sample rated the adequacy of this aspect as good or better.

All the broiler operators rated their treatment system as good or better, but around 50 percent of the other operators felt the adequacy of their system was good or better (item d). The treatment or biological reduction of animal manure was viewed as the most inadequate or vulnerable component of the animal waste management system by the respondents in this study.

Application of wastes to the land was, on average, the most adequate system element in the view of the respondents (item e). More than 77 percent rated the adequacy of this component of their animal waste disposal system as good or better.

**SYSTEM IMPACT RATINGS.** The data in table 9 show the percent of respondents who rated three central impacts of their waste management system on the environment and their overall operation. Few operators anticipated substantial off-site pollution from their animal waste handling system (item a). Seven percent of the poultry growers saw a great or very great potential for off-site pollution, but negligible numbers of farmers in other enterprise categories perceived such problems.

TABLE 9. RATINGS OF OVERALL WASTE MANAGEMENT SYSTEM BY ENTERPRISE SYSTEM, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Aspect	Rating, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. High potential for off-site pollution from system .....	2.7	0	7.2	7.3	0
b. Satisfied with convenience and ease of operation of waste handling system ....	90.7	57.2	93.4	98.3	78.1
c. Satisfied with pollution control achieved by system .....	93.1	78.6	93.3	93.1	81.2
Number .....	250	14	27	54	32

About 93 percent of the beef and poultry growers were satisfied with the level of pollution control achieved by their waste management system. Hog and dairy farmers were somewhat less satisfied with this dimension of their facilities.

Over 90 percent of the beef and poultry farmers were satisfied with the convenience and ease of operation of their waste management system (item c). Nearly all the broiler growers thought they had good systems. Only 57 percent of the dairy operators were satisfied with their system, and hog farmers were intermediate at 78 percent. Dairy and hog operations seem to be associated with somewhat greater felt needs for disposal system improvements.

### Improving Waste Management Systems

**PREVIOUS ASSISTANCE.** Respondents were asked a series of questions about their previous contacts with public agencies and other sources of information and technical assistance on animal waste disposal problems. As noted in table 10, more dairy operators had discussed animal waste disposal problems with the listed sources than farmers in any other enterprise category (item a). Broiler growers were more likely to have discussed waste management problems with their peers and least likely to have consulted public agencies.

Many respondents indicated they had received cost-share monies from public agencies in the past (item b). Half or more of the beef, layer, and hog farmers had done so. Hog farmers had not received any

TABLE 10. PREVIOUS CONTACTS AND ASSISTANCE RELATIVE TO ANIMAL WASTE MANAGEMENT BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Source of contact and assistance	Agree, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
<b>a. Discussed animal waste management problems with:</b>					
SCS staff .....	28.3	60.0	47.4	25.0	47.8
ASCS staff .....	18.9	40.0	42.1	9.4	34.8
County Extension staff .....	13.2	40.0	26.3	9.4	17.4
Private engineers .....	5.7	0	10.5	0	13.0
Equipment dealers .....	7.5	20.0	21.1	12.5	8.7
Other farmers .....	50.0	60.0	57.9	71.9	52.2
<b>b. Obtained cost-share monies from:</b>					
ASCS .....	54.3	40.0	64.3	44.4	50.0
Farmers Home Administration ...	9.9	0	7.1	22.2	0
Soil & Water Conservation District	21.5	40.0	28.6	22.2	0
<i>Number</i> .....	250	14	27	54	32

funds from the Farmers Home Administration or from their local Soil and Water Conservation District.

**NEED FOR TECHNICAL ASSISTANCE.** Table 11 lists the percent of respondents agreeing or strongly agreeing with statements associated with upgrading or installing an animal waste handling system. A majority felt that they had a good understanding of the next step to take in improving their waste handling facilities (item a). Over 70 percent of the dairy and layer operators felt this way, but beef and hog farmers were somewhat less certain.

About a third of dairy and hog farmers indicated they needed technical assistance to determine the type of animal waste treatment needed on their farms (item b). About 11 percent of the other respondents felt this way.

About 57 percent of the dairy farmers reported they needed financial assistance to install needed waste treatment facilities, as did 40 percent of the hog farmers (item c). Respondents in the other enterprise categories were less clear about the role of financial assistance in the actions they might take.

About 57 percent of the beef and broiler operators believed that the government should not pay anything to help farmers improve their waste handling facilities (item d). In contrast, about 40 percent of the

TABLE 11. PERCEIVED NEEDS FOR ASSISTANCE TO IMPROVE WASTE HANDLING FACILITIES BY ENTERPRISE, BLOUNT AND CULLMAN COUNTIES, ALABAMA 1988

Assistance need	Agreement, by enterprise				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. Have <i>good understanding</i> of the next step to take in improving facilities . . . . .	59.6	71.4	75.9	64.8	56.3
b. Need <i>technical assistance</i> to determine the type of treatment needed . . . . .	11.9	35.7	10.7	10.7	31.4
c. Need <i>financial assistance</i> to install treatment facilities . . . . .	12.2	57.1	21.4	9.4	40.0
d. If <i>financial assistance</i> were available to improve waste handling facilities, what level of the cost should be paid by the government?					
Should not pay anything . . . . .	57.5	41.7	39.3	56.4	37.5
25 percent or less . . . . .	6.4	0	3.6	1.8	3.1
26-50 percent . . . . .	16.9	8.3	25.0	18.2	18.8
51-75 percent . . . . .	11.9	41.7	17.9	12.7	25.0
More than 75 percent . . . . .	7.3	8.3	14.3	10.9	15.6
<i>Number</i> . . . . .	250	14	27	54	32



other operators thought financial assistance would be appropriate. Half the dairy farmers responded that such assistance should pay for 51 percent or more of the cost of environmental improvements. About 40 percent of the hog farmers also expected this level of cost sharing.

### Anticipated Impacts of Environmental Regulation

Farmers were asked to assess the extent to which selected environmental and regulatory issues might affect the future survival and growth of their farms. Table 12 summarizes these responses by showing the percent viewing each factor as hindering their future in farming. About a third of the sample said that compliance with water pollution laws and regulations will hinder their future in farming (item a). Dairy farmers were the most pessimistic, as 43 percent of this group saw water pollution rules as hindering their future in farming.

The availability of cost-sharing assistance for pollution control was not viewed as a hindrance to their future in farming by many respondents (item b). Poultry growers were slightly more pessimistic about the availability of cost-sharing and its relationship to their future in farming.

The cost of pollution control technology was viewed as a hindrance by most respondents in the study (item c). About 85 percent of the dairy farmers felt this way and more than 50 percent of the hog farmers. Beef and broiler operators were not as likely to rate this item as a hindrance to their future in farming, as less than half of these groups saw it that way.

TABLE 12. RATED IMPACT OF SELECTED ENVIRONMENTAL AND REGULATORY ISSUES ON FUTURE GROWTH OR SURVIVAL OF FARM, BLOUNT AND CULLMAN COUNTIES, ALABAMA, 1988

Regulatory issue	Rated as hindering future in farming				
	Beef	Dairy	Layers	Broilers	Hogs
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
a. Water pollution laws and regulations ..	27.4	42.9	39.3	36.0	32.3
b. The availability of cost sharing assistance for pollution control .....	4.5	7.1	11.1	11.8	9.4
c. The cost of pollution control technology .....	39.5	84.6	69.2	42.3	53.1
d. Soil erosion control requirements .....	7.0	23.1	11.5	11.5	9.7
e. The availability of technical assistance for pollution control .....	3.6	7.7	3.8	3.9	3.1
<i>Number</i> .....	250	14	27	54	32

About a quarter of the dairy operators rated soil erosion requirements as a hindrance to their future in farming (item d). Only about 10 percent of the other respondents saw this as a problem for their future.

The availability of technical assistance for pollution control did not seem to be perceived as an obstacle for most operators (item e). Dairy farmers, however, were slightly more concerned about the availability of help in deciding what to do about animal waste generated on their farms.

## **SUMMARY AND CONCLUSIONS**

The results suggest that farmers clearly recognize the value of animal waste as a feed and a fertilizer, while at the same time they tend to discount the extent to which animal waste is a source of pollution of groundwater, rivers, and streams. Few respondents acknowledged the necessity of making changes in the way animal waste is handled on their farms. Consequently, they exhibited little commitment to effecting improvements in this part of their operations.

Many animal producers did not have on-farm waste treatment facilities and many who did rated the ones they had as beyond capacity, implying that the system needs to be renovated or a larger system installed. The most common use of animal waste was spreading on pasture or hayland. Many dairy and poultry operators gave at least some of their waste away without charge. A major conclusion to be drawn from the results relates to the wide variability in treatment, application, and feeding practices across different types of farm operations, even among those engaged in the same enterprise.

The terrain of the study counties is such that application of animal waste to hilly land could readily lead to runoff and pollution problems. Many respondents applied animal waste in multiple periods of the year and many applied it to at least partly hilly land. Coupled with low levels of problem recognition and a physical environment readily amenable to rapid runoff of waste into flowing waters, animal waste pollution may represent a significant performance gap for some farm operators.

Most respondents reported having discussed animal waste management problems with other farmers, as well as with representatives of public agencies concerned with environmental matters. It seems relatively clear that farmers are beginning to understand the shifting societal expectations for agricultural production, particularly the off-site impacts of animal confinement. Just as other industries can no longer externalize the costs of environmental pollution, animal production must develop systems for treating and disposing of waste in

a responsible manner that also minimizes on-farm investments and operating costs. The first step toward adoption of an economically viable and environmentally acceptable waste management system is a recognition of the problem and the potential for improvement among those closest to the situation.

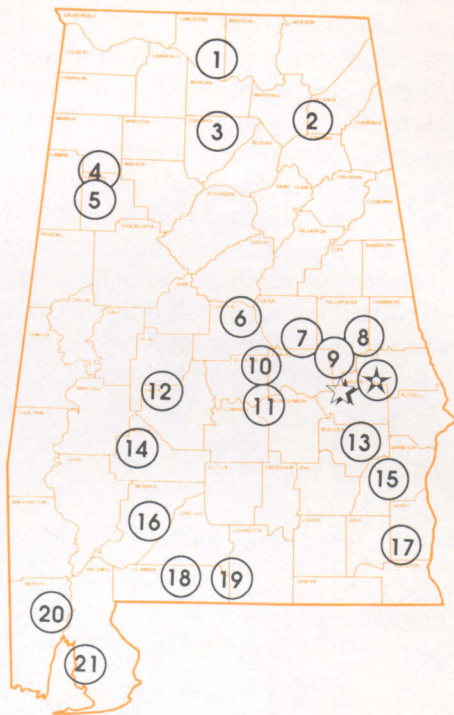
Ameliorating the impacts of animal waste on the environment will require better treatment facilities on some farms and more careful practices on the part of many farm operators (4). Changing waste disposal practices will depend on awareness and recognition of the problem, as well as on the availability of solutions tailored to individual farm situations. Many operators rely on rivers and streams for stock watering, and watercourses often flow through confinement areas. Habit, convenience, and traditional acceptance of casual disposal of animal waste will only be overcome through education, readily available technical assistance, and financial incentives to install, renovate, or expand facilities.

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# Alabama's Agricultural Experiment Station System AUBURN UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



## Research Unit Identification

- ★ Main Agricultural Experiment Station, Auburn.
- ★ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Chilton Area Horticulture Substation, Clanton.
7. Forestry Unit, Coosa County.
8. Piedmont Substation, Camp Hill.
9. Plant Breeding Unit, Tallassee.
10. Forestry Unit, Autauga County.
11. Prattville Experiment Field, Prattville.
12. Black Belt Substation, Marion Junction.
13. The Turnipseed-Ikenberry Place, Union Springs.
14. Lower Coastal Plain Substation, Camden.
15. Forestry Unit, Barbour County.
16. Monroeville Experiment Field, Monroeville.
17. Wiregrass Substation, Headland.
18. Brewton Experiment Field, Brewton.
19. Solon Dixon Forestry Education Center,  
Covington and Escambia counties.
20. Ornamental Horticulture Substation, Spring Hill.
21. Gulf Coast Substation, Fairhope.