VOLUME VIII: CHAPTER 8

METHODS FOR ESTIMATING GREENHOUSE GAS EMISSIONS FROM LIVESTOCK MANURE MANAGEMENT

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1

INTRODUCTION

The EIIP guidelines are designed to describe emission estimation techniques for greenhouse gas sources in a clear and unambiguous manner and to facilitate preparation of inventories at the state level. This chapter presents the methodology for estimating methane and nitrous oxide emissions from manure management. The methodology presented in this chapter has been revised to reflect new activity data, emission factors, and methods pertaining to this source category. Where possible, the methodology has been updated to be consistent with the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2002*.

Section 2 of this chapter contains a general description of this source category. Section 3 provides a listing of the steps involved in estimating methane and nitrous oxide emissions from manure management. Section 4 presents the preferred estimation method. Section 5 is a placeholder for alternative estimation techniques that may be added in the future. A summary of uncertainty for this source category is provided in Section 6. References used in developing this chapter are identified in Section 7. Section 8 provides additional data for the preferred methodology in the form of an appendix.

In addition to these guidelines, there are a series of user friendly spreadsheet tools available to assist in the development of emission inventories at the state level. Please consult the Agriculture Module of the State Inventory Tool[1] to calculate emissions from this source category using the preferred emission estimation method.

[1] Note: The spreadsheet tool may have a different order of calculations, and may not show all calculations to the user.

2

SOURCE CATEGORY DESCRIPTION

2.1 EMISSION SOURCES

Manure decomposition is a process in which microorganisms derive energy and material for cellular growth by metabolizing organic material in manure. When decomposition occurs without oxygen (i.e., anaerobic decomposition), methane (CH_4) is produced. This overview section will describe the fundamentals of anaerobic decomposition, the CH_4-producing capacity of livestock manure, and the factors that influence CH_4 production from livestock manure.[2] Only manure from animals managed by humans for production of animal products is included in the calculations (i.e., manure from wild animals is excluded).

In addition to CH_4, nitrous oxide (N_2O) is produced during the manure decomposition process. Estimation of N_2O emissions from animal waste is divided into three methodologies in this volume. Emissions from animal waste during storage in a management system are accounted for in this chapter. It is assumed that the manure from these waste management systems is ultimately applied to soils, where further emissions take place. These emissions, as well as the third emission type, manure managed through daily spread, are considered to be emissions from agricultural soils, and are presented in Chapter 10 (*Methods for Estimating Greenhouse Gas Emissions from Agricultural Soil Management*), Section 4.2. Table 8.2-1 summarizes these and other agricultural and forestry activities associated with emissions of carbon dioxide (CO_2), CH_4, and N_2O, and provides a roadmap indicating the chapter in which each activity is addressed.

Production of N_2O during the storage and treatment of animal wastes occurs by combined nitrification-denitrification of nitrogen contained in ammonia that is present in the wastes. The amount of N_2O released depends on the system and the duration of waste management. Aeration initiates the nitrification-denitrification reactions (i.e., oxygen is required to begin the nitrification process); thus one would expect increased aeration to cause increased N_2O production. However, there is not yet enough quantitative data to derive a relationship between the degree of aeration and N_2O emissions from slurry during storage and treatment. Because there is very limited information available on N_2O emissions from animal waste during storage and treatment, and there is a very wide range in estimated N_2O losses from those sources, the estimates of N_2O emissions from storage and treatment of animal wastes will not be as accurate as estimates of CH_4 emissions. For more information on the nitrogen cycle, refer to Chapter 10 (*Methods for Estimating Greenhouse Gas Emissions from Agricultural Soil Management*).

[2] Background information on animal wastes is adapted from Safley et al. (1992a).

Table 8.2-1: Greenhouse Gas Emissions and Sinks from the Agricultural and Forest Sectors

A check indicates emissions or sinks may be significant

Activity	Associated Greenhouse Gas Emissions and Sinks and Chapter where these Emissions or Sinks are Addressed					
	CO_2	Chapter	CH_4	Chapter	N_2O	Chapter
Energy (Farm Equipment)	✓	1	✓	3	✓	3
Animal Production: Enteric Fermentation			✓	7		
Animal Production: Manure Management						
Solid Storage			✓	8	✓	8
Drylot			✓	8	✓	8
Deep Pit Stacks			✓	8	✓	8
Litter			✓	8	✓	8
Liquids/Slurry			✓	8	✓	8
Anaerobic Lagoon			✓	8	✓	8
Pit Storage			✓	8	✓	8
Periodic land application of solids from above management practices					✓	10
Pasture/Range (deposited on soil)			✓	8	✓	10
Paddock (deposited on soil)			✓	8	✓	10
Daily Spread (applied to soil)			✓	8	✓	10
Animal Production: Nitrogen Excretion (indirect emissions)					✓	10
Cropping Practices						
Rice Cultivation			✓	9		
Commercial Synthetic Fertilizer Application					✓	10
Commercial Organic Fertilizer Application					✓	10
Incorporation of Crop Residues into the Soil					✓	10
Production of Nitrogen-fixing Crops					✓	10
Liming of Soils	✓	12				
Cultivation of High Organic Content Soils (histosols)	✓	10			✓	10
Cultivation of Mineral Soils	✓	Not included[a]				
Changes in Agricultural Management Practices (e.g., tillage, erosion control)	✓	Not included[a]				
Forest and Land Use Change						
Forest and Grassland Conversion	✓	12				
Abandonment of Managed Lands	✓	12				
Changes in Forests and Woody Biomass Stocks	✓	12				
Agricultural Residue Burning			✓	11	✓	11

[a] Emissions may be significant, but methods for estimating greenhouse gas emissions from these sources are not included in the EIIP chapters.

The Fundamentals of Anaerobic Decomposition

Livestock manure is primarily composed of organic material and water. Under anaerobic conditions, the organic material is decomposed by anaerobic and facultative bacteria (i.e., bacteria living in the presence or absence of oxygen). The end products of anaerobic decomposition are CH_4, CO_2, and stabilized organic material.

The anaerobic decomposition process can be represented in three stages: hydrolytic, acid forming, and methanogenic. Anaerobic decomposition of carbohydrates in manure proceeds as follows:[3]

- Stage 1: Hydrolytic. In the first stage, complex organic materials in the manure substrate are broken down through the hydrolytic action of enzymes. (Enzymes are proteins formed by living cells that act as catalysts in metabolic reactions.) The amount and rate of breakdown can vary substantially, depending on the enzymes present, the characteristics of the manure, and environmental factors such as pH and temperature.
- Stage 2: Acid Forming. Anaerobic and facultative bacteria reduce (ferment) the simple sugars produced in Stage 1 to simple organic acids. Acetic acid is the primary product of the breakdown of carbohydrates, though other organic acids such as propionic acid and butyric acid can be formed. In addition, metabolic hydrogen and CO_2 are produced. With acetic acid as an end product, the breakdown of a simple sugar molecule (glucose) in Stage 2 can be represented as:

$$\begin{array}{ccccccccc} C_6H_{12}O_6 & + & 2H_2O & \rightarrow & 2CH_3COOH & + & 2CO_2 & + & 4H_2 \\ \textit{Glucose} & + & \textit{Water} & \rightarrow & \textit{Acetic Acid} & + & \textit{Carbon Dioxide} & + & \textit{Metabolic Hydrogen} \end{array}$$

- Stage 3: Methanogenic. CH_4 producing bacteria (methanogens) convert acetic acids to CH_4 and CO_2 and convert metabolic hydrogen and CO_2 into CH_4 and water. Methanogens are strict anaerobes and cannot tolerate the presence of molecular oxygen. Methanogens multiply slowly and are very sensitive to temperature, pH, and substrate composition. With acetic acid, metabolic hydrogen, and CO_2 as substrate, the reactions producing CH_4 can be expressed as:

$$\begin{array}{ccccccc} 2CH_3COOH & \rightarrow & 2CH_4 & + & 2CO_2 \\ \textit{Acetic Acid} & \rightarrow & \textit{Methane} & + & \textit{Carbon Dioxide} \end{array}$$

$$\begin{array}{ccccccccc} 4H_2 & + & CO_2 & \rightarrow & CH_4 & + & 2H_2O \\ \textit{Metabolic Hydrogen} & + & \textit{Carbon Dioxide} & \rightarrow & \textit{Methane} & + & \textit{Water} \end{array}$$

[3] This discussion focuses on the decomposition of carbohydrates because carbohydrate decomposition accounts for the majority of the CH_4 produced from livestock manure and because the process of CH_4 production from the decomposition of carbohydrates is best understood.

Methane-Producing Capacity of Livestock Manure

In general, livestock manure is highly conducive to CH_4 generation due to its high organic content and large bacterial populations. However, the specific CH_4-producing capacity of livestock manure depends on the specific composition of the manure, which in turn depends on the composition and digestibility of the animal diet. In general, the greater the energy content of the feed, the greater the CH_4-producing capacity of the resulting manure. For example, feedlot cattle eating a high energy grain diet produce highly biodegradable manure with a high CH_4-producing capacity. Range cattle eating a low energy forage diet produce a less biodegradable manure with only half the CH_4-producing capacity of feedlot cattle manure. However, some higher energy feeds also are more digestible than lower quality forages, which can result in less overall waste excreted from the animal. Ultimately, a combination of diet characteristics and the growth rate of the animals will affect the total manure produced.

In principle, the CH_4-producing capacity of a quantity of manure could be predicted from the gross elemental composition of the manure. In practice, however, data have not been collected to implement this approach and the CH_4-producing capacity is instead determined through direct laboratory measurement. The CH_4-producing capacity of livestock manure is generally expressed in terms of the quantity of CH_4 that can be produced per kilogram of volatile solids (VS) in the manure.[4] This quantity is commonly referred to as B_o with units of cubic meters of CH_4 per kilogram VS (m^3 CH_4/ kg VS). Representative B_o values for a number of livestock manure types are presented later in this chapter.

2.2 FACTORS INFLUENCING EMISSIONS

Methane

While a particular quantity of manure may have a certain potential to produce CH_4 based on its VS content, the manure management system and the climate in which the manure is managed are major factors influencing the amount of CH_4 actually produced during manure decomposition.

The characteristics of the manure management systems and climate can be expressed in a methane conversion factor, which represents the extent to which the potential for emitting CH_4 is realized. The methane conversion factor can theoretically range from 0 to 1, with "0" representing manure management systems and climate conditions resulting in no CH_4 production and "1" representing systems and conditions where the full B_o value is realized. In reality, most manure management systems operate with methane conversion factor values somewhere between these two extremes. The primary characteristics determining the methane conversion factor are the following:

[4] Volatile solids are defined as the organic fraction of the total solids in manure that will oxidize and be driven off as gas at a temperature of 1,112°F. Total solids are defined as the material that remains after evaporation of water at a temperature between 217° and 221°F.

Manure Management System Factors

- *Contact with Oxygen*. Under aerobic conditions where oxygen is in contact with the manure, there is no potential for CH_4 production.
- *Water Content*. Liquid-based systems promote an oxygen-free environment and anaerobic decomposition. In addition, water is required for bacterial cell production and metabolism, and acts as a buffer to stabilize pH. Moist conditions increase the potential for CH_4 production.
- *pH.* CH_4-producing bacteria are sensitive to changes in pH. The optimal pH is near 7.0 but CH_4 can be produced in a pH range between 6.6 and 8.0.
- *Nutrients*. Bacterial growth depends on the availability of nutrients such as nitrogen, phosphorus, and sulfur. Deficiency in one or more of these nutrients will inhibit bacterial growth and CH_4 formation. Animal diets typically contain sufficient nutrients to sustain bacterial growth. Therefore, under most circumstances, nutrient availability is not a limiting factor in CH_4 production.

Climate Factors

- *Temperature*. Temperature is one of the major factors affecting the growth of the bacteria responsible for CH_4 formation (Chawla, 1986). Although methanogenesis in livestock manure has been observed between 39°F and 167°F, the rate of CH_4 production generally increases with rising temperature.
- *Moisture*. For non-liquid-based manure systems, the moisture content of the manure is determined by rainfall and humidity. The moisture content of the manure will determine the rate of bacterial growth and decomposition. Moist conditions promote CH_4 production.

Management System and Climate Factors Combined

The management system and climate factors can be combined into the following expression for estimating realized CH_4 emissions from livestock manure:

$$\textit{Realized } CH_4 \textit{ emissions} = B_o \times MCF$$

Where: B_o = the maximum CH_4 producing capacity of the manure determined by animal type and diet (m^3 CH_4/kg VS).

MCF = Methane Conversion Factor (MCF) that represents the extent to which the B_o is realized for a given livestock manure management system and environmental conditions. Note: $0 \leq MCF \leq 1$.

Nitrous Oxide

The quantity of N_2O produced depends on the manure and urine composition, the type of bacteria involved in the decomposition process, and the amount of oxygen and liquid present in the manure management system. For N_2O emissions to occur, the manure must first be handled

in an aerobic system, in which the nitrogen in ammonia is converted to nitrites (nitrification). Following this the manure must go through an anaerobic decomposition period, in which the nitrates are converted to N_2O (denitrification). These types of conditions are most likely to occur in dry manure management systems that generally have aerobic conditions, but that can undergo periods of saturation to create the anaerobic conditions necessary for N_2O emissions to occur. For example, in a cattle drylot system, manure is deposited on soil where it is oxidized to nitrite, and can be exposed to saturated conditions in the case of rain events.

3

OVERVIEW OF AVAILABLE METHODS

3.1 OVERVIEW OF PREFERRED METHOD FOR ESTIMATING METHANE EMISSIONS FROM MANURE MANAGEMENT

As discussed above, methane (CH_4) emissions from livestock manure depend on the type of manure, the characteristics of the manure management system, and the climatic conditions in which the manure decomposes.

Manure CH_4 emission estimates are developed using the following six steps: (1) obtain the required data on animal populations and manure management practices; (2) calculate the amount of volatile solids (VS) produced by each animal type; (3) estimate CH_4 emissions from each animal type, using animal specific B_o values and weighted methane conversion factors (MCFs); (4) convert emissions to metric tons of CH_4; (5) sum across animal types to estimate total annual CH_4 emissions; and (6) convert units to metric tons of carbon equivalent (MTCE).

Total emissions will equal the quantity of volatile solids managed in each system, times emissions per kilogram of volatile solids for that system. Safley et al. (1992a) demonstrated that CH_4 emissions are driven by four main factors: the quantity of volatile solids produced; the maximum CH_4-producing capacity values for the manure; the methane conversion factors for the manure management systems; and the portion of the manure handled by each manure management system.

The method described here is taken from the report by the Intergovernmental Panel on Climate Change (IPCC) entitled *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC 2000). This method is used in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* (U.S. EPA 2004).

3.2 OVERVIEW OF PREFERRED METHOD FOR ESTIMATING NITROUS OXIDE EMISSIONS FROM MANURE MANAGEMENT

To estimate emissions of nitrous oxide from manure management, not including manure used as daily spread or manure that is excreted directly on pasture, range, and paddock, the following four steps should be performed: (1) obtain required data; (2) calculate the total Kjeldahl nitrogen[5] for manure managed in each system type; (3) calculate nitrous oxide emissions from manure management; and (4) convert to units of metric tons of carbon equivalent.

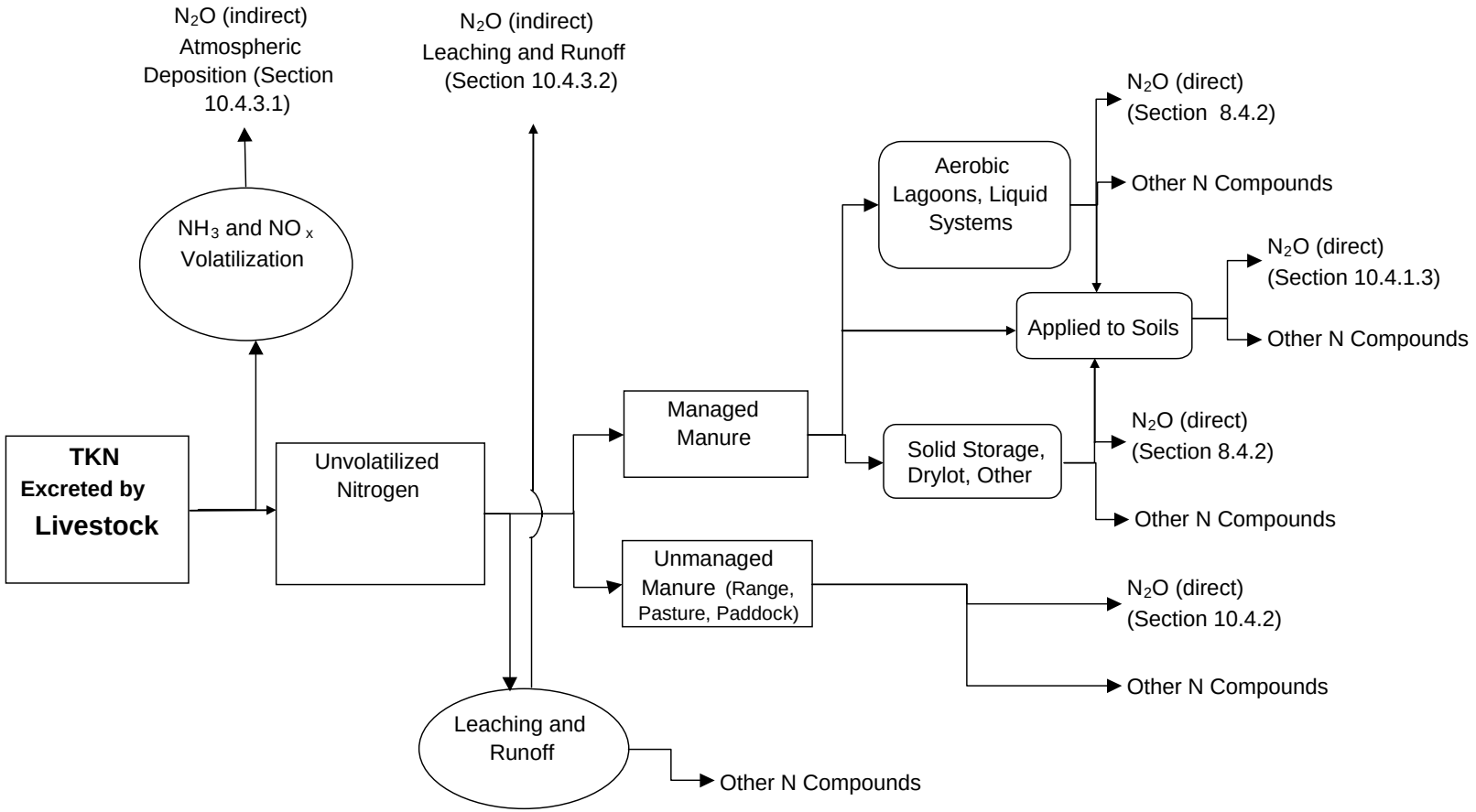
[5] Total Kjeldahl nitrogen is a measure of organically bound nitrogen and ammonia nitrogen.

This method is also taken from the report by the IPCC entitled *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC 2002), and used in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* (U.S. EPA 2004). Figure 8.3-1 traces the flow of nitrogen from livestock and indicates the section where nitrous oxide emissions from each step are addressed (note that several emission sources are addressed in other chapters).

3.3 HARMONIZING THESE METHODS WITH ESTIMATES FOR DOMESTICATED ANIMALS

Emissions estimates for manure management and enteric fermentation from domesticated livestock rely on the same underlying data on livestock populations and livestock characteristics. It is important to use the same underlying data to estimate emissions from these two sources. One way to ensure consistency is to use USDA National Agriculture Statistics Service (NASS) data to estimate the livestock populations for both sources. Although the sub-categories of livestock types for some species vary between the methods for the two sources, they are consistent overall and rely on the same underlying USDA/NASS population data. If the alternative method for cattle is used to estimate emissions from domesticated animals (this method is referred to in Chapter 7, Section 5), an effort should be undertaken to make the estimates from manure management consistent with the cattle populations and characteristics developed for that method. This effort should focus on the sizes of the cattle (their typical animal mass) and their amount of manure production, which are important factors in the emissions estimates for manure management. The estimates of the sizes of the cattle should be adjusted to ensure that the sizes are the same for both sources.

Figure 8.3-1: Nitrogen Flows Related to Livestock



4

PREFERRED METHOD FOR ESTIMATING EMISSIONS

4.1 METHANE EMISSIONS FROM ANIMAL MANURE

To estimate methane (CH_4) emissions from animal manure, the following steps should be performed: (1) obtain the required data on animal populations and manure management practices; (2) calculate the amount of volatile solids (VS) produced by each animal type; (3) estimate CH_4 emissions from each animal type, using animal specific B_o values and weighted methane conversion factors (MCFs); (4) convert emissions to metric tons of CH_4; (5) sum across animal types to estimate total annual CH_4 emissions; and (6) convert units to metric tons of carbon equivalent (MTCE). These steps are outlined in detail below and are also incorporated into the Agriculture Module of the State Inventory Tool (hereafter referred to as the State Inventory Tool). The State Inventory Tool contains annual average populations for most states and animal categories, as well as default animal characteristics, waste characteristics, and manure management system data for each state and animal type.

Step (1) Obtain Required Data

- *Required Data.* To estimate CH_4 emissions from manure, information is needed on annual average animal populations (in number of head) for the following animal types: cattle (by type), swine (by type), poultry (by type), sheep (by type), goats, and horses (see Chapter 7, Section 4.1 and Table 8.4-1 for further detail). Each animal type also needs animal characteristic data, such as typical animal mass (TAM), VS production (in kg VS per 1,000 kg animal mass per day), and maximum CH_4 producing capacity (B_o)[6] of the manure. Default animal characteristic data are provided in this guidance.

  In addition, data are needed on either the weighted MCF for each animal type or the percentage of each type of animal's manure handled in manure management systems and the MCF for each manure management system.

- *Data Sources.* Departments within each state responsible for conducting agricultural research should be consulted for animal population data. Alternatively, animal population data are provided by the U.S. Department of Agriculture's National Agriculture Statistics Service (USDA-NASS 2002). When using this data source, a state's annual average population of a given animal type may be estimated as described in Chapter 7 of this volume. Additionally,

[6] B_o is the maximum quantity of CH_4 that can be produced per kg of VS in the manure, expressed as m^3 CH_4/kg VS.

data on state and county level animal populations may be found in the *Census of Agriculture* published by the USDA for 1992 and 1997. See Table 8.4-1 for suggested data sources for populations for each animal type. Currently, the State Inventory Tool contains annual average populations from USDA-NASS for most states and animal categories and can be used to simplify data collection efforts.

Most data on animal characteristics are derived from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* (U.S. EPA 2004). The TAM for all animal types, the VS for all animal types, and the B_o for all animal types except sheep, goats, and horses were obtained from U.S. EPA (2004). Cattle VS rates are broken out by region and year in the tables at the end of this section. The B_o for sheep, goats, and horses were taken from ASAE (1995).

Weighted MCFs for dairy and feedlot cattle, swine, and poultry layers were developed by U.S. EPA (2004) and they vary by year and by state. Values are provided by state and year in the appendix at the end of this chapter.

To develop the weighted MCF for the remaining animals, data are provided in the tables at the end of this section on the percentage breakdown of the systems used to manage manure (WS%), for most states and animal types, and the MCF from each manure management system. Some of this data was derived from U.S. EPA (2004), while other information was developed for this analysis. Livestock manure management system usage was determined by obtaining information from staff of the U.S. Department of Agriculture's Agricultural Extension Service in each state. The default MCFs were developed for this analysis using average monthly temperature data. Note that the MCFs and WS% for these animals may not match the national U.S. Inventory manure management data. This is because methodology for determining these estimates was revised at the national level, but the state-specific estimates have not yet been updated to reflect this revision. Data on animal characteristics are also available in the State Inventory Tool.

Table 8.4-1: Recommended Representative Animal Types and Data Sources

Animal Type in Preferred Method	USDA Category	Source for Data
Dairy Cattle		
Dairy Cows	Milk Cows That Have Calved	*Cattle*-January and July Inventories
Dairy Replacement Heifers	Milk Cow Replacement[a]	
Beef Cattle		
Beef Cows	Beef Cows That Have Calved	*Cattle*-January and July Inventories
Beef Replacement Heifers	Beef Cow Replacement[a]	
Calves	All Calves	
Steer Stockers	Steer (500 lbs +) – Feedlot Steer	
Heifer Stockers	Other Heifers (500 lbs +) – Feedlot Heifers	
Feedlot Steer	Total Cattle on Feed * ratio of Steer to Other Heifers (or Other Heifers to Steer)	
Feedlot Heifers		
Bulls	Bulls (500 lbs +)	
Swine		
Breeding	Total Breeding swine	USDA, *Hogs and Pigs*, December report has all states, other quarterly reports have top producers and totals for scaling factors
Market <60 lbs	Total Market < 60 lbs	
Market 60 – 119 lbs	Total Market 60 – 119 lbs	
Market 120 – 179 lbs	Total Market 120 – 179 lbs	
Market >180 lbs	Total Market > 180 lbs	
Poultry		
Layers		USDA, *Poultry Production and Value* and *Chicken and eggs*, annual summaries
Hens > 1 yr		
Pullets	Includes: Pullets laying, Pullets > 3 mo., and Pullets < 3 mo.	
Chickens		
Broilers		
Turkeys		
Sheep		
On Feed	Total Sheep on Feed	USDA, *Sheep*, not available for all states Sheep on Feed data only available from 1990-1993. The average percent from those years is used to calculate remaining years.
Not on Feed	Total Sheep and Lambs minus Total Sheep on Feed	
Goats	All Goats	USDA, *Census of Agricultural, 1992 and 1997*, scaled between 1993 and 1996, held constant from 1990-1992 and 1997 on
Horses	All Horses	FAO reports national data at: http://apps.fao.org/

[a] The USDA's reported heifer count does not disaggregate replacements into age categories. Therefore, the total number of heifers is used unless state specific sources can disaggregate replacements by age.

Step (2) Calculate the Amount of Volatile Solids Produced

CH_4 emissions from livestock are directly related to the amount of VS produced. The data required to estimate total VS production for a given animal type *i* are the number of animals (N_i), average size, and average VS production per unit of animal size.

In the United States, considerable data are available to allow the populations of animals to be categorized by species, production system, and (for cattle) age. For each animal type subcategory, VS production is estimated by multiplying the animal population by:

- the typical animal mass;
- the average daily VS production per unit of animal mass; and
- 365 days per year.

Refer to the animal characteristic data in Table 8.4-2 through Table 8.4-10 when performing the following calculation of total VS for each animal subcategory.

Total VS_i produced (kg/yr) = $Animal_i$ Population (head) x TAM_i (kg) x VS_i (kg VS per 1,000 kg animal mass per day) x 365 (days per yr) / 1,000 (kg animal mass)

Example	The total amount of VS produced by dairy cows in Ohio for 2000 is calculated as follows: 258,845 head x 604 kg x 8.35 kg VS per 1,000 kg animal mass per day x 365 days per year / 1,000 kg animal mass = **477 billion kg/yr**

Step (3) Estimate Methane Emissions for Each Manure Management System

CH_4 emissions from livestock depend upon animal type and diet, in addition to the manure management system employed. A large variety of manure management systems exist in the United States, each requiring different methane conversion factors to estimate CH_4 emissions.

For each animal type *i* and manure system *j*, multiply the amount of VS produced by the B_o of the manure times the weighted MCF. Refer to Table 8.4-2 through Table 8.4-10 for the default values for B_o and VS rates. The weighted MCF values for dairy and feedlot cattle, swine, and poultry layers[7] vary by state and year, and can be found in the appendix at the end of this chapter. The weighted MCF for the other animals can be calculated by multiplying the MCF of each manure system times the WS% for that manure system. WS% values for the states, animal types, and management practices are provided in Table 8.4-11 through Table 8.4-13. Default values for MCF by state and management system are presented in Table 8.4-14. Note that while feedlot cattle provide a WS%, the weighted MCFs from the appendix at the end of this chapter should be used because they provide additional detail. The WS% provided for feedlot cattle

[7] Poultry layers are hens that lay eggs on a regular basis.

should be used for estimating N_2O emissions. See the example below for determining the weighted MCF from Sheep on Feed.[8]

Example:	According to Table 8.4-13, the manure management practices for sheep on feed in Ohio are 29 percent pasture and 71 percent drylot. Then, according to Table 8.4-14, the MCFs are 1.0 percent for pasture and 1.1 percent for drylot. To estimate the weighted average MCF for sheep on feed in Ohio, multiply the percent in each management system by the MCF for that system, and then sum the results: [29/100 (amount in pasture) x 1.0% (MCF for pasture)] + [71/100 (amount in drylot) x 1.1% (MCF for drylot)] = **1.071%**

CH_4 Emissions for animal i (m^3 CH_4) = VS_i (kg/yr) x B_{oi} (m^3/kg VS) x weighted MCF_j

where:

VS_i = total volatile solids produced (kg/yr) for animal *i*;

B_{oi} = maximum CH_4 producing capacity per pound of VS for animal *i* (m^3/kg VS);

Weighted MCF_j = weighted average of the methane conversion factors (%).

Example	Total annual CH_4 emissions from dairy cows in Ohio are calculated as follows: 477 million kg/yr x 0.24 m^3 CH_4/kg VS x 0.099 = **11.4 million m^3 CH_4/yr**

Step (4) Convert to Metric Tons of Methane

For each animal type *i* multiply CH_4 emissions by the density of CH_4 (0.662 kg/m^3) to convert from m^3 to kg.

Divide the results by 1,000 to obtain CH_4 emissions from each animal type in metric tons.

Example	Annual CH_4 emissions from dairy cows in Ohio [from Step 3] are converted from cubic meters to metric tons as follows: 11.4 million m^3 CH_4/yr x 0.662 kg/m^3 / 1,000 kg/MT = 7**,528 MT CH_4/yr**

Step (5) Estimate Total Annual Methane Emissions

Sum across all animal types *i* to obtain total CH_4 emissions from animal manure.

[8] Please note that all other examples in this section demonstrate emission calculations from milk cows. However, since this example describes how to calculate a weighted MCF, and weighted MCFs are already provided for dairy cows, this example calculates the MCFs for sheep on feed. The remaining examples in this section return to estimating emissions from milk cows.

Step (6) Convert Units to Metric Tons of Carbon Equivalent

To convert the units to MTCE, multiply by 12/44 (the ratio of the molecular weight of carbon to the molecular weight of CO_2), and by the Global Warming Potential (GWP) of CH_4, which is 21. The result is CH_4 emissions in units of MTCE.

Table 8.4-2: Recommended Animal Characteristic Data

Animal Type	TAM (kg)	VS Rate (kg VS/1000 kg animal mass/day)	B_o (m^3 CH_4/kg VS)
Dairy Cattle			
Dairy Cows	604	See Table 8.4-3	0.24
Dairy Replacement Heifers	476	See Table 8.4-4	0.17
Beef Cattle			
Beef Cows	533	See Table 8.4-5	0.17
Beef Replacement Heifers	420	See Table 8.4-6	0.17
Calves	118	6.41	0.17
Steer Stockers	318	See Table 8.4-7	0.17
Heifer Stockers	420	See Table 8.4-8	0.17
Feedlot Steer	420	See Table 8.4-9	0.33
Feedlot Heifers	420	See Table 8.4-10	0.33
Bulls	750	6.04	0.17
Swine			
Breeding	198	2.6	0.48
Market <60 lbs	15.9	8.8	0.48
Market 60 – 119 lbs	40.6	5.4	0.48
Market 120 – 179 lbs	67.8	5.4	0.48
Market >180 lbs	90.8	5.4	0.48
Poultry			
Layers			
Hens > 1 yr	1.8	10.8	0.39
Pullets	1.8	9.7	0.39
Chickens	1.8	10.8	0.39
Broilers	0.9	15.0	0.36
Turkeys	6.8	9.7	0.36
Sheep			
On Feed	27	9.21	0.36
Not on Feed	27	9.21	0.19
Goats	64	9.53	0.17
Horses	450	10.00	0.33

Source: U.S. EPA (2004)

Table 8.4-3: VS Rate for Dairy Cows
(kg VS/1000 kg animal mass/day)

Dairy Cows	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	10.04	10.07	10.13	9.44	9.87	9.67	8.85	9.04	8.94	9.32	9.43	9.35	9.44
West	9.72	9.83	9.99	9.97	10.16	10.13	10.18	10.34	10.43	10.66	10.75	10.76	10.86
Northern Great Plains	8.41	8.44	8.60	7.99	8.17	8.21	7.66	7.77	7.92	8.05	8.32	8.33	8.53
Southcentral	9.28	9.21	9.38	8.63	8.75	8.72	7.93	7.91	8.03	8.11	8.21	8.06	8.36
Northeast	7.96	8.09	8.31	8.05	8.09	8.25	8.02	8.09	8.19	8.31	8.37	8.41	8.52
Midwest	8.67	8.75	8.94	8.30	8.36	8.49	7.84	7.97	8.14	8.22	8.35	8.29	8.38
Southeast	8.40	8.47	8.61	8.38	8.50	8.57	8.22	8.31	8.27	8.42	8.52	8.56	8.61
National Average	**8.77**	**8.85**	**9.03**	**8.56**	**8.71**	**8.78**	**8.30**	**8.44**	**8.54**	**8.71**	**8.84**	**8.83**	**8.97**

Source: U.S. EPA (2004)

Table 8.4-4: VS Rate for Dairy Replacements
(kg VS/1000 kg animal mass/day)

Dairy Replacements	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82
West	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82
Northern Great Plains	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82
Southcentral	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57
Northeast	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14
Midwest	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82
Southeast	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82	6.82
National Average	**6.72**	**6.72**	**6.72**	**6.72**	**6.73**	**6.74**	**6.73**	**6.73**	**6.72**	**6.72**	**6.72**	**6.72**	**6.72**

Source: U.S. EPA (2004)

Table 8.4-5: VS Rate for Beef Cows
(kg VS/1000 kg animal mass/day)

Beef Cows	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57
West	8.71	8.71	8.71	8.71	8.71	8.71	8.70	8.71	8.71	8.71	8.71	8.71	8.71
Northern Great Plains	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.19
Southcentral	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72	6.72
Northeast	6.62	6.62	6.62	6.62	6.62	6.62	6.62	6.62	6.62	6.62	6.62	6.62	6.62
Midwest	6.63	6.63	6.63	6.63	6.63	6.63	6.63	6.63	6.63	6.63	6.63	6.63	6.63
Southeast	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74
National Average	**6.75**	**6.75**	**6.75**	**6.74**	**6.74**	**6.73**	**6.73**	**6.73**	**6.73**	**6.73**	**6.73**	**6.72**	**6.72**

Source: U.S. EPA (2004)

Table 8.4-6: VS Rate for Beef Replacements
(kg VS/1000 kg animal mass/day)

Beef Replacements	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	6.98	6.98	6.98	6.98	6.98	6.99	6.98	6.99	6.99	6.98	6.98	6.98	6.98
West	9.44	9.44	9.44	9.44	9.44	9.45	9.45	9.45	9.45	9.45	9.45	9.45	9.45
Northern Great Plains	6.56	6.56	6.55	6.56	6.56	6.56	6.56	6.56	6.56	6.56	6.56	6.56	6.56
Southcentral	7.15	7.15	7.15	7.15	7.15	7.16	7.15	7.16	7.16	7.15	7.15	7.15	7.15
Northeast	7.05	7.05	7.04	7.04	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05
Midwest	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05
Southeast	7.18	7.18	7.17	7.18	7.18	7.18	7.18	7.18	7.18	7.18	7.18	7.18	7.18
National Average	**7.23**	**7.21**	**7.19**	**7.19**	**7.19**	**7.20**	**7.21**	**7.21**	**7.21**	**7.20**	**7.19**	**7.19**	**7.19**

Source: U.S. EPA (2004)

Table 8.4-7: VS Rate for Steer Stockers
(kg VS/1000 kg animal mass/day)

Steer Stockers	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	7.37	7.40	7.27	7.26	7.28	7.19	7.17	7.25	7.31	7.38	7.40	7.37	7.39
West	10.01	10.05	9.88	9.85	9.89	9.76	9.73	9.84	9.93	10.02	10.06	10.01	10.04
Northern Great Plains	6.91	6.94	6.83	6.81	6.83	6.75	6.73	6.80	6.86	6.92	6.95	6.91	6.93
Southcentral	7.55	7.58	7.45	7.43	7.46	7.37	7.35	7.43	7.49	7.56	7.59	7.55	7.57
Northeast	7.43	7.47	7.34	7.32	7.35	7.26	7.24	7.32	7.38	7.45	7.47	7.44	7.46
Midwest	7.44	7.47	7.34	7.32	7.35	7.26	7.24	7.32	7.38	7.45	7.47	7.44	7.46
Southeast	7.57	7.61	7.48	7.46	7.49	7.39	7.37	7.45	7.52	7.59	7.61	7.58	7.60
National Average	**7.50**	**7.53**	**7.40**	**7.37**	**7.39**	**7.31**	**7.28**	**7.34**	**7.39**	**7.47**	**7.49**	**7.45**	**7.48**

Source: U.S. EPA (2004)

Table 8.4-8: VS Rate for Heifer Stockers
(kg VS/1000 kg animal mass/day)

Heifer Stockers	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	7.02	7.03	6.95	6.93	6.93	6.89	6.89	6.93	6.95	6.98	6.99	6.99	6.97
West	9.51	9.52	9.41	9.38	9.37	9.31	9.32	9.37	9.40	9.45	9.46	9.46	9.43
Northern Great Plains	6.59	6.60	6.53	6.51	6.50	6.47	6.47	6.50	6.52	6.56	6.56	6.56	6.54
Southcentral	7.19	7.21	7.12	7.10	7.10	7.05	7.05	7.10	7.11	7.15	7.16	7.16	7.14
Northeast	7.09	7.10	7.02	6.99	6.99	6.95	6.95	6.99	7.01	7.05	7.05	7.05	7.03
Midwest	7.09	7.10	7.02	7.00	6.99	6.95	6.95	6.99	7.01	7.05	7.06	7.05	7.04
Southeast	7.22	7.23	7.15	7.12	7.12	7.08	7.08	7.12	7.14	7.18	7.18	7.18	7.16
National Average	**7.05**	**7.07**	**7.00**	**6.97**	**6.97**	**6.93**	**6.92**	**6.96**	**6.98**	**7.02**	**7.01**	**7.00**	**6.99**

Source: U.S. EPA (2004)

Table 8.4-9: VS Rate for Feedlot Steer
(kg VS/1000 kg animal mass/day)

Steer Feedlot	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	5.01	4.83	4.50	4.20	3.99	3.60	3.48	3.35	3.31	3.30	3.31	3.26	3.23
West	5.10	4.78	4.47	4.25	3.92	3.65	3.43	3.38	3.33	3.32	3.28	3.27	3.26
Northern Great Plains	4.99	4.78	4.48	4.24	3.92	3.63	3.39	3.36	3.33	3.31	3.29	3.28	3.26
Southcentral	5.01	4.79	4.48	4.22	3.88	3.68	3.37	3.38	3.31	3.32	3.30	3.30	3.27
Northeast	5.01	4.78	4.45	4.24	3.99	3.60	3.42	3.40	3.33	3.31	3.33	3.33	3.26
Midwest	5.00	4.79	4.51	4.27	3.91	3.65	3.41	3.38	3.35	3.30	3.31	3.32	3.28
Southeast	5.13	4.80	4.42	4.32	3.95	3.63	3.55	3.45	3.35	3.39	3.39	3.27	3.30
National Average	**5.01**	**4.79**	**4.48**	**4.24**	**3.91**	**3.65**	**3.40**	**3.37**	**3.33**	**3.31**	**3.30**	**3.29**	**3.26**

Source: U.S. EPA (2004)

Table 8.4-10: VS Rate for Feedlot Heifers
(kg VS/1000 kg animal mass/day)

Heifer Feedlot	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
California	5.17	5.13	4.60	4.28	4.11	3.69	3.58	3.43	3.40	3.38	3.38	3.33	3.29
West	5.27	4.83	4.56	4.35	4.03	3.74	3.52	3.46	3.41	3.40	3.35	3.34	3.33
Northern Great Plains	5.14	4.84	4.57	4.33	4.03	3.73	3.48	3.45	3.41	3.39	3.36	3.35	3.33
Southcentral	5.16	4.86	4.56	4.31	3.98	3.78	3.46	3.46	3.39	3.40	3.37	3.36	3.34
Northeast	5.16	4.81	4.53	4.33	4.11	3.69	3.51	3.48	3.41	3.39	3.40	3.40	3.33
Midwest	5.16	4.87	4.61	4.37	4.02	3.75	3.49	3.46	3.44	3.38	3.39	3.39	3.35
Southeast	5.31	4.93	4.49	4.42	4.07	3.73	3.65	3.53	3.44	3.47	3.47	3.33	3.37
National Average	**5.16**	**4.86**	**4.57**	**4.33**	**4.02**	**3.74**	**3.48**	**3.45**	**3.41**	**3.39**	**3.37**	**3.36**	**3.33**

Source: U.S. EPA (2004)

Table 8.4-11: Percentage Breakdown of Manure Management Systems for Animal Types That Do Not Vary by State

Animal Type	Drylot	Pasture, Range, or Paddock	Poultry with/without Bedding
Beef Not on Feed*		100%	
Beef Feedlot	100%		
Broilers			100%
Goats		100%	
Horses		100%	
Sheep Not on Feed		100%	

* Includes beef cows, beef replacements, steer stockers, heifer stockers, calves, and bulls.

Table 8.4-12: Percentage Breakdown of Manure Management Systems for Turkeys

State	Poultry with/without Bedding	Range
AL	95%	5%
AK	88%	12%
AZ	88%	12%
AR	88%	12%
CA	93%	7%
CO	88%	12%
CT	0%	100%
DE	88%	12%
FL	88%	12%
GA	50%	50%
HI	88%	12%
ID	88%	12%
IL	85%	15%
IN	95%	5%
IA	100%	0%
KS	100%	0%
KY	88%	12%
LA	88%	12%
ME	88%	12%
MA	75%	25%
MD	90%	10%
MI	93%	7%
MN	100%	0%
MS	88%	12%
MO	100%	0%
MT	88%	12%
NC	90%	10%
ND	40%	60%
NH	100%	0%
NJ	75%	25%
NM	88%	12%
NY	100%	0%
NE	100%	0%
NV	88%	12%
OH	100%	0%
OK	88%	12%
OR	100%	0%
PA	90%	10%
RI	88%	12%
SC	95%	5%
SD	100%	0%
TN	88%	12%
TX	88%	12%
UT	0%	100%
VA	94%	6%
VT	88%	12%
WV	90%	10%
WA	88%	12%
WI	88%	12%
WY	88%	12%

Table 8.4-13: Percentage Breakdown of Manure Management Systems for Sheep on Feed

State	Pasture	Drylot
AL	0.0%	100.0%
AK	0.0%	100.0%
AZ	100.0%	0.0%
AR	0.0%	100.0%
CA	98.2%	1.8%
CO	3.8%	96.2%
CT	0.0%	100.0%
DE	0.0%	100.0%
FL	0.0%	100.0%
GA	0.0%	100.0%
HI	0.0%	100.0%
ID	100.0%	0.0%
IL	20.0%	80.0%
IN	100.0%	0.0%
IA	0.0%	100.0%
KS	29.1%	70.9%
KY	0.0%	100.0%
LA	0.0%	100.0%
ME	0.0%	100.0%
MD	0.0%	100.0%
MA	0.0%	100.0%
MI	100.0%	0.0%
MN	6.9%	93.1%
MS	0.0%	100.0%
MO	100.0%	0.0%
MT	22.6%	77.4%
NE	7.5%	92.5%
NV	100.0%	0.0%
NH	0.0%	100.0%
NJ	0.0%	100.0%
NM	100.0%	0.0%
NY	0.0%	100.0%
NC	0.0%	100.0%
ND	2.9%	97.1%
OH	29.0%	71.0%
OK	100.0%	0.0%
OR	70.2%	29.8%
PA	0.0%	100.0%
RI	0.0%	100.0%
SC	0.0%	100.0%
SD	7.1%	92.9%
TN	0.0%	100.0%
TX	30.6%	69.4%
UT	100.0%	0.0%
VT	0.0%	100.0%
VA	66.7%	33.3%
WA	0.0%	100.0%
WV	0.0%	100.0%
WI	100.0%	0.0%
WY	38.5%	61.5%

Table 8.4-14: State-Specific Methane Conversion Factors for the Most Commonly Used Manure Management Systems in the United States

State	Pasture, Range & Paddocks	Drylot	Poultry with/without Bedding
Alabama	1.4%	1.9%	1.5%
Arizona	1.4%	1.9%	1.5%
Arkansas	1.3%	1.8%	1.5%
California	1.2%	1.4%	1.5%
Colorado	0.9%	1.0%	1.5%
Connecticut	0.9%	1.0%	1.5%
Delaware	1.2%	1.4%	1.5%
Florida	1.5%	2.4%	1.5%
Georgia	1.4%	1.8%	1.5%
Idaho	0.8%	0.8%	1.5%
Illinois	1.1%	1.3%	1.5%
Indiana	1.0%	1.2%	1.5%
Iowa	0.9%	1.1%	1.5%
Kansas	1.1%	1.5%	1.5%
Kentucky	1.2%	1.5%	1.5%
Louisiana	1.4%	2.1%	1.5%
Maine	0.8%	0.8%	1.5%
Maryland	1.1%	1.2%	1.5%
Massachusetts	0.9%	1.0%	1.5%
Michigan	0.8%	0.9%	1.5%
Minnesota	0.8%	0.8%	1.5%
Mississippi	1.4%	1.9%	1.5%
Missouri	1.1%	1.4%	1.5%
Montana	0.7%	0.8%	1.5%
Nebraska	1.0%	1.1%	1.5%
Nevada	1.2%	1.4%	1.5%
New Hampshire	0.8%	0.8%	1.5%
New Jersey	1.0%	1.1%	1.5%
New Mexico	1.2%	1.3%	1.5%
New York	0.9%	0.9%	1.5%
North Carolina	1.3%	1.5%	1.5%
North Dakota	0.7%	0.7%	1.5%
Ohio	1.0%	1.1%	1.5%
Oklahoma	1.4%	1.9%	1.5%
Oregon	1.1%	1.1%	1.5%
Pennsylvania	0.9%	1.0%	1.5%
Rhode Island	1.0%	1.1%	1.5%
South Carolina	1.3%	1.7%	1.5%
South Dakota	0.8%	0.9%	1.5%
Tennessee	1.3%	1.6%	1.5%
Texas	1.4%	2.1%	1.5%
Utah	0.9%	1.0%	1.5%
Vermont	0.8%	0.8%	1.5%
Virginia	1.2%	1.4%	1.5%
Washington	1.0%	1.0%	1.5%
West Virginia	1.2%	1.3%	1.5%
Wisconsin	0.8%	0.8%	1.5%
Wyoming	0.8%	0.8%	1.5%

Note: No information was available for Alaska and Hawaii.

4.2 NITROUS OXIDE EMISSIONS FROM MANURE MANAGEMENT

Nitrous oxide (N_2O) emissions from animal production are divided into two methodologies, addressed in separate chapters of this volume. The methods for calculating direct emissions of N_2O from daily application of manure to soil and from manure that is excreted directly on pasture, range, and paddock are presented in Chapter 10 of this volume, in Sections 4.1.3 and 4.2, respectively. These emissions are considered to be emissions from agricultural soils, whereas emissions from other animal waste management systems are addressed in this chapter. However, while emissions from manure in other management systems are not directly attributable to soils, it is assumed that they are eventually removed from the management system and deposited on soils. This second phase of emissions from management systems is also accounted for in Chapter 10, Section 4.2. To estimate N_2O emissions from manure management, the following steps should be performed: (1) Obtain required data; (2) calculate the amount of Kjeldahl nitrogen[9] (N) excreted; (3) calculate N_2O emissions from manure management; and (4) convert units to MTCE.

Step (1) Obtain Required Data

- *Required Data.* The information needed to estimate direct N_2O emissions from manure management consists of: animal population (in number of head) for each type of animal, typical animal mass (TAM), Kjeldahl N emitted per unit of animal mass (kg per 1,000 kg animal mass per day), and the percent of manure managed in each type of manure management system (WS%).
- *Data Sources.* Departments within each state responsible for conducting agricultural research and monitoring agricultural waste practices should be consulted for animal population data. Alternatively, animal population data are provided by the National Agriculture Statistics Service of the USDA (USDA-NASS 2002). When using this data source, a state's annual average population of a given animal type may be estimated as described in Chapter 7 of this volume. Additionally, data on state and county level animal populations may be found in the *Census of Agriculture* published by the USDA for 1992 and 1997. Refer back to Table 8.4-1 for suggested data sources for populations for each animal type. The State Inventory Tool contains annual average populations from USDA-NASS for most states and animal categories and can be used to simplify data collection efforts.

  The TAM and Kjeldahl N are derived from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* (U.S. EPA 2004), and are listed in Table 8.4-15.

  The WS% for each system for dairy cattle, swine, and poultry layers are developed by U.S. EPA (2004) and are both year and state specific. These values are provided in the appendix at the end of this chapter. The WS% breakdown of the systems used to manage manure for the remaining animals are provided in Table 8.4-11 through Table 8.4-13. Where state data are available, they may be used in place of these default values. All animal characteristic data can also be found in the State Inventory Tool.

[9] Total Kjeldahl N is a measure of organically bound N and ammonia nitrogen.

Step (2) Calculate the Amount of Kjeldahl Nitrogen Excreted

First calculate the amount of Kjeldahl N excreted by the state's livestock that is managed. To do so, for each animal type *i*, multiply population by

- the TAM for animal type *i*, in units of 1,000 kg animal mass (using data from Table 8.4-15 and dividing by 1,000)
- the daily rate of Kjeldahl N excreted by animal type *i* per 1,000 kg of animal mass (see Table 8.4-15)
- 365 days per year

The formula is shown below. Then sum the results across all animal types, to yield total Kjeldahl N excreted in managed manure.

Kjeldahl N Excreted by Animal$_i$ (kg/yr) = Population (head) x TAM (kg) / 1,000 kg x Kjeldahl N (kg/day/1,000 kg animal mass) x 365 days/yr

Next calculate the amount of Kjeldahl N in liquid systems (lagoons and liquid/slurry) and dry systems (drylot and solid storage[10]). The sum of these two numbers will be the total Kjeldahl N from manure that is managed—i.e., not applied through daily spread operations nor deposited on pasture, range, or paddock. The percents for dairy cows and heifers, swine, and layers can be found in the appendix at the end of this chapter, and the remaining animals can be found in Table 8.4-11 through Table 8.4-13.

Example:	The total Kjeldahl N excreted by dairy cows in Ohio for 2000 is calculated as follows:
	258,845 head x 604 kg/head / 1,000 kg x 0.44 kg Kjeldahl N per 1,000 kg mass per day x 365 days/year = 25.1 million kg per year of Kjeldahl N
	Next, determine the amount of Kjeldahl N in liquid systems and dry systems:
	25.1 million kg/yr of Kjeldahl N x (0.05 + 0.17) = **5.5 million kg/yr in liquid systems**
	25.1 million kg/yr of Kjeldahl N x (0.46 + 0.05) = **12.8 million kg/yr in dry systems**

Step (3) Calculate Nitrous Oxide Emissions from Manure Management

The direct N_2O emissions from animal production can be calculated by multiplying the N from managed animal waste by the appropriate IPCC default emission factor, for each manure management system.

- The emission factor for liquid systems (anaerobic lagoons and liquid/slurry systems) is 0.001 kg N_2O-N/kg N excreted (IPCC/UNEP/OECD/IEA 1997); and

[10] Although the IPCC guidelines (IPCC/UNEP/OECD/IEA 1997) include emissions from solid storage and drylot under agricultural soils, the U.S. Inventory (U.S. EPA 2004) includes these sources under manure management; this chapter conforms to the U.S. Inventory approach.

- The emission factor for dry systems (solid storage and drylot) is 0.02 kg N_2O-N/kg N excreted (IPCC/UNEP/OECD/IEA 1997, U.S. EPA 2004)

Emissions from each management system (kg N_2O-N) = N excreted (kg) x EF (kg N_2O-N/kg N excreted)

where:

N = Total kg N from manure managed in that system (kg N);

EF = Emission factor for N_2O for that system (kg N_2O-N/kg N).

Then obtain total emissions from manure management by summing across liquid and dry manure management systems.

Step (4) Convert Units to Metric Tons of Carbon Equivalent

To convert units from kg N_2O-N to metric tons of carbon equivalent (MTCE) of N_2O, first, multiply the total emissions, in units of kg of N_2O-N, by 44/28 to convert to units of kg of N_2O. Then to convert to units of MTCE, first divide by 1,000 to obtain the number of metric tons of N_2O. Then multiply the number of metric tons of N_2O by (1) a factor of 310 (the GWP for N_2O) and (2) 12/44 (the ratio of the atomic weight of carbon to the molecular weight of CO_2).

Table 8.4-15: Recommended Animal Characteristic Data for Estimating Nitrous Oxide Emissions

Animal Type	TAM (kg)	Kjeldahl Nitrogen (kg/1000 kg animal mass/day)
Dairy Cattle		
Dairy Cows	604	0.440
Dairy Replacement Heifers	476	0.310
Beef Cattle		
Beef Cows	533	0.330
Beef Replacement Heifers	420	0.310
Calves	118	0.300
Steer Stockers	318	0.310
Heifer Stockers	420	0.310
Feedlot Steer	420	0.300
Feedlot Heifers	420	0.300
Bulls	750	0.310
Swine		
Breeding	198	0.235
Market <60 lbs	15.9	0.600
Market 60 – 119 lbs	40.6	0.420
Market 120 – 179 lbs	67.8	0.420
Market >180 lbs	90.8	0.420
Poultry		
Layers		
Hens > 1 yr	1.8	0.830
Pullets	1.8	0.620
Chickens	1.8	0.830
Broilers	0.9	1.100
Turkeys	6.8	0.740
Sheep		
On Feed	27	0.420
Not on Feed	27	0.420
Goats	64	0.450
Horses	450	0.300

Source: U.S. EPA 2004

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ALTERNATIVE METHODS FOR ESTIMATING EMISSIONS

There are no alternative methods for estimating state-level emissions from manure management systems at this time.

6

UNCERTAINTY SUMMARY

Similar to emission estimates of methane from enteric fermentation, emissions from manure management are dependent on the estimates of animal populations and the various factors used for each animal type. Therefore, the uncertainty associated with the emission estimates stems from those variables. Animal populations fluctuate throughout the year, and thus using a single point estimate (e.g., horses and sheep), multiple point estimates (e.g., cattle and swine), or periodic estimates (e.g., goats) introduces uncertainty into the average annual estimates of these populations. In addition, there is uncertainty associated with the original population survey methods employed by USDA.

The largest contributors to uncertainty in emissions from manure management are the lack of extensive data describing the management systems used in each region, and the methane generating characteristics used to estimate emissions from each of these systems. Also, the nitrous oxide emission factors are derived from a limited data set and are provided as global estimates, not country or state specific.

In particular, methane conversion factors (MCFs) vary widely for anaerobic lagoon systems, based on design and handling procedures. The default range from the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC 2000) is between zero and 100 percent, reflecting the vast discrepancies that can occur in this type of system. In the United States, MCFs were estimated based on observed system performance and climatic factors, though the methodology employed introduces additional uncertainty because it is based on data from relatively few systems (U.S. EPA 2004).

In addition, there is uncertainty in the maximum methane producing potential (B_o) used for each animal group. This value varies with both animal and diet characteristics, so estimating an average across an entire population introduces uncertainty. While the B_o values used in this analysis vary by animal subcategory to try to reflect as many of these differences as possible, there is not sufficient data available at this time to estimate precise values that accurately portray the B_o for all animal types and feeding situations (U.S. EPA 2004).

Finally, nitrous oxide emission factors used for this analysis are the global defaults provided by the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC 2000). These factors are based on limited studies, and do not take into account the fact that U.S. emission factors may vary significantly on both a national and state level.

7

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8

APPENDIX

Certain data from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2002* were developed using specific variables that change by geographic location and over time. As a result, these inputs vary by both state and year. In this analysis, these variables include the weighted methane conversion factors for all dairy cattle, feedlot cattle, swine, and poultry layers as well as the percentage breakdowns of the systems used to manage manure from dairy cattle, swine, and poultry layers. Because of the magnitude of these data tables, they were not provided in the text of this chapter. This section provides those data tables needed to complete the methane and nitrous oxide emission estimation calculations from livestock manure management. All of the data presented in this section were derived from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2002* (U.S. EPA 2004). As with all of the data required to calculate emissions from this source category, the data in this section are also available electronically in the Agriculture Module of the State Inventory Tool.

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1990	AL	12.9%	1.9%	2.0%	2.0%	44.1%	44.0%	66.1%
	AK	0.9%	1.7%	1.7%	1.7%	1.5%	1.5%	10.6%
	AZ	60.8%	1.6%	1.7%	1.7%	52.5%	50.3%	1.5%
	AR	8.1%	1.9%	2.0%	2.0%	51.8%	51.5%	52.3%
	CA	43.2%	1.8%	1.9%	2.0%	47.1%	47.3%	7.8%
	CO	40.4%	1.6%	1.6%	1.6%	25.8%	25.8%	5.6%
	CT	11.7%	1.7%	1.7%	1.8%	1.5%	1.5%	1.5%
	DE	12.0%	1.7%	1.8%	1.8%	33.8%	33.8%	1.5%
	FL	37.4%	2.1%	2.3%	2.2%	31.5%	31.1%	14.0%
	GA	15.2%	1.9%	2.0%	2.0%	49.4%	49.5%	4.1%
	HI	57.0%	2.0%	2.2%	2.2%	34.8%	34.8%	60.2%
	ID	38.6%	1.6%	1.6%	1.6%	20.1%	20.2%	13.6%
	IL	10.1%	1.6%	1.7%	1.7%	31.9%	31.9%	8.5%
	IN	9.4%	1.6%	1.7%	1.7%	30.2%	30.2%	2.7%
	IA	8.1%	1.6%	1.7%	1.7%	34.9%	35.0%	3.9%
	KS	12.9%	1.7%	1.7%	1.7%	33.2%	33.1%	1.5%
	KY	4.5%	1.7%	1.8%	1.8%	37.0%	37.0%	54.6%
	LA	8.5%	2.0%	2.1%	2.1%	39.5%	39.6%	74.8%
	ME	6.2%	1.7%	1.7%	1.7%	1.5%	1.5%	3.2%
	MD	7.9%	1.7%	1.8%	1.8%	31.2%	31.3%	1.5%
	MA	7.2%	1.7%	1.7%	1.7%	20.2%	20.1%	3.5%
	MI	11.6%	1.6%	1.6%	1.6%	27.2%	27.3%	4.1%
	MN	6.7%	1.6%	1.6%	1.6%	28.8%	28.7%	6.8%
	MS	9.2%	1.9%	2.0%	2.0%	45.8%	45.8%	68.5%
	MO	10.7%	1.7%	1.7%	1.7%	32.1%	32.0%	7.5%
	MT	25.9%	1.6%	1.6%	1.6%	23.2%	23.2%	5.5%
	NE	10.6%	1.6%	1.7%	1.7%	31.1%	31.1%	1.5%
	NV	45.7%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.5%	1.7%	1.7%	1.7%	1.5%	1.5%	1.5%
	NJ	7.7%	1.7%	1.8%	1.8%	19.3%	19.2%	3.8%
	NM	45.7%	1.6%	1.6%	1.6%	1.5%	1.5%	18.2%
	NY	7.8%	1.7%	1.7%	1.7%	18.8%	18.9%	7.8%
	NC	6.4%	1.8%	1.8%	1.8%	57.5%	57.4%	25.3%
	ND	7.0%	1.6%	1.6%	1.6%	23.4%	23.5%	5.8%
	OH	9.6%	1.6%	1.7%	1.7%	27.5%	27.5%	1.5%
	OK	33.0%	1.6%	1.7%	1.7%	40.6%	40.8%	8.9%
	OR	26.2%	1.7%	1.8%	1.8%	16.5%	16.4%	10.3%
	PA	5.6%	1.7%	1.7%	1.7%	30.1%	30.0%	2.7%
	RI	5.3%	1.7%	1.8%	1.8%	25.7%	25.7%	3.6%
	SC	11.6%	1.9%	2.0%	2.0%	44.9%	44.9%	32.0%
	SD	9.3%	1.6%	1.6%	1.6%	28.4%	28.4%	15.0%
	TN	6.1%	1.8%	1.8%	1.8%	35.5%	35.4%	34.8%
	TX	44.8%	1.6%	1.7%	1.7%	42.4%	42.2%	32.1%
	UT	30.5%	1.6%	1.6%	1.6%	16.4%	16.4%	1.5%
	VT	6.6%	1.7%	1.7%	1.7%	1.5%	1.5%	3.2%
	VA	5.9%	1.7%	1.8%	1.8%	45.1%	45.0%	1.5%
	WA	30.0%	1.7%	1.8%	1.8%	21.6%	21.6%	3.6%
	WV	7.0%	1.7%	1.8%	1.8%	11.6%	11.6%	1.5%
	WI	7.0%	1.6%	1.6%	1.6%	25.2%	25.2%	2.6%
	WY	21.0%	1.6%	1.6%	1.6%	18.6%	18.5%	5.6%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1991	AL	12.5%	1.9%	2.0%	2.0%	42.7%	42.7%	60.6%
	AK	0.9%	1.7%	1.7%	1.7%	1.5%	1.5%	11.0%
	AZ	59.8%	1.6%	1.7%	1.7%	52.4%	50.3%	6.7%
	AR	8.1%	1.9%	2.0%	2.0%	51.4%	51.2%	46.5%
	CA	49.6%	1.8%	1.9%	1.9%	47.4%	47.6%	8.1%
	CO	37.5%	1.6%	1.6%	1.6%	25.5%	25.4%	9.2%
	CT	11.6%	1.7%	1.8%	1.8%	1.5%	1.5%	1.9%
	DE	11.9%	1.8%	1.8%	1.8%	34.7%	34.8%	1.9%
	FL	37.1%	2.1%	2.2%	2.2%	30.9%	30.6%	15.9%
	GA	15.1%	1.9%	2.0%	2.0%	47.3%	47.4%	7.1%
	HI	61.6%	2.0%	2.2%	2.2%	34.8%	34.8%	55.7%
	ID	36.2%	1.6%	1.6%	1.6%	19.5%	19.5%	15.9%
	IL	10.8%	1.7%	1.7%	1.7%	34.3%	34.3%	8.0%
	IN	10.2%	1.7%	1.7%	1.7%	33.1%	33.1%	2.8%
	IA	8.1%	1.6%	1.7%	1.7%	35.8%	35.9%	3.6%
	KS	13.3%	1.7%	1.7%	1.7%	34.0%	34.0%	1.7%
	KY	4.6%	1.8%	1.8%	1.8%	38.6%	38.6%	50.0%
	LA	9.4%	2.0%	2.1%	2.1%	38.5%	38.6%	69.9%
	ME	5.9%	1.7%	1.7%	1.7%	1.5%	1.5%	3.4%
	MD	8.6%	1.7%	1.8%	1.8%	32.2%	32.2%	1.9%
	MA	7.3%	1.7%	1.7%	1.7%	20.6%	20.5%	3.7%
	MI	12.2%	1.6%	1.6%	1.6%	29.2%	29.3%	4.0%
	MN	6.6%	1.6%	1.6%	1.6%	29.5%	29.4%	6.5%
	MS	9.2%	1.9%	2.0%	2.0%	44.8%	44.8%	64.2%
	MO	11.7%	1.7%	1.7%	1.7%	33.3%	33.3%	7.2%
	MT	23.4%	1.6%	1.6%	1.6%	23.2%	23.2%	9.2%
	NE	10.8%	1.6%	1.7%	1.7%	31.9%	31.9%	1.7%
	NV	50.2%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.2%	1.7%	1.7%	1.7%	1.5%	1.5%	1.8%
	NJ	7.8%	1.7%	1.8%	1.8%	20.1%	19.9%	4.1%
	NM	49.3%	1.6%	1.6%	1.6%	1.5%	1.5%	20.4%
	NY	7.6%	1.7%	1.7%	1.7%	19.7%	19.8%	7.9%
	NC	6.6%	1.8%	1.8%	1.8%	55.8%	55.8%	25.5%
	ND	7.1%	1.6%	1.6%	1.6%	24.0%	24.0%	5.5%
	OH	10.0%	1.6%	1.7%	1.7%	30.1%	30.1%	1.5%
	OK	35.9%	1.6%	1.7%	1.7%	40.0%	40.1%	13.0%
	OR	24.7%	1.7%	1.8%	1.8%	16.0%	15.9%	10.9%
	PA	5.9%	2.2%	2.4%	1.8%	31.8%	31.7%	2.7%
	RI	5.1%	1.7%	1.8%	1.8%	25.7%	25.7%	3.8%
	SC	12.1%	1.9%	2.0%	2.0%	43.1%	43.1%	32.5%
	SD	9.3%	1.6%	1.7%	1.7%	29.2%	29.2%	13.6%
	TN	6.1%	1.8%	1.8%	1.8%	36.0%	35.8%	32.7%
	TX	47.2%	1.6%	1.7%	1.7%	41.5%	41.3%	29.1%
	UT	31.6%	1.6%	1.6%	1.6%	15.8%	15.8%	6.0%
	VT	6.3%	1.7%	1.7%	1.7%	1.5%	1.5%	3.4%
	VA	6.3%	1.7%	1.8%	1.8%	45.5%	45.5%	1.9%
	WA	27.3%	1.7%	1.8%	1.8%	20.7%	20.7%	4.1%
	WV	7.6%	1.7%	1.8%	1.8%	12.3%	12.3%	1.9%
	WI	7.4%	1.6%	1.6%	1.6%	26.3%	26.2%	2.7%
	WY	20.7%	1.6%	1.6%	1.6%	18.7%	18.6%	9.4%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1992	AL	12.1%	1.9%	2.0%	2.0%	40.6%	40.5%	56.0%
	AK	0.9%	1.7%	1.7%	1.7%	1.5%	1.5%	11.3%
	AZ	59.1%	1.6%	1.7%	1.7%	52.4%	50.4%	11.6%
	AR	7.7%	1.8%	1.9%	1.9%	48.5%	48.3%	38.2%
	CA	49.4%	1.8%	2.0%	2.0%	47.7%	47.9%	8.4%
	CO	36.7%	1.6%	1.6%	1.6%	24.8%	24.8%	12.6%
	CT	10.6%	1.7%	1.7%	1.7%	1.5%	1.5%	2.2%
	DE	10.9%	1.7%	1.8%	1.8%	31.4%	31.4%	2.3%
	FL	36.8%	2.0%	2.2%	2.2%	29.5%	29.2%	18.0%
	GA	14.7%	1.9%	2.0%	2.0%	45.5%	45.6%	10.0%
	HI	61.6%	2.0%	2.2%	2.2%	34.8%	34.8%	51.2%
	ID	36.2%	1.6%	1.6%	1.6%	19.8%	19.8%	19.1%
	IL	9.6%	1.6%	1.7%	1.7%	30.1%	30.1%	7.0%
	IN	8.9%	1.6%	1.6%	1.6%	28.6%	28.6%	2.4%
	IA	7.2%	1.6%	1.6%	1.6%	32.0%	32.0%	3.2%
	KS	11.9%	1.6%	1.7%	1.7%	29.9%	29.9%	1.8%
	KY	4.3%	1.7%	1.8%	1.8%	35.5%	35.5%	42.2%
	LA	9.2%	1.9%	2.1%	2.1%	37.3%	37.4%	66.6%
	ME	5.6%	1.7%	1.7%	1.7%	1.5%	1.5%	3.4%
	MD	7.7%	1.7%	1.8%	1.8%	29.5%	29.5%	2.3%
	MA	6.8%	1.7%	1.7%	1.7%	19.0%	18.9%	3.6%
	MI	10.7%	1.6%	1.6%	1.6%	25.2%	25.3%	3.6%
	MN	5.9%	1.6%	1.6%	1.6%	26.0%	26.0%	5.2%
	MS	9.0%	1.9%	2.0%	2.0%	42.8%	42.8%	61.1%
	MO	10.5%	1.6%	1.7%	1.7%	29.4%	29.4%	5.7%
	MT	22.2%	1.6%	1.6%	1.6%	21.5%	21.5%	12.1%
	NE	9.5%	1.6%	1.6%	1.6%	27.8%	27.8%	1.8%
	NV	50.6%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	6.8%	1.7%	1.7%	1.7%	1.5%	1.5%	2.2%
	NJ	7.1%	1.7%	1.7%	1.7%	18.2%	18.0%	3.9%
	NM	50.2%	1.6%	1.6%	1.6%	1.5%	1.5%	23.5%
	NY	7.0%	1.7%	1.7%	1.7%	17.7%	17.7%	6.7%
	NC	6.2%	1.7%	1.8%	1.8%	54.7%	54.6%	26.0%
	ND	6.3%	1.6%	1.6%	1.6%	21.1%	21.1%	4.7%
	OH	8.8%	1.6%	1.6%	1.6%	26.2%	26.2%	1.5%
	OK	34.2%	1.6%	1.6%	1.6%	38.0%	38.1%	16.2%
	OR	25.2%	1.7%	1.8%	1.8%	16.8%	16.7%	11.8%
	PA	5.3%	1.7%	1.7%	1.7%	28.1%	28.0%	2.4%
	RI	4.7%	1.7%	1.7%	1.7%	23.7%	23.7%	3.7%
	SC	11.8%	1.9%	2.0%	2.0%	41.5%	41.6%	34.1%
	SD	8.1%	1.6%	1.6%	1.6%	25.2%	25.2%	11.4%
	TN	5.7%	1.7%	1.8%	1.8%	33.5%	33.3%	26.1%
	TX	46.6%	1.6%	1.7%	1.6%	40.9%	40.7%	26.8%
	UT	31.9%	1.6%	1.6%	1.6%	16.1%	16.1%	10.6%
	VT	6.0%	1.7%	1.7%	1.7%	1.5%	1.5%	3.4%
	VA	5.9%	1.7%	1.8%	1.8%	43.3%	43.3%	2.3%
	WA	27.9%	1.7%	1.8%	1.8%	21.6%	21.5%	4.8%
	WV	6.9%	1.7%	1.7%	1.7%	11.2%	11.2%	2.2%
	WI	6.6%	1.6%	1.6%	1.6%	23.2%	23.2%	2.5%
	WY	20.1%	1.6%	1.6%	1.6%	18.0%	17.9%	12.5%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1993	AL	12.0%	1.9%	2.0%	2.0%	43.4%	43.4%	53.9%
	AK	4.2%	1.7%	1.7%	1.7%	1.5%	1.5%	11.7%
	AZ	59.7%	1.6%	1.7%	1.7%	52.3%	50.5%	16.8%
	AR	7.9%	1.9%	2.0%	2.0%	51.1%	51.1%	34.5%
	CA	48.7%	1.8%	1.9%	1.9%	46.6%	46.7%	8.6%
	CO	36.5%	1.6%	1.6%	1.6%	24.3%	24.4%	15.9%
	CT	11.2%	1.7%	1.7%	1.7%	4.0%	4.0%	2.6%
	DE	11.3%	1.7%	1.8%	1.8%	33.8%	33.8%	2.7%
	FL	37.7%	2.0%	2.2%	2.2%	28.1%	27.9%	20.1%
	GA	15.2%	1.9%	2.0%	2.0%	48.1%	48.1%	13.6%
	HI	59.6%	2.0%	2.2%	2.2%	34.8%	34.8%	46.7%
	ID	34.3%	1.6%	1.6%	1.6%	17.8%	17.8%	19.8%
	IL	10.5%	1.6%	1.7%	1.7%	31.9%	31.9%	6.6%
	IN	9.6%	1.6%	1.7%	1.7%	30.8%	30.9%	2.4%
	IA	7.9%	1.6%	1.6%	1.6%	34.4%	34.5%	3.0%
	KS	12.0%	1.6%	1.7%	1.7%	31.1%	31.1%	2.0%
	KY	4.4%	1.7%	1.8%	1.8%	39.1%	39.0%	38.4%
	LA	9.7%	1.9%	2.1%	2.1%	34.6%	34.6%	64.7%
	ME	5.9%	1.7%	1.7%	1.7%	1.5%	1.5%	3.7%
	MD	8.5%	1.7%	1.8%	1.8%	31.6%	31.6%	2.7%
	MA	7.3%	1.7%	1.7%	1.7%	20.1%	20.0%	3.9%
	MI	12.3%	1.6%	1.6%	1.6%	27.5%	27.5%	3.6%
	MN	6.5%	1.6%	1.6%	1.6%	27.0%	26.9%	4.7%
	MS	9.2%	1.9%	2.0%	2.0%	46.4%	46.4%	60.1%
	MO	10.8%	1.6%	1.7%	1.7%	31.5%	31.4%	5.3%
	MT	21.2%	1.6%	1.6%	1.6%	20.6%	20.6%	14.8%
	NE	9.7%	1.6%	1.6%	1.6%	28.7%	28.7%	2.0%
	NV	48.2%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.2%	1.7%	1.7%	1.7%	3.6%	3.6%	2.5%
	NJ	7.8%	1.7%	1.8%	1.8%	19.5%	19.5%	4.3%
	NM	50.6%	1.6%	1.6%	1.6%	1.5%	1.5%	26.7%
	NY	7.7%	1.7%	1.7%	1.7%	19.3%	19.3%	6.8%
	NC	6.7%	1.8%	1.8%	1.8%	56.7%	56.6%	27.5%
	ND	6.1%	1.6%	1.6%	1.6%	21.2%	21.2%	4.4%
	OH	9.6%	1.6%	1.7%	1.7%	28.6%	28.6%	1.5%
	OK	35.3%	1.6%	1.6%	1.6%	41.9%	42.5%	21.0%
	OR	24.4%	1.7%	1.8%	1.8%	14.6%	14.5%	11.9%
	PA	5.8%	1.7%	1.8%	1.8%	31.0%	30.9%	2.3%
	RI	4.8%	1.7%	1.7%	1.7%	24.1%	24.1%	4.0%
	SC	12.0%	1.9%	2.0%	2.0%	45.3%	45.3%	36.5%
	SD	8.3%	1.6%	1.6%	1.6%	25.9%	25.8%	10.2%
	TN	5.9%	1.8%	1.8%	1.8%	36.6%	36.4%	24.9%
	TX	47.8%	1.6%	1.7%	1.7%	43.4%	43.3%	24.7%
	UT	30.5%	1.6%	1.6%	1.6%	17.2%	17.2%	14.4%
	VT	6.6%	1.7%	1.7%	1.7%	1.5%	1.5%	3.6%
	VA	6.1%	1.7%	1.8%	1.8%	46.8%	46.7%	2.7%
	WA	27.6%	1.7%	1.8%	1.8%	20.1%	20.1%	5.2%
	WV	7.3%	1.7%	1.8%	1.8%	14.0%	13.9%	2.7%
	WI	7.4%	1.6%	1.6%	1.6%	24.7%	24.6%	2.6%
	WY	19.2%	1.6%	1.6%	1.6%	18.6%	18.5%	15.1%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1994	AL	11.5%	1.9%	2.0%	2.0%	44.4%	44.5%	50.2%
	AK	7.5%	1.7%	1.7%	1.7%	1.5%	1.5%	12.2%
	AZ	60.2%	1.6%	1.7%	1.7%	53.7%	52.5%	21.9%
	AR	7.7%	1.8%	2.0%	2.0%	51.5%	51.6%	28.9%
	CA	49.3%	1.8%	1.9%	1.9%	47.3%	47.4%	9.0%
	CO	40.3%	1.6%	1.6%	1.6%	27.0%	27.0%	20.8%
	CT	11.1%	1.7%	1.8%	1.8%	6.6%	6.6%	3.0%
	DE	10.8%	1.7%	1.8%	1.8%	33.3%	33.3%	3.0%
	FL	39.6%	2.1%	2.2%	2.2%	27.0%	26.8%	22.7%
	GA	14.8%	1.9%	2.0%	2.0%	47.6%	47.6%	16.5%
	HI	58.8%	2.0%	2.2%	2.2%	36.0%	36.0%	43.0%
	ID	40.4%	1.6%	1.6%	1.6%	20.6%	20.6%	25.6%
	IL	10.8%	1.6%	1.7%	1.7%	32.0%	32.1%	6.0%
	IN	9.6%	1.6%	1.7%	1.7%	30.9%	30.9%	2.2%
	IA	8.5%	1.6%	1.7%	1.7%	37.0%	37.1%	2.8%
	KS	12.4%	1.7%	1.7%	1.7%	33.4%	33.4%	2.1%
	KY	4.3%	1.7%	1.8%	1.8%	40.0%	40.0%	32.5%
	LA	10.1%	1.9%	2.1%	2.1%	31.0%	31.0%	62.1%
	ME	6.1%	1.7%	1.7%	1.7%	1.5%	1.5%	3.9%
	MD	8.6%	1.7%	1.8%	1.8%	30.8%	30.8%	3.1%
	MA	7.5%	1.7%	1.7%	1.7%	20.2%	20.1%	4.1%
	MI	13.2%	1.6%	1.6%	1.6%	27.9%	28.0%	3.5%
	MN	7.4%	1.6%	1.6%	1.6%	29.0%	29.0%	4.5%
	MS	9.2%	1.9%	2.0%	2.0%	48.7%	48.7%	58.0%
	MO	10.8%	1.7%	1.7%	1.7%	32.3%	32.2%	4.7%
	MT	24.5%	1.6%	1.6%	1.6%	24.3%	24.3%	20.3%
	NE	10.3%	1.6%	1.7%	1.7%	30.9%	30.9%	2.1%
	NV	51.0%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.2%	2.1%	2.3%	1.7%	5.8%	5.8%	2.8%
	NJ	7.9%	1.7%	1.8%	1.8%	19.3%	19.3%	4.4%
	NM	52.6%	1.6%	1.6%	1.6%	1.5%	1.5%	30.4%
	NY	8.0%	1.7%	1.7%	1.7%	19.6%	19.6%	6.4%
	NC	6.5%	1.8%	1.8%	1.8%	56.4%	56.3%	27.9%
	ND	6.7%	1.6%	1.6%	1.6%	23.8%	23.8%	4.3%
	OH	9.6%	1.6%	1.7%	1.7%	28.6%	28.7%	1.5%
	OK	35.5%	1.6%	1.6%	1.6%	46.1%	46.5%	25.3%
	OR	25.6%	1.7%	1.8%	1.8%	14.3%	14.2%	13.3%
	PA	5.8%	1.7%	1.7%	1.8%	31.0%	30.8%	2.2%
	RI	4.6%	1.7%	1.7%	1.7%	22.9%	22.9%	4.2%
	SC	11.4%	1.9%	2.0%	2.0%	45.7%	45.6%	37.8%
	SD	8.9%	1.6%	1.6%	1.6%	28.2%	28.2%	9.4%
	TN	5.7%	1.8%	1.8%	1.8%	37.5%	37.3%	21.0%
	TX	48.9%	1.6%	1.7%	1.7%	46.4%	46.3%	22.5%
	UT	35.2%	1.6%	1.6%	1.6%	23.2%	23.1%	20.3%
	VT	7.1%	1.7%	1.7%	1.7%	1.5%	1.5%	3.8%
	VA	5.8%	1.7%	1.8%	1.8%	46.5%	46.4%	3.0%
	WA	30.2%	1.7%	1.8%	1.8%	22.0%	21.8%	6.0%
	WV	7.1%	1.7%	1.8%	1.8%	15.5%	15.4%	3.0%
	WI	8.2%	1.6%	1.6%	1.6%	25.9%	25.8%	2.7%
	WY	22.2%	1.6%	1.6%	1.6%	22.9%	22.8%	20.7%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1995	AL	11.0%	1.9%	2.0%	2.0%	46.0%	46.1%	46.0%
	AK	10.9%	1.7%	1.7%	1.7%	1.5%	1.5%	12.7%
	AZ	61.5%	1.6%	1.7%	1.7%	53.1%	52.2%	27.7%
	AR	7.6%	1.9%	2.0%	2.0%	52.3%	52.5%	23.6%
	CA	51.2%	1.8%	1.9%	2.0%	49.1%	49.1%	9.6%
	CO	39.3%	1.6%	1.6%	1.6%	25.6%	25.6%	23.6%
	CT	10.9%	1.7%	1.7%	1.7%	9.1%	9.0%	3.4%
	DE	10.6%	1.8%	1.8%	1.8%	33.8%	33.8%	3.4%
	FL	39.6%	2.1%	2.2%	2.2%	25.1%	25.0%	24.2%
	GA	14.6%	1.9%	2.0%	2.0%	48.3%	48.1%	19.4%
	HI	57.8%	2.1%	2.2%	2.2%	37.3%	37.3%	38.9%
	ID	39.2%	1.6%	1.6%	1.6%	18.8%	18.8%	26.6%
	IL	11.5%	1.6%	1.7%	1.7%	33.4%	33.4%	5.5%
	IN	10.1%	1.6%	1.7%	1.7%	32.7%	32.7%	2.1%
	IA	9.3%	1.6%	1.7%	1.7%	39.2%	39.3%	2.6%
	KS	11.9%	1.7%	1.7%	1.7%	32.8%	32.7%	2.3%
	KY	4.4%	1.8%	1.8%	1.8%	42.4%	42.4%	27.4%
	LA	10.4%	2.0%	2.1%	2.1%	27.8%	27.8%	58.1%
	ME	6.2%	1.7%	1.7%	1.7%	1.5%	1.5%	4.0%
	MD	8.9%	1.7%	1.8%	1.8%	31.0%	31.0%	3.5%
	MA	7.4%	1.7%	1.7%	1.7%	19.6%	19.6%	4.2%
	MI	14.7%	1.6%	1.6%	1.6%	29.8%	29.8%	3.5%
	MN	8.1%	1.6%	1.6%	1.6%	30.0%	29.9%	4.0%
	MS	9.3%	1.9%	2.0%	2.0%	51.0%	51.0%	54.8%
	MO	10.8%	1.7%	1.7%	1.7%	33.2%	33.1%	4.1%
	MT	23.3%	1.6%	1.6%	1.6%	22.9%	22.9%	22.7%
	NE	10.3%	1.6%	1.7%	1.7%	31.1%	31.1%	2.3%
	NV	49.4%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.3%	1.7%	1.7%	1.7%	7.9%	7.9%	3.2%
	NJ	8.1%	1.7%	1.8%	1.8%	19.3%	19.3%	4.5%
	NM	51.7%	1.6%	1.6%	1.6%	1.5%	1.5%	32.8%
	NY	8.6%	1.7%	1.7%	1.7%	20.7%	20.7%	6.3%
	NC	6.6%	1.8%	1.8%	1.8%	56.0%	55.9%	28.4%
	ND	6.7%	1.6%	1.6%	1.6%	24.6%	24.6%	4.0%
	OH	10.1%	1.6%	1.7%	1.7%	30.2%	30.2%	1.5%
	OK	34.7%	1.6%	1.6%	1.6%	48.4%	49.0%	29.2%
	OR	26.0%	1.7%	1.8%	1.8%	13.1%	13.0%	13.8%
	PA	6.0%	1.7%	1.8%	1.8%	31.9%	31.7%	2.1%
	RI	4.3%	1.7%	1.7%	1.7%	21.5%	21.5%	4.3%
	SC	11.0%	1.9%	2.0%	2.0%	47.3%	47.2%	38.8%
	SD	9.0%	1.6%	1.6%	1.6%	28.9%	28.8%	8.1%
	TN	5.7%	1.8%	1.8%	1.8%	39.3%	39.2%	18.4%
	TX	49.0%	1.6%	1.7%	1.7%	47.6%	47.5%	19.9%
	UT	33.8%	1.6%	1.6%	1.6%	23.8%	23.7%	24.0%
	VT	7.6%	1.7%	1.7%	1.7%	1.5%	1.5%	4.0%
	VA	5.6%	1.7%	1.8%	1.8%	47.4%	47.4%	3.4%
	WA	30.4%	1.7%	1.8%	1.8%	20.8%	20.7%	6.6%
	WV	7.2%	1.7%	1.8%	1.8%	17.7%	17.7%	3.4%
	WI	9.1%	1.6%	1.6%	1.6%	27.7%	27.6%	2.8%
	WY	21.3%	1.6%	1.6%	1.6%	22.9%	22.8%	23.4%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1996	AL	10.5%	1.9%	2.0%	2.0%	46.7%	46.9%	43.1%
	AK	13.7%	1.7%	1.7%	1.7%	1.5%	1.5%	12.5%
	AZ	59.9%	1.6%	1.7%	1.7%	52.1%	51.7%	31.7%
	AR	7.4%	1.8%	1.9%	1.9%	51.8%	52.0%	17.7%
	CA	50.4%	1.8%	1.9%	2.0%	49.1%	49.0%	9.6%
	CO	40.8%	1.6%	1.6%	1.6%	26.7%	26.7%	27.6%
	CT	10.5%	1.7%	1.7%	1.7%	11.3%	11.2%	3.7%
	DE	9.8%	1.7%	1.8%	1.8%	32.3%	32.3%	3.8%
	FL	40.9%	2.0%	2.2%	2.2%	22.7%	22.6%	26.9%
	GA	14.5%	1.9%	2.0%	2.0%	48.4%	48.1%	22.8%
	HI	50.5%	2.0%	2.1%	2.1%	33.4%	33.4%	31.3%
	ID	41.5%	1.6%	1.6%	1.6%	19.4%	19.4%	29.9%
	IL	11.2%	1.6%	1.7%	1.7%	31.6%	31.5%	4.8%
	IN	9.6%	1.6%	1.7%	1.7%	30.7%	30.7%	1.9%
	IA	9.1%	1.6%	1.6%	1.6%	38.5%	38.6%	2.2%
	KS	11.6%	1.7%	1.7%	1.7%	32.9%	32.9%	2.4%
	KY	4.1%	1.7%	1.8%	1.8%	42.3%	42.2%	21.3%
	LA	10.7%	1.9%	2.1%	2.1%	23.6%	23.6%	55.9%
	ME	6.0%	1.7%	1.7%	1.7%	1.5%	1.5%	4.1%
	MD	8.7%	1.7%	1.8%	1.8%	29.3%	29.3%	3.9%
	MA	7.4%	1.7%	1.7%	1.7%	19.0%	19.0%	4.3%
	MI	14.6%	1.6%	1.6%	1.6%	28.0%	28.0%	3.2%
	MN	8.3%	1.6%	1.6%	1.6%	28.6%	28.6%	3.2%
	MS	9.3%	1.9%	2.0%	2.0%	53.3%	53.2%	53.3%
	MO	10.4%	1.6%	1.7%	1.7%	32.5%	32.5%	3.4%
	MT	24.2%	1.6%	1.6%	1.6%	24.0%	24.0%	26.9%
	NE	9.9%	1.6%	1.6%	1.6%	30.0%	29.9%	2.4%
	NV	50.0%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.1%	1.7%	1.7%	1.7%	9.9%	9.8%	3.5%
	NJ	7.9%	1.7%	1.8%	1.8%	18.5%	18.6%	4.5%
	NM	51.1%	1.6%	1.6%	1.6%	1.5%	1.5%	35.1%
	NY	8.7%	1.7%	1.7%	1.7%	20.3%	20.3%	5.7%
	NC	6.4%	1.7%	1.8%	1.8%	56.8%	56.7%	29.2%
	ND	6.5%	1.6%	1.6%	1.6%	24.5%	24.5%	3.7%
	OH	9.8%	1.6%	1.7%	1.7%	29.1%	29.1%	1.5%
	OK	34.3%	1.6%	1.6%	1.6%	51.0%	51.6%	32.9%
	OR	25.6%	1.7%	1.8%	1.8%	11.9%	11.9%	14.4%
	PA	5.8%	1.7%	1.7%	1.7%	30.7%	30.6%	1.9%
	RI	4.0%	1.7%	1.7%	1.7%	19.6%	19.6%	4.4%
	SC	10.6%	1.9%	2.0%	2.0%	48.7%	48.5%	41.0%
	SD	8.8%	1.6%	1.6%	1.6%	27.9%	27.9%	6.7%
	TN	5.5%	1.7%	1.8%	1.8%	39.8%	39.7%	14.5%
	TX	49.8%	1.6%	1.7%	1.7%	50.2%	50.1%	17.6%
	UT	35.7%	1.6%	1.6%	1.6%	28.1%	28.0%	28.7%
	VT	7.8%	1.7%	1.7%	1.7%	1.5%	1.5%	4.1%
	VA	5.3%	1.7%	1.8%	1.8%	47.2%	47.2%	3.8%
	WA	30.9%	1.7%	1.8%	1.8%	20.8%	20.6%	7.0%
	WV	6.8%	1.7%	1.8%	1.8%	18.4%	18.4%	3.7%
	WI	9.0%	1.6%	1.6%	1.6%	25.6%	25.6%	2.7%
	WY	22.2%	1.6%	1.6%	1.6%	25.0%	24.9%	27.2%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1997	AL	9.9%	1.9%	2.0%	2.0%	47.5%	48.0%	39.1%
	AK	18.2%	1.7%	1.7%	1.7%	1.5%	1.5%	13.7%
	AZ	60.4%	1.6%	1.7%	1.7%	51.4%	51.4%	37.2%
	AR	7.3%	1.8%	1.9%	1.9%	52.9%	52.9%	12.4%
	CA	50.9%	1.8%	1.9%	2.0%	49.7%	49.6%	9.9%
	CO	41.8%	1.6%	1.6%	1.6%	26.9%	27.0%	31.4%
	CT	10.2%	1.7%	1.7%	1.7%	13.5%	13.6%	4.1%
	DE	9.5%	1.7%	1.8%	1.8%	32.7%	32.3%	4.2%
	FL	42.0%	2.0%	2.2%	2.2%	21.4%	21.0%	28.9%
	GA	14.3%	1.9%	2.0%	2.0%	48.6%	48.5%	25.7%
	HI	49.8%	2.0%	2.1%	2.1%	32.9%	33.8%	28.3%
	ID	43.5%	1.6%	1.6%	1.6%	20.1%	19.6%	33.3%
	IL	11.5%	1.6%	1.7%	1.7%	31.6%	31.7%	4.2%
	IN	9.4%	1.6%	1.7%	1.7%	30.0%	30.8%	1.8%
	IA	9.7%	1.6%	1.7%	1.7%	40.9%	40.5%	2.0%
	KS	11.5%	1.7%	1.7%	1.7%	33.5%	33.5%	2.6%
	KY	4.0%	1.7%	1.8%	1.8%	43.3%	43.8%	15.8%
	LA	11.0%	1.9%	2.1%	2.1%	20.0%	19.9%	52.3%
	ME	6.1%	1.7%	1.7%	1.7%	1.5%	1.5%	4.2%
	MD	8.9%	1.7%	1.8%	1.8%	28.7%	29.1%	4.3%
	MA	7.4%	1.7%	1.7%	1.7%	18.7%	18.8%	4.4%
	MI	15.0%	1.6%	1.6%	1.6%	27.5%	28.0%	3.1%
	MN	8.9%	1.6%	1.6%	1.6%	29.8%	29.1%	2.7%
	MS	9.2%	1.9%	2.0%	2.0%	54.6%	54.9%	50.4%
	MO	10.3%	1.6%	1.7%	1.7%	33.1%	33.1%	2.7%
	MT	24.9%	1.6%	1.6%	1.6%	24.9%	24.6%	31.1%
	NE	10.2%	1.6%	1.7%	1.7%	31.5%	30.5%	2.6%
	NV	49.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.0%	1.7%	1.7%	1.7%	11.7%	11.8%	3.9%
	NJ	7.9%	1.7%	1.8%	1.8%	18.1%	18.5%	4.6%
	NM	51.9%	1.6%	1.6%	1.6%	1.5%	1.5%	40.1%
	NY	8.7%	1.7%	1.7%	1.7%	19.8%	20.4%	5.3%
	NC	6.4%	1.7%	1.8%	1.8%	56.6%	56.7%	29.9%
	ND	6.7%	1.6%	1.6%	1.6%	25.7%	25.2%	3.4%
	OH	9.6%	1.6%	1.6%	1.6%	28.2%	29.2%	1.5%
	OK	34.3%	1.6%	1.6%	1.6%	55.1%	55.8%	37.7%
	OR	27.0%	1.7%	1.8%	1.8%	11.2%	11.0%	15.4%
	PA	5.7%	1.7%	1.7%	1.7%	30.2%	30.7%	1.8%
	RI	3.7%	1.7%	1.7%	1.7%	18.2%	18.3%	4.5%
	SC	10.2%	1.8%	2.0%	2.0%	49.8%	50.0%	42.4%
	SD	9.1%	1.6%	1.6%	1.6%	29.5%	28.5%	5.5%
	TN	5.3%	1.7%	1.8%	1.8%	40.7%	40.9%	11.2%
	TX	49.8%	1.6%	1.7%	1.7%	51.4%	52.3%	15.2%
	UT	36.4%	1.6%	1.6%	1.6%	31.0%	31.0%	33.3%
	VT	7.8%	1.7%	1.7%	1.7%	1.5%	1.5%	4.1%
	VA	5.1%	1.7%	1.8%	1.8%	47.8%	48.3%	4.2%
	WA	32.9%	1.7%	1.8%	1.8%	21.5%	20.9%	7.9%
	WV	6.6%	1.7%	1.7%	1.7%	19.7%	20.1%	4.1%
	WI	9.5%	1.6%	1.6%	1.6%	26.0%	25.9%	2.7%
	WY	22.8%	1.6%	1.6%	1.6%	26.9%	26.6%	31.0%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1998	AL	10.7%	1.9%	2.1%	2.1%	51.7%	49.4%	37.5%
	AK	16.6%	1.7%	1.7%	1.7%	1.5%	1.5%	13.0%
	AZ	59.8%	1.6%	1.7%	1.7%	50.7%	51.6%	42.7%
	AR	7.8%	1.9%	2.0%	2.0%	57.6%	54.9%	7.5%
	CA	49.8%	1.8%	1.9%	1.9%	48.2%	49.2%	10.2%
	CO	43.1%	1.6%	1.6%	1.6%	27.7%	27.1%	36.1%
	CT	10.9%	1.7%	1.8%	1.8%	14.5%	13.7%	4.6%
	DE	9.8%	1.8%	1.8%	1.8%	33.7%	32.8%	4.6%
	FL	43.8%	2.1%	2.3%	2.3%	23.0%	21.8%	32.2%
	GA	15.2%	1.9%	2.1%	2.1%	52.6%	49.5%	30.2%
	HI	52.8%	2.0%	2.2%	2.2%	35.4%	33.4%	25.1%
	ID	45.0%	1.6%	1.6%	1.6%	20.9%	20.3%	37.5%
	IL	12.6%	1.7%	1.7%	1.7%	34.8%	32.1%	3.6%
	IN	10.4%	1.6%	1.7%	1.7%	33.5%	30.6%	1.7%
	IA	10.4%	1.6%	1.7%	1.7%	43.1%	41.9%	1.8%
	KS	12.4%	1.7%	1.7%	1.7%	36.6%	33.8%	2.8%
	KY	4.3%	1.8%	1.8%	1.8%	46.8%	44.4%	10.9%
	LA	11.7%	2.0%	2.2%	2.2%	22.2%	20.3%	51.5%
	ME	6.3%	1.7%	1.7%	1.7%	1.5%	1.5%	4.4%
	MD	9.5%	1.7%	1.8%	1.8%	31.0%	29.0%	4.8%
	MA	7.7%	1.7%	1.7%	1.7%	19.6%	18.9%	4.7%
	MI	16.5%	1.6%	1.6%	1.6%	30.8%	28.2%	3.0%
	MN	9.4%	1.6%	1.6%	1.7%	31.6%	30.2%	2.1%
	MS	9.8%	2.0%	2.1%	2.1%	59.3%	56.8%	50.6%
	MO	11.4%	1.7%	1.7%	1.7%	36.7%	33.5%	2.2%
	MT	26.2%	1.6%	1.6%	1.6%	26.4%	25.5%	36.4%
	NE	10.8%	1.6%	1.7%	1.7%	33.3%	31.7%	2.8%
	NV	49.4%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.3%	1.7%	1.7%	1.7%	12.3%	11.8%	4.3%
	NJ	8.4%	1.7%	1.8%	1.8%	19.3%	18.5%	4.9%
	NM	53.0%	1.6%	1.6%	1.6%	1.5%	1.5%	43.0%
	NY	9.3%	1.7%	1.7%	1.7%	21.6%	20.3%	5.2%
	NC	6.9%	1.8%	1.8%	1.8%	60.0%	58.1%	32.0%
	ND	6.8%	1.6%	1.6%	1.6%	26.5%	26.0%	3.1%
	OH	10.6%	1.6%	1.7%	1.7%	31.4%	28.8%	1.5%
	OK	37.8%	1.6%	1.7%	1.7%	58.7%	57.3%	43.8%
	OR	26.8%	1.7%	1.8%	1.8%	11.4%	11.2%	16.5%
	PA	6.2%	1.7%	1.8%	1.8%	32.6%	30.6%	1.6%
	RI	3.9%	1.7%	1.8%	1.8%	19.3%	18.5%	4.7%
	SC	10.9%	1.9%	2.0%	2.0%	53.6%	50.8%	45.8%
	SD	9.5%	1.6%	1.7%	1.7%	30.7%	29.8%	4.2%
	TN	5.8%	1.8%	1.9%	1.9%	44.5%	41.8%	8.8%
	TX	53.5%	1.6%	1.7%	1.7%	55.3%	52.6%	13.3%
	UT	36.7%	1.6%	1.6%	1.6%	31.0%	30.9%	38.3%
	VT	8.3%	1.7%	1.7%	1.7%	1.5%	1.5%	4.5%
	VA	5.5%	1.7%	1.8%	1.8%	50.9%	49.4%	4.7%
	WA	33.8%	1.7%	1.8%	1.8%	22.8%	21.6%	8.6%
	WV	7.1%	1.7%	1.8%	1.8%	21.5%	20.0%	4.6%
	WI	10.3%	1.6%	1.6%	1.6%	28.4%	26.5%	2.8%
	WY	23.3%	1.6%	1.6%	1.6%	27.5%	27.0%	35.6%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
1999	AL	10.2%	1.9%	2.0%	2.0%	49.1%	50.5%	32.4%
	AK	17.0%	1.7%	1.7%	1.7%	1.5%	1.5%	13.6%
	AZ	60.7%	1.6%	1.7%	1.7%	50.9%	50.5%	48.0%
	AR	7.5%	1.9%	2.0%	2.0%	54.9%	56.8%	1.5%
	CA	50.7%	1.8%	1.9%	1.9%	49.1%	48.4%	10.6%
	CO	41.4%	1.6%	1.6%	1.6%	26.5%	27.3%	38.4%
	CT	11.0%	1.7%	1.8%	1.8%	14.7%	14.5%	5.0%
	DE	9.9%	1.8%	1.8%	1.8%	34.1%	33.7%	5.0%
	FL	41.4%	2.0%	2.2%	2.2%	21.6%	22.7%	32.7%
	GA	14.5%	1.9%	2.0%	2.0%	49.7%	50.9%	32.0%
	HI	51.2%	2.0%	2.2%	2.2%	35.1%	35.0%	19.7%
	ID	42.8%	1.6%	1.6%	1.6%	19.5%	20.3%	38.2%
	IL	12.2%	1.6%	1.7%	1.7%	33.6%	34.5%	2.9%
	IN	10.3%	1.6%	1.7%	1.7%	33.0%	33.3%	1.5%
	IA	10.1%	1.6%	1.7%	1.7%	41.5%	42.5%	1.5%
	KS	11.7%	1.7%	1.7%	1.7%	34.3%	36.2%	2.9%
	KY	4.3%	1.8%	1.8%	1.8%	46.2%	46.1%	5.1%
	LA	11.2%	2.0%	2.1%	2.1%	20.9%	21.9%	46.5%
	ME	6.6%	1.7%	1.7%	1.7%	1.5%	1.5%	4.7%
	MD	9.4%	1.7%	1.8%	1.8%	30.6%	30.7%	5.1%
	MA	7.9%	1.7%	1.7%	1.8%	20.1%	19.7%	4.9%
	MI	16.2%	1.6%	1.6%	1.6%	30.0%	30.4%	2.8%
	MN	9.1%	1.6%	1.6%	1.6%	30.4%	31.3%	1.5%
	MS	9.4%	1.9%	2.1%	2.1%	56.4%	57.5%	46.0%
	MO	10.9%	1.7%	1.7%	1.7%	35.1%	36.3%	1.5%
	MT	24.3%	1.6%	1.6%	1.6%	23.9%	25.6%	37.2%
	NE	10.3%	1.6%	1.7%	1.7%	31.6%	32.9%	2.9%
	NV	49.1%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.5%	1.7%	1.7%	1.7%	12.5%	12.3%	4.7%
	NJ	8.5%	1.7%	1.8%	1.8%	19.4%	19.5%	5.0%
	NM	51.4%	1.6%	1.6%	1.6%	1.5%	1.5%	45.1%
	NY	9.4%	1.7%	1.7%	1.7%	21.7%	21.6%	4.8%
	NC	6.6%	1.8%	1.8%	1.8%	57.8%	58.5%	31.8%
	ND	6.4%	1.6%	1.6%	1.6%	24.9%	26.0%	2.7%
	OH	10.5%	1.6%	1.7%	1.7%	31.3%	31.3%	1.5%
	OK	35.4%	1.6%	1.7%	1.7%	55.9%	58.5%	46.6%
	OR	25.7%	1.7%	1.8%	1.8%	10.8%	11.1%	16.5%
	PA	6.2%	1.7%	1.8%	1.8%	32.7%	32.5%	1.5%
	RI	4.0%	1.7%	1.8%	1.8%	19.9%	19.4%	4.8%
	SC	10.4%	1.9%	2.0%	2.0%	50.9%	52.1%	45.6%
	SD	9.1%	1.6%	1.6%	1.6%	29.4%	30.4%	2.8%
	TN	5.7%	1.8%	1.8%	1.8%	43.1%	43.7%	5.1%
	TX	51.6%	1.6%	1.7%	1.7%	53.0%	54.4%	10.6%
	UT	36.0%	1.6%	1.6%	1.6%	30.5%	30.6%	42.2%
	VT	8.6%	1.7%	1.7%	1.7%	1.5%	1.5%	1.4%
	VA	5.4%	1.7%	1.8%	1.8%	49.5%	50.0%	5.0%
	WA	31.6%	1.7%	1.8%	1.8%	20.6%	21.8%	8.8%
	WV	7.1%	1.7%	1.8%	1.8%	21.3%	21.3%	5.0%
	WI	10.0%	1.6%	1.6%	1.6%	27.7%	28.1%	2.8%
	WY	22.4%	1.6%	1.6%	1.6%	26.5%	27.0%	37.8%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
2000	AL	10.3%	1.9%	2.0%	2.0%	49.6%	49.8%	32.4%
	AK	16.0%	1.6%	1.7%	1.7%	1.5%	1.5%	12.8%
	AZ	59.9%	1.6%	1.7%	1.7%	52.3%	52.3%	47.0%
	AR	7.5%	1.9%	2.0%	2.0%	54.8%	55.1%	1.5%
	CA	49.9%	1.8%	1.9%	2.0%	48.6%	48.4%	10.3%
	CO	44.0%	1.6%	1.6%	1.6%	28.7%	28.7%	40.5%
	CT	10.2%	1.7%	1.7%	1.7%	13.5%	13.4%	4.8%
	DE	9.3%	1.7%	1.8%	1.8%	32.0%	32.0%	5.0%
	FL	41.5%	2.0%	2.2%	2.2%	21.5%	21.5%	33.0%
	GA	14.4%	1.9%	2.0%	2.0%	49.0%	48.7%	31.7%
	HI	55.2%	2.1%	2.3%	2.3%	39.2%	39.2%	20.8%
	ID	44.1%	1.6%	1.6%	1.6%	20.5%	20.4%	39.3%
	IL	11.9%	1.6%	1.7%	1.7%	33.0%	33.0%	2.9%
	IN	9.8%	1.6%	1.7%	1.7%	31.5%	31.5%	1.5%
	IA	10.0%	1.6%	1.7%	1.7%	41.8%	41.9%	1.5%
	KS	12.5%	1.7%	1.7%	1.7%	36.9%	36.8%	3.0%
	KY	4.2%	1.7%	1.8%	1.8%	44.7%	44.6%	5.0%
	LA	11.2%	2.0%	2.1%	2.1%	20.9%	20.9%	46.4%
	ME	6.0%	1.7%	1.7%	1.7%	1.5%	1.5%	4.5%
	MD	8.9%	1.7%	1.8%	1.8%	28.9%	28.8%	5.0%
	MA	7.2%	1.7%	1.7%	1.7%	18.4%	18.4%	4.7%
	MI	15.4%	1.6%	1.6%	1.6%	28.3%	28.3%	2.8%
	MN	9.0%	1.6%	1.6%	1.6%	30.0%	29.9%	1.5%
	MS	9.5%	1.9%	2.1%	2.1%	56.7%	56.7%	46.1%
	MO	11.0%	1.7%	1.7%	1.7%	35.4%	35.4%	1.5%
	MT	25.3%	1.6%	1.6%	1.6%	25.3%	25.3%	38.7%
	NE	10.7%	1.6%	1.7%	1.7%	33.2%	33.1%	2.9%
	NV	49.6%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	6.9%	1.7%	1.7%	1.7%	11.5%	11.4%	4.5%
	NJ	7.9%	1.7%	1.8%	1.8%	18.0%	18.3%	4.9%
	NM	52.4%	1.6%	1.6%	1.6%	1.5%	1.5%	45.4%
	NY	8.8%	1.7%	1.7%	1.7%	20.1%	20.1%	4.6%
	NC	6.6%	1.8%	1.8%	1.8%	56.5%	56.4%	31.2%
	ND	6.6%	1.6%	1.6%	1.6%	25.3%	25.3%	2.7%
	OH	9.9%	1.6%	1.7%	1.7%	29.5%	29.5%	1.5%
	OK	35.6%	1.6%	1.7%	1.7%	57.2%	57.6%	46.1%
	OR	25.9%	1.7%	1.8%	1.8%	10.9%	10.9%	16.5%
	PA	5.8%	1.7%	1.7%	1.7%	30.5%	30.4%	1.5%
	RI	3.7%	1.7%	1.7%	1.7%	18.4%	18.4%	4.8%
	SC	10.3%	1.9%	2.0%	2.0%	50.2%	50.0%	45.1%
	SD	9.3%	1.6%	1.6%	1.6%	30.1%	30.1%	2.8%
	TN	5.6%	1.8%	1.8%	1.8%	42.7%	42.6%	5.1%
	TX	51.1%	1.6%	1.7%	1.7%	53.2%	53.1%	10.5%
	UT	37.7%	1.6%	1.6%	1.6%	32.8%	32.6%	43.2%
	VT	7.8%	1.7%	1.7%	1.7%	1.5%	1.5%	4.4%
	VA	5.2%	1.7%	1.8%	1.8%	48.2%	48.2%	4.9%
	WA	31.4%	1.7%	1.8%	1.8%	20.8%	20.5%	8.8%
	WV	6.8%	1.7%	1.8%	1.8%	20.5%	20.4%	4.9%
	WI	9.8%	1.6%	1.6%	1.6%	26.9%	26.9%	2.8%
	WY	23.3%	1.6%	1.6%	1.6%	28.2%	27.9%	39.1%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
2001	AL	10.2%	1.9%	2.0%	2.0%	48.9%	49.1%	32.9%
	AK	16.5%	1.7%	1.7%	1.7%	1.5%	1.5%	13.2%
	AZ	61.8%	1.6%	1.7%	1.7%	52.7%	52.7%	48.4%
	AR	7.5%	1.9%	2.0%	2.0%	55.0%	55.4%	1.5%
	CA	51.7%	1.8%	1.9%	2.0%	50.6%	50.2%	10.6%
	CO	43.7%	1.6%	1.6%	1.6%	28.4%	28.4%	40.3%
	CT	10.8%	1.7%	1.8%	1.8%	14.4%	13.1%	4.9%
	DE	9.7%	1.7%	1.8%	1.8%	33.2%	33.2%	5.1%
	FL	42.7%	2.0%	2.2%	2.2%	21.5%	21.6%	34.1%
	GA	14.6%	1.9%	2.0%	2.0%	49.9%	49.6%	32.6%
	HI	54.7%	2.1%	2.3%	2.3%	39.7%	39.7%	20.4%
	ID	45.1%	1.6%	1.6%	1.6%	21.0%	20.9%	40.4%
	IL	12.2%	1.6%	1.7%	1.7%	33.5%	33.6%	2.9%
	IN	10.0%	1.6%	1.7%	1.7%	32.3%	32.3%	1.5%
	IA	10.1%	1.6%	1.7%	1.7%	41.9%	42.0%	1.5%
	KS	12.4%	1.7%	1.7%	1.7%	36.4%	36.4%	1.5%
	KY	4.2%	1.8%	1.8%	1.8%	45.3%	45.2%	5.1%
	LA	11.2%	2.0%	2.1%	2.1%	20.4%	20.4%	47.8%
	ME	6.4%	1.7%	1.7%	1.7%	1.5%	1.5%	4.6%
	MD	9.2%	1.7%	1.8%	1.8%	29.6%	29.6%	5.1%
	MA	7.7%	1.7%	1.7%	1.7%	19.7%	19.7%	4.9%
	MI	15.9%	1.6%	1.6%	1.6%	29.4%	29.3%	2.8%
	MN	9.2%	1.6%	1.6%	1.6%	30.6%	30.6%	1.5%
	MS	9.4%	1.9%	2.0%	2.0%	56.2%	56.2%	47.0%
	MO	11.1%	1.7%	1.7%	1.7%	35.5%	35.5%	1.5%
	MT	26.0%	1.6%	1.6%	1.6%	26.2%	26.2%	39.9%
	NE	10.6%	1.6%	1.7%	1.7%	32.8%	32.7%	2.9%
	NV	51.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.3%	1.7%	1.7%	1.7%	12.3%	12.2%	4.7%
	NJ	8.3%	1.7%	1.8%	1.8%	18.9%	19.1%	5.0%
	NM	52.9%	1.6%	1.6%	1.6%	1.5%	1.5%	46.0%
	NY	9.2%	1.7%	1.7%	1.7%	21.3%	21.2%	4.8%
	NC	6.6%	1.8%	1.8%	1.8%	58.4%	58.2%	32.1%
	ND	6.7%	1.6%	1.6%	1.6%	26.2%	26.2%	2.8%
	OH	10.2%	1.6%	1.7%	1.7%	30.3%	30.3%	1.5%
	OK	36.0%	1.6%	1.7%	1.6%	57.7%	58.1%	46.7%
	OR	26.1%	1.7%	1.8%	1.8%	11.0%	11.0%	16.8%
	PA	6.0%	1.7%	1.8%	1.8%	32.0%	31.9%	1.5%
	RI	3.9%	1.7%	1.8%	1.8%	19.5%	19.5%	3.3%
	SC	10.5%	1.9%	2.0%	2.0%	51.7%	51.5%	47.0%
	SD	9.5%	1.6%	1.7%	1.7%	30.6%	30.6%	2.9%
	TN	5.5%	1.8%	1.8%	1.8%	42.5%	42.4%	5.1%
	TX	51.5%	1.6%	1.7%	1.7%	53.7%	53.6%	10.8%
	UT	38.1%	1.6%	1.6%	1.6%	33.1%	32.9%	43.8%
	VT	8.4%	1.7%	1.7%	1.7%	1.5%	1.5%	4.6%
	VA	5.3%	1.7%	1.8%	1.8%	49.0%	49.0%	5.0%
	WA	32.1%	1.7%	1.8%	1.8%	21.3%	21.0%	8.9%
	WV	6.9%	1.7%	1.8%	1.8%	20.7%	20.6%	4.9%
	WI	10.0%	1.6%	1.6%	1.6%	27.6%	27.5%	2.8%
	WY	23.8%	1.6%	1.6%	1.6%	28.5%	28.4%	39.9%

Table 8.8-1: State-Specific Weighted Methane Conversion Factors by Year

Year	State	Dairy Cows	Dairy Heifers	Feedlot Heifers	Feedlot Steer	Market Swine	Breeding Swine	Layers
2002	AL	10.4%	1.9%	2.0%	2.0%	49.8%	50.1%	32.6%
	AK	16.8%	1.7%	1.7%	1.7%	1.5%	1.5%	13.5%
	AZ	60.6%	1.6%	1.7%	1.7%	52.4%	52.4%	47.4%
	AR	7.4%	1.9%	2.0%	2.0%	54.0%	54.4%	1.5%
	CA	50.8%	1.8%	1.9%	2.0%	49.5%	49.2%	10.5%
	CO	43.3%	1.6%	1.6%	1.6%	28.6%	28.6%	40.0%
	CT	10.9%	1.7%	1.8%	1.8%	14.6%	13.3%	4.9%
	DE	10.0%	1.8%	1.8%	1.8%	34.6%	34.6%	5.1%
	FL	41.8%	2.1%	2.2%	2.2%	21.9%	21.9%	33.0%
	GA	14.6%	1.9%	2.0%	2.0%	50.2%	49.9%	32.1%
	HI	54.3%	2.1%	2.3%	2.3%	39.3%	39.3%	20.3%
	ID	43.7%	1.6%	1.6%	1.6%	20.3%	20.2%	39.2%
	IL	12.4%	1.6%	1.7%	1.7%	34.2%	34.2%	2.9%
	IN	10.4%	1.6%	1.7%	1.7%	33.5%	33.6%	1.5%
	IA	10.1%	1.6%	1.7%	1.7%	42.2%	42.2%	1.5%
	KS	12.1%	1.7%	1.7%	1.7%	35.8%	35.8%	1.5%
	KY	4.3%	1.8%	1.8%	1.8%	46.4%	46.3%	5.1%
	LA	11.1%	2.0%	2.1%	2.1%	20.5%	20.5%	46.7%
	ME	6.3%	1.7%	1.7%	1.7%	1.5%	1.5%	4.6%
	MD	9.4%	1.7%	1.8%	1.8%	30.9%	30.9%	5.1%
	MA	7.7%	1.7%	1.7%	1.7%	19.6%	19.6%	4.9%
	MI	16.3%	1.6%	1.6%	1.6%	30.1%	30.0%	2.9%
	MN	9.2%	1.6%	1.6%	1.6%	30.7%	30.7%	1.5%
	MS	9.4%	1.9%	2.0%	2.0%	56.2%	56.3%	46.4%
	MO	10.9%	1.7%	1.7%	1.7%	35.4%	35.4%	1.5%
	MT	24.7%	1.6%	1.6%	1.6%	24.4%	24.4%	37.6%
	NE	10.8%	1.6%	1.7%	1.7%	33.3%	33.3%	2.9%
	NV	50.3%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%
	NH	7.4%	1.7%	1.7%	1.7%	12.5%	12.4%	4.8%
	NJ	8.5%	1.7%	1.8%	1.8%	19.3%	19.5%	5.0%
	NM	52.1%	1.6%	1.6%	1.6%	1.5%	1.5%	45.3%
	NY	9.3%	1.7%	1.7%	1.7%	21.7%	21.6%	4.8%
	NC	6.8%	1.8%	1.8%	1.8%	58.4%	58.3%	31.8%
	ND	6.7%	1.6%	1.6%	1.6%	26.0%	26.1%	2.7%
	OH	10.7%	1.6%	1.7%	1.7%	32.0%	32.0%	1.5%
	OK	34.4%	1.6%	1.6%	1.7%	55.6%	56.0%	45.8%
	OR	26.3%	1.7%	1.8%	1.8%	11.0%	11.0%	16.8%
	PA	6.2%	1.7%	1.8%	1.8%	33.2%	33.1%	1.5%
	RI	3.9%	1.7%	1.8%	1.8%	19.4%	19.4%	3.3%
	SC	10.5%	1.9%	2.0%	2.0%	51.7%	51.5%	45.7%
	SD	9.6%	1.6%	1.7%	1.7%	30.9%	31.0%	2.9%
	TN	5.7%	1.8%	1.8%	1.8%	43.2%	43.1%	5.2%
	TX	50.2%	1.6%	1.7%	1.7%	51.9%	51.9%	10.5%
	UT	37.3%	1.6%	1.6%	1.6%	32.0%	31.9%	42.8%
	VT	8.3%	1.7%	1.7%	1.7%	1.5%	1.5%	4.6%
	VA	5.5%	1.7%	1.8%	1.8%	50.2%	50.2%	5.0%
	WA	32.1%	1.7%	1.8%	1.8%	21.1%	20.8%	8.9%
	WV	7.2%	1.7%	1.8%	1.8%	21.5%	21.5%	5.0%
	WI	10.1%	1.6%	1.6%	1.6%	27.9%	27.9%	2.8%
	WY	23.2%	1.6%	1.6%	1.6%	27.7%	27.5%	38.9%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1990	AL	11%	8%	15%	10%	56%	0%	29%	56%	15%
	AK	0%	0%	63%	0%	37%	0%	0%	37%	63%
	AZ	65%	22%	9%	4%	0%	0%	91%	0%	9%
	AR	7%	5%	14%	11%	63%	1%	23%	63%	14%
	CA	59%	23%	12%	4%	2%	0%	86%	2%	12%
	CO	52%	27%	3%	13%	2%	3%	95%	2%	3%
	CT	9%	17%	44%	20%	7%	3%	49%	7%	44%
	DE	7%	17%	44%	23%	6%	3%	50%	6%	44%
	FL	40%	15%	21%	4%	20%	0%	59%	20%	21%
	GA	15%	9%	16%	8%	52%	0%	32%	52%	16%
	HI	74%	21%	0%	4%	0%	0%	100%	0%	0%
	ID	47%	24%	5%	16%	3%	4%	92%	3%	5%
	IL	5%	16%	15%	50%	9%	5%	76%	9%	15%
	IN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	IA	4%	13%	22%	45%	13%	4%	65%	13%	22%
	KS	6%	18%	15%	46%	9%	4%	75%	9%	15%
	KY	2%	5%	14%	16%	62%	1%	24%	62%	14%
	LA	7%	6%	14%	10%	63%	1%	23%	63%	14%
	ME	4%	11%	47%	26%	9%	3%	44%	9%	47%
	MD	4%	12%	46%	26%	8%	3%	46%	8%	46%
	MA	5%	12%	46%	25%	8%	3%	45%	8%	46%
	MI	8%	21%	13%	45%	8%	5%	79%	8%	13%
	MN	3%	11%	26%	41%	15%	3%	58%	15%	26%
	MS	7%	6%	14%	10%	63%	0%	23%	63%	14%
	MO	5%	16%	17%	47%	10%	4%	73%	10%	17%
	MT	28%	21%	8%	30%	5%	8%	87%	5%	8%
	NE	5%	17%	17%	46%	10%	5%	73%	10%	17%
	NV	63%	27%	2%	7%	1%	1%	97%	1%	2%
	NH	5%	13%	46%	25%	8%	3%	46%	8%	46%
	NJ	4%	12%	47%	26%	9%	3%	44%	9%	47%
	NM	64%	21%	9%	5%	0%	0%	91%	0%	9%
	NY	5%	12%	46%	25%	8%	3%	45%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	4%	13%	23%	43%	14%	4%	63%	14%	23%
	OH	5%	15%	20%	43%	12%	4%	68%	12%	20%
	OK	31%	24%	5%	32%	0%	9%	95%	0%	5%
	OR	32%	19%	0%	13%	33%	3%	67%	33%	0%
	PA	3%	9%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	8%	48%	29%	10%	3%	42%	10%	48%
	SC	11%	8%	15%	8%	58%	0%	27%	58%	15%
	SD	5%	15%	21%	42%	12%	4%	67%	12%	21%
	TN	3%	7%	14%	13%	61%	2%	25%	61%	14%
	TX	46%	26%	6%	17%	0%	4%	94%	0%	6%
	UT	35%	27%	4%	25%	3%	7%	93%	3%	4%
	VT	4%	12%	47%	26%	9%	3%	45%	9%	47%
	VA	3%	8%	14%	12%	61%	2%	25%	61%	14%
	WA	37%	21%	0%	10%	29%	3%	71%	29%	0%
	WV	4%	11%	47%	26%	9%	3%	44%	9%	47%
	WI	4%	13%	22%	44%	13%	4%	65%	13%	22%
	WY	25%	19%	17%	23%	10%	6%	74%	10%	17%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1991	AL	11%	8%	15%	10%	56%	0%	29%	56%	15%
	AK	0%	0%	63%	0%	37%	0%	0%	37%	63%
	AZ	65%	22%	9%	4%	0%	0%	91%	0%	9%
	AR	7%	5%	14%	11%	63%	1%	23%	63%	14%
	CA	59%	23%	12%	4%	2%	0%	86%	2%	12%
	CO	52%	27%	3%	13%	2%	3%	95%	2%	3%
	CT	9%	17%	44%	20%	7%	3%	49%	7%	44%
	DE	7%	17%	44%	23%	6%	3%	50%	6%	44%
	FL	40%	15%	21%	4%	20%	0%	59%	20%	21%
	GA	15%	9%	16%	8%	52%	0%	32%	52%	16%
	HI	74%	21%	0%	4%	0%	0%	100%	0%	0%
	ID	47%	24%	5%	16%	3%	4%	92%	3%	5%
	IL	5%	16%	15%	50%	9%	5%	76%	9%	15%
	IN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	IA	4%	13%	22%	45%	13%	4%	65%	13%	22%
	KS	6%	18%	15%	46%	9%	4%	75%	9%	15%
	KY	2%	5%	14%	16%	62%	1%	24%	62%	14%
	LA	7%	6%	14%	10%	63%	1%	23%	63%	14%
	ME	4%	11%	47%	26%	9%	3%	44%	9%	47%
	MD	4%	12%	46%	26%	8%	3%	46%	8%	46%
	MA	5%	12%	46%	25%	8%	3%	45%	8%	46%
	MI	8%	21%	13%	45%	8%	5%	79%	8%	13%
	MN	3%	11%	26%	41%	15%	3%	58%	15%	26%
	MS	7%	6%	14%	10%	63%	0%	23%	63%	14%
	MO	5%	16%	17%	47%	10%	4%	73%	10%	17%
	MT	28%	21%	8%	30%	5%	8%	87%	5%	8%
	NE	5%	17%	17%	46%	10%	5%	73%	10%	17%
	NV	63%	27%	2%	7%	1%	1%	97%	1%	2%
	NH	5%	13%	46%	25%	8%	3%	46%	8%	46%
	NJ	4%	12%	47%	26%	9%	3%	44%	9%	47%
	NM	64%	21%	9%	5%	0%	0%	91%	0%	9%
	NY	5%	12%	46%	25%	8%	3%	45%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	4%	13%	23%	43%	14%	4%	63%	14%	23%
	OH	5%	15%	20%	43%	12%	4%	68%	12%	20%
	OK	31%	24%	5%	32%	0%	9%	95%	0%	5%
	OR	32%	19%	0%	13%	33%	3%	67%	33%	0%
	PA	3%	9%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	8%	48%	29%	10%	3%	42%	10%	48%
	SC	11%	8%	15%	8%	58%	0%	27%	58%	15%
	SD	5%	15%	21%	42%	12%	4%	67%	12%	21%
	TN	3%	7%	14%	13%	61%	2%	25%	61%	14%
	TX	46%	26%	6%	17%	0%	4%	94%	0%	6%
	UT	35%	27%	4%	25%	3%	7%	93%	3%	4%
	VT	4%	12%	47%	26%	9%	3%	45%	9%	47%
	VA	3%	8%	14%	12%	61%	2%	25%	61%	14%
	WA	37%	21%	0%	10%	29%	3%	71%	29%	0%
	WV	4%	11%	47%	26%	9%	3%	44%	9%	47%
	WI	4%	13%	22%	44%	13%	4%	65%	13%	22%
	WY	25%	19%	17%	23%	10%	6%	74%	10%	17%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1992	AL	11%	8%	15%	10%	56%	0%	29%	56%	15%
	AK	0%	0%	63%	0%	37%	0%	0%	37%	63%
	AZ	65%	22%	9%	4%	0%	0%	91%	0%	9%
	AR	7%	5%	14%	11%	63%	1%	23%	63%	14%
	CA	59%	23%	12%	4%	2%	0%	86%	2%	12%
	CO	52%	27%	3%	13%	2%	3%	95%	2%	3%
	CT	9%	17%	44%	20%	7%	3%	49%	7%	44%
	DE	7%	17%	44%	23%	6%	3%	50%	6%	44%
	FL	40%	15%	21%	4%	20%	0%	59%	20%	21%
	GA	15%	9%	16%	8%	52%	0%	32%	52%	16%
	HI	74%	21%	0%	4%	0%	0%	100%	0%	0%
	ID	47%	24%	5%	16%	3%	4%	92%	3%	5%
	IL	5%	16%	15%	50%	9%	5%	76%	9%	15%
	IN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	IA	4%	13%	22%	45%	13%	4%	65%	13%	22%
	KS	6%	18%	15%	46%	9%	4%	75%	9%	15%
	KY	2%	5%	14%	16%	62%	1%	24%	62%	14%
	LA	7%	6%	14%	10%	63%	1%	23%	63%	14%
	ME	4%	11%	47%	26%	9%	3%	44%	9%	47%
	MD	4%	12%	46%	26%	8%	3%	46%	8%	46%
	MA	5%	12%	46%	25%	8%	3%	45%	8%	46%
	MI	8%	21%	13%	45%	8%	5%	79%	8%	13%
	MN	3%	11%	26%	41%	15%	3%	58%	15%	26%
	MS	7%	6%	14%	10%	63%	0%	23%	63%	14%
	MO	5%	16%	17%	47%	10%	4%	73%	10%	17%
	MT	28%	21%	8%	30%	5%	8%	87%	5%	8%
	NE	5%	17%	17%	46%	10%	5%	73%	10%	17%
	NV	63%	27%	2%	7%	1%	1%	97%	1%	2%
	NH	5%	13%	46%	25%	8%	3%	46%	8%	46%
	NJ	4%	12%	47%	26%	9%	3%	44%	9%	47%
	NM	64%	21%	9%	5%	0%	0%	91%	0%	9%
	NY	5%	12%	46%	25%	8%	3%	45%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	4%	13%	23%	43%	14%	4%	63%	14%	23%
	OH	5%	15%	20%	43%	12%	4%	68%	12%	20%
	OK	31%	24%	5%	32%	0%	9%	95%	0%	5%
	OR	32%	19%	0%	13%	33%	3%	67%	33%	0%
	PA	3%	9%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	8%	48%	29%	10%	3%	42%	10%	48%
	SC	11%	8%	15%	8%	58%	0%	27%	58%	15%
	SD	5%	15%	21%	42%	12%	4%	67%	12%	21%
	TN	3%	7%	14%	13%	61%	2%	25%	61%	14%
	TX	46%	26%	6%	17%	0%	4%	94%	0%	6%
	UT	35%	27%	4%	25%	3%	7%	93%	3%	4%
	VT	4%	12%	47%	26%	9%	3%	45%	9%	47%
	VA	3%	8%	14%	12%	61%	2%	25%	61%	14%
	WA	37%	21%	0%	10%	29%	3%	71%	29%	0%
	WV	4%	11%	47%	26%	9%	3%	44%	9%	47%
	WI	4%	13%	22%	44%	13%	4%	65%	13%	22%
	WY	25%	19%	17%	23%	10%	6%	74%	10%	17%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1993	AL	11%	7%	15%	9%	57%	0%	28%	57%	15%
	AK	5%	4%	54%	4%	32%	1%	15%	32%	54%
	AZ	65%	21%	9%	4%	0%	0%	91%	0%	9%
	AR	6%	5%	14%	11%	63%	1%	23%	63%	14%
	CA	60%	22%	12%	4%	2%	0%	87%	2%	12%
	CO	54%	27%	3%	12%	2%	3%	95%	2%	3%
	CT	9%	17%	44%	21%	7%	3%	49%	7%	44%
	DE	6%	16%	44%	23%	6%	3%	49%	6%	44%
	FL	41%	15%	21%	4%	18%	0%	60%	18%	21%
	GA	14%	9%	16%	8%	52%	0%	32%	52%	16%
	HI	71%	21%	0%	5%	3%	0%	97%	3%	0%
	ID	50%	24%	5%	15%	3%	4%	93%	3%	5%
	IL	5%	17%	14%	50%	9%	5%	77%	9%	14%
	IN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	IA	4%	14%	21%	45%	12%	4%	67%	12%	21%
	KS	6%	18%	15%	47%	9%	4%	76%	9%	15%
	KY	2%	5%	14%	16%	62%	1%	24%	62%	14%
	LA	8%	6%	14%	10%	62%	1%	24%	62%	14%
	ME	4%	11%	47%	26%	9%	3%	44%	9%	47%
	MD	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MA	5%	12%	46%	25%	8%	3%	45%	8%	46%
	MI	8%	22%	12%	44%	7%	5%	80%	7%	12%
	MN	4%	12%	25%	42%	15%	3%	61%	15%	25%
	MS	7%	6%	14%	10%	63%	0%	23%	63%	14%
	MO	5%	16%	17%	47%	10%	5%	73%	10%	17%
	MT	28%	22%	7%	30%	4%	8%	88%	4%	7%
	NE	5%	17%	17%	47%	10%	5%	74%	10%	17%
	NV	64%	25%	2%	6%	1%	1%	97%	1%	2%
	NH	5%	13%	46%	25%	8%	3%	46%	8%	46%
	NJ	4%	12%	47%	26%	9%	3%	45%	9%	47%
	NM	65%	21%	9%	4%	0%	0%	91%	0%	9%
	NY	6%	13%	46%	24%	8%	2%	45%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	4%	12%	23%	44%	14%	4%	64%	14%	23%
	OH	5%	16%	19%	44%	12%	4%	69%	12%	19%
	OK	31%	24%	5%	32%	0%	9%	95%	0%	5%
	OR	32%	19%	0%	12%	33%	3%	67%	33%	0%
	PA	3%	9%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	8%	48%	29%	10%	3%	41%	10%	48%
	SC	11%	8%	15%	8%	59%	0%	26%	59%	15%
	SD	5%	15%	20%	43%	12%	4%	68%	12%	20%
	TN	3%	7%	14%	13%	62%	2%	24%	62%	14%
	TX	47%	26%	6%	16%	0%	4%	94%	0%	6%
	UT	37%	27%	4%	24%	2%	6%	94%	2%	4%
	VT	5%	12%	47%	26%	9%	3%	45%	9%	47%
	VA	3%	8%	14%	12%	61%	2%	25%	61%	14%
	WA	39%	21%	0%	10%	28%	2%	72%	28%	0%
	WV	4%	11%	47%	26%	9%	3%	44%	9%	47%
	WI	4%	14%	21%	44%	13%	4%	66%	13%	21%
	WY	26%	20%	16%	23%	9%	6%	75%	9%	16%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1994	AL	10%	7%	15%	9%	59%	0%	27%	59%	15%
	AK	10%	8%	44%	9%	26%	2%	29%	26%	44%
	AZ	65%	21%	9%	4%	0%	0%	91%	0%	9%
	AR	6%	5%	14%	11%	63%	1%	23%	63%	14%
	CA	60%	22%	11%	4%	2%	0%	87%	2%	11%
	CO	55%	27%	3%	11%	2%	2%	96%	2%	3%
	CT	8%	17%	44%	21%	6%	3%	49%	6%	44%
	DE	6%	16%	45%	24%	7%	3%	49%	7%	45%
	FL	43%	15%	22%	4%	17%	0%	62%	17%	22%
	GA	14%	9%	16%	8%	52%	0%	32%	52%	16%
	HI	67%	21%	0%	6%	5%	1%	95%	5%	0%
	ID	52%	24%	4%	14%	2%	3%	94%	2%	4%
	IL	5%	17%	14%	50%	8%	5%	78%	8%	14%
	IN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	IA	5%	14%	20%	45%	12%	4%	68%	12%	20%
	KS	6%	18%	15%	48%	9%	5%	76%	9%	15%
	KY	2%	5%	14%	16%	62%	1%	24%	62%	14%
	LA	8%	6%	14%	10%	61%	1%	25%	61%	14%
	ME	4%	11%	47%	26%	9%	3%	44%	9%	47%
	MD	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MA	5%	13%	46%	25%	8%	3%	46%	8%	46%
	MI	9%	23%	12%	44%	7%	5%	81%	7%	12%
	MN	4%	13%	23%	43%	14%	3%	63%	14%	23%
	MS	7%	6%	14%	10%	63%	0%	23%	63%	14%
	MO	5%	16%	17%	48%	10%	5%	74%	10%	17%
	MT	29%	22%	7%	30%	4%	8%	90%	4%	7%
	NE	5%	17%	16%	47%	10%	5%	74%	10%	16%
	NV	65%	24%	2%	6%	1%	1%	96%	1%	2%
	NH	5%	13%	46%	25%	8%	3%	46%	8%	46%
	NJ	4%	12%	46%	26%	8%	3%	45%	8%	46%
	NM	65%	21%	10%	4%	0%	0%	90%	0%	10%
	NY	6%	13%	46%	24%	8%	2%	46%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	22%	45%	13%	4%	65%	13%	22%
	OH	5%	16%	19%	45%	11%	4%	70%	11%	19%
	OK	30%	23%	5%	32%	0%	9%	95%	0%	5%
	OR	33%	20%	0%	12%	32%	3%	68%	32%	0%
	PA	3%	9%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	7%	49%	28%	11%	2%	40%	11%	49%
	SC	10%	7%	14%	8%	60%	0%	26%	60%	14%
	SD	5%	16%	19%	44%	12%	4%	69%	12%	19%
	TN	3%	7%	14%	13%	62%	2%	24%	62%	14%
	TX	48%	26%	7%	15%	0%	4%	93%	0%	7%
	UT	38%	27%	4%	23%	2%	6%	94%	2%	4%
	VT	5%	12%	46%	25%	8%	3%	45%	8%	46%
	VA	3%	7%	14%	12%	62%	2%	24%	62%	14%
	WA	41%	21%	0%	9%	27%	2%	73%	27%	0%
	WV	4%	11%	47%	26%	9%	3%	44%	9%	47%
	WI	5%	15%	20%	45%	12%	4%	68%	12%	20%
	WY	26%	20%	15%	23%	9%	6%	76%	9%	15%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1995	AL	10%	7%	14%	8%	60%	0%	26%	60%	14%
	AK	15%	12%	35%	13%	21%	4%	44%	21%	35%
	AZ	66%	21%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	61%	22%	11%	4%	1%	0%	87%	1%	11%
	CO	57%	27%	3%	10%	2%	2%	96%	2%	3%
	CT	8%	17%	44%	22%	6%	3%	49%	6%	44%
	DE	6%	15%	45%	24%	7%	3%	48%	7%	45%
	FL	44%	15%	22%	4%	15%	0%	63%	15%	22%
	GA	14%	9%	16%	8%	53%	0%	32%	53%	16%
	HI	64%	21%	0%	7%	7%	1%	93%	7%	0%
	ID	55%	24%	3%	13%	2%	3%	95%	2%	3%
	IL	6%	18%	13%	51%	8%	5%	79%	8%	13%
	IN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	IA	5%	15%	19%	46%	11%	4%	70%	11%	19%
	KS	6%	18%	14%	49%	9%	5%	77%	9%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	8%	6%	14%	11%	60%	1%	26%	60%	14%
	ME	4%	11%	47%	26%	9%	3%	44%	9%	47%
	MD	5%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	10%	24%	11%	43%	7%	5%	82%	7%	11%
	MN	4%	14%	22%	43%	13%	4%	65%	13%	22%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	48%	10%	5%	74%	10%	16%
	MT	29%	22%	6%	31%	3%	8%	91%	3%	6%
	NE	5%	17%	16%	47%	10%	5%	74%	10%	16%
	NV	67%	23%	2%	6%	1%	1%	96%	1%	2%
	NH	5%	13%	46%	25%	8%	3%	47%	8%	46%
	NJ	4%	12%	46%	26%	8%	3%	46%	8%	46%
	NM	66%	20%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	13%	46%	23%	8%	2%	46%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	22%	46%	13%	4%	66%	13%	22%
	OH	5%	16%	18%	45%	11%	4%	71%	11%	18%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	34%	20%	0%	12%	32%	3%	68%	32%	0%
	PA	3%	9%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	7%	50%	28%	11%	2%	39%	11%	50%
	SC	10%	7%	14%	7%	61%	0%	25%	61%	14%
	SD	5%	16%	19%	45%	11%	4%	70%	11%	19%
	TN	3%	7%	14%	13%	62%	2%	24%	62%	14%
	TX	50%	26%	7%	14%	0%	3%	93%	0%	7%
	UT	40%	27%	3%	22%	2%	6%	95%	2%	3%
	VT	6%	13%	46%	25%	8%	3%	46%	8%	46%
	VA	3%	7%	14%	12%	62%	2%	24%	62%	14%
	WA	42%	21%	0%	9%	25%	2%	75%	25%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	5%	16%	19%	45%	11%	4%	70%	11%	19%
	WY	27%	21%	15%	23%	9%	6%	76%	9%	15%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1996	AL	9%	7%	14%	8%	61%	0%	24%	61%	14%
	AK	20%	16%	26%	18%	15%	5%	59%	15%	26%
	AZ	66%	20%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	62%	22%	11%	4%	1%	0%	88%	1%	11%
	CO	58%	27%	2%	9%	1%	2%	96%	1%	2%
	CT	8%	17%	44%	22%	6%	3%	50%	6%	44%
	DE	6%	15%	45%	24%	7%	3%	48%	7%	45%
	FL	46%	15%	22%	3%	13%	0%	64%	13%	22%
	GA	14%	9%	16%	8%	53%	0%	31%	53%	16%
	HI	61%	21%	0%	7%	10%	1%	90%	10%	0%
	ID	57%	25%	3%	11%	1%	3%	96%	1%	3%
	IL	6%	18%	13%	51%	8%	5%	80%	8%	13%
	IN	5%	16%	18%	45%	11%	4%	71%	11%	18%
	IA	5%	16%	18%	46%	11%	4%	72%	11%	18%
	KS	5%	17%	14%	50%	8%	5%	78%	8%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	9%	6%	15%	11%	59%	1%	26%	59%	15%
	ME	4%	12%	47%	26%	9%	3%	44%	9%	47%
	MD	5%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	11%	25%	10%	42%	6%	5%	84%	6%	10%
	MN	5%	15%	20%	44%	12%	4%	67%	12%	20%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	49%	10%	5%	74%	10%	16%
	MT	30%	23%	5%	31%	3%	9%	92%	3%	5%
	NE	5%	17%	16%	48%	9%	5%	75%	9%	16%
	NV	68%	22%	3%	6%	2%	1%	96%	2%	3%
	NH	5%	13%	46%	25%	8%	3%	47%	8%	46%
	NJ	4%	13%	46%	26%	8%	3%	46%	8%	46%
	NM	66%	20%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	14%	46%	23%	8%	2%	46%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	21%	47%	12%	4%	67%	12%	21%
	OH	5%	17%	18%	46%	10%	4%	72%	10%	18%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	34%	20%	0%	11%	32%	3%	68%	32%	0%
	PA	3%	10%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	6%	50%	28%	12%	2%	38%	12%	50%
	SC	9%	7%	14%	7%	62%	0%	24%	62%	14%
	SD	5%	16%	18%	46%	11%	4%	71%	11%	18%
	TN	2%	7%	14%	13%	63%	2%	23%	63%	14%
	TX	51%	26%	7%	13%	0%	3%	93%	0%	7%
	UT	41%	28%	3%	21%	2%	6%	95%	2%	3%
	VT	6%	13%	46%	24%	8%	3%	46%	8%	46%
	VA	3%	7%	14%	12%	62%	2%	24%	62%	14%
	WA	44%	22%	0%	9%	24%	2%	76%	24%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	6%	16%	18%	45%	11%	4%	72%	11%	18%
	WY	28%	21%	14%	22%	8%	6%	77%	8%	14%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1997	AL	9%	7%	14%	8%	63%	0%	23%	63%	14%
	AK	25%	20%	17%	22%	10%	6%	73%	10%	17%
	AZ	67%	20%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	62%	21%	11%	4%	1%	0%	88%	1%	11%
	CO	60%	27%	2%	8%	1%	2%	96%	1%	2%
	CT	8%	17%	44%	22%	6%	3%	50%	6%	44%
	DE	5%	14%	45%	25%	8%	3%	47%	8%	45%
	FL	47%	15%	23%	3%	12%	0%	66%	12%	23%
	GA	14%	9%	16%	8%	53%	0%	31%	53%	16%
	HI	57%	21%	0%	8%	12%	2%	88%	12%	0%
	ID	60%	25%	2%	10%	1%	2%	97%	1%	2%
	IL	6%	19%	12%	51%	7%	5%	81%	7%	12%
	IN	5%	16%	18%	45%	11%	4%	71%	11%	18%
	IA	6%	16%	17%	47%	10%	4%	73%	10%	17%
	KS	5%	17%	14%	51%	8%	5%	78%	8%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	9%	6%	15%	11%	58%	1%	27%	58%	15%
	ME	4%	12%	47%	26%	9%	3%	44%	9%	47%
	MD	6%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	12%	26%	10%	41%	6%	5%	85%	6%	10%
	MN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	49%	10%	5%	74%	10%	16%
	MT	30%	23%	4%	31%	3%	9%	93%	3%	4%
	NE	5%	17%	16%	48%	9%	5%	75%	9%	16%
	NV	69%	20%	3%	5%	2%	0%	95%	2%	3%
	NH	5%	13%	45%	26%	7%	3%	47%	7%	45%
	NJ	4%	13%	46%	26%	8%	3%	47%	8%	46%
	NM	67%	19%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	14%	46%	23%	8%	2%	47%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	20%	48%	12%	4%	67%	12%	20%
	OH	5%	17%	17%	46%	10%	5%	73%	10%	17%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	35%	20%	0%	11%	31%	3%	69%	31%	0%
	PA	3%	10%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	6%	51%	28%	12%	2%	37%	12%	51%
	SC	9%	7%	14%	7%	63%	0%	23%	63%	14%
	SD	5%	16%	17%	47%	10%	4%	73%	10%	17%
	TN	2%	7%	14%	13%	63%	2%	23%	63%	14%
	TX	52%	26%	7%	12%	0%	3%	93%	0%	7%
	UT	43%	28%	3%	20%	2%	5%	96%	2%	3%
	VT	7%	14%	46%	24%	8%	3%	47%	8%	46%
	VA	2%	7%	14%	12%	63%	2%	23%	63%	14%
	WA	46%	22%	0%	8%	23%	2%	77%	23%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	6%	17%	17%	46%	10%	4%	74%	10%	17%
	WY	28%	22%	14%	22%	8%	6%	78%	8%	14%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1998	AL	9%	7%	14%	8%	63%	0%	23%	63%	14%
	AK	25%	20%	17%	22%	10%	6%	73%	10%	17%
	AZ	67%	20%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	62%	21%	11%	4%	1%	0%	88%	1%	11%
	CO	60%	27%	2%	8%	1%	2%	96%	1%	2%
	CT	8%	17%	44%	22%	6%	3%	50%	6%	44%
	DE	5%	14%	45%	25%	8%	3%	47%	8%	45%
	FL	47%	15%	23%	3%	12%	0%	66%	12%	23%
	GA	14%	9%	16%	8%	53%	0%	31%	53%	16%
	HI	57%	21%	0%	8%	12%	2%	88%	12%	0%
	ID	60%	25%	2%	10%	1%	2%	97%	1%	2%
	IL	6%	19%	12%	51%	7%	5%	81%	7%	12%
	IN	5%	16%	18%	45%	11%	4%	71%	11%	18%
	IA	6%	16%	17%	47%	10%	4%	73%	10%	17%
	KS	5%	17%	14%	51%	8%	5%	78%	8%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	9%	6%	15%	11%	58%	1%	27%	58%	15%
	ME	4%	12%	47%	26%	9%	3%	44%	9%	47%
	MD	6%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	12%	26%	10%	41%	6%	5%	85%	6%	10%
	MN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	49%	10%	5%	74%	10%	16%
	MT	30%	23%	4%	31%	3%	9%	93%	3%	4%
	NE	5%	17%	16%	48%	9%	5%	75%	9%	16%
	NV	69%	20%	3%	5%	2%	0%	95%	2%	3%
	NH	5%	13%	45%	26%	7%	3%	47%	7%	45%
	NJ	4%	13%	46%	26%	8%	3%	47%	8%	46%
	NM	67%	19%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	14%	46%	23%	8%	2%	47%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	20%	48%	12%	4%	67%	12%	20%
	OH	5%	17%	17%	46%	10%	5%	73%	10%	17%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	35%	20%	0%	11%	31%	3%	69%	31%	0%
	PA	3%	10%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	6%	51%	28%	12%	2%	37%	12%	51%
	SC	9%	7%	14%	7%	63%	0%	23%	63%	14%
	SD	5%	16%	17%	47%	10%	4%	73%	10%	17%
	TN	2%	7%	14%	13%	63%	2%	23%	63%	14%
	TX	52%	26%	7%	12%	0%	3%	93%	0%	7%
	UT	43%	28%	3%	20%	2%	5%	96%	2%	3%
	VT	7%	14%	46%	24%	8%	3%	47%	8%	46%
	VA	2%	7%	14%	12%	63%	2%	23%	63%	14%
	WA	46%	22%	0%	8%	23%	2%	77%	23%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	6%	17%	17%	46%	10%	4%	74%	10%	17%
	WY	28%	22%	14%	22%	8%	6%	78%	8%	14%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
1999	AL	9%	7%	14%	8%	63%	0%	23%	63%	14%
	AK	25%	20%	17%	22%	10%	6%	73%	10%	17%
	AZ	67%	20%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	62%	21%	11%	4%	1%	0%	88%	1%	11%
	CO	60%	27%	2%	8%	1%	2%	96%	1%	2%
	CT	8%	17%	44%	22%	6%	3%	50%	6%	44%
	DE	5%	14%	45%	25%	8%	3%	47%	8%	45%
	FL	47%	15%	23%	3%	12%	0%	66%	12%	23%
	GA	14%	9%	16%	8%	53%	0%	31%	53%	16%
	HI	57%	21%	0%	8%	12%	2%	88%	12%	0%
	ID	60%	25%	2%	10%	1%	2%	97%	1%	2%
	IL	6%	19%	12%	51%	7%	5%	81%	7%	12%
	IN	5%	16%	18%	45%	11%	4%	71%	11%	18%
	IA	6%	16%	17%	47%	10%	4%	73%	10%	17%
	KS	5%	17%	14%	51%	8%	5%	78%	8%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	9%	6%	15%	11%	58%	1%	27%	58%	15%
	ME	4%	12%	47%	26%	9%	3%	44%	9%	47%
	MD	6%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	12%	26%	10%	41%	6%	5%	85%	6%	10%
	MN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	49%	10%	5%	74%	10%	16%
	MT	30%	23%	4%	31%	3%	9%	93%	3%	4%
	NE	5%	17%	16%	48%	9%	5%	75%	9%	16%
	NV	69%	20%	3%	5%	2%	0%	95%	2%	3%
	NH	5%	13%	45%	26%	7%	3%	47%	7%	45%
	NJ	4%	13%	46%	26%	8%	3%	47%	8%	46%
	NM	67%	19%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	14%	46%	23%	8%	2%	47%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	20%	48%	12%	4%	67%	12%	20%
	OH	5%	17%	17%	46%	10%	5%	73%	10%	17%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	35%	20%	0%	11%	31%	3%	69%	31%	0%
	PA	3%	10%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	6%	51%	28%	12%	2%	37%	12%	51%
	SC	9%	7%	14%	7%	63%	0%	23%	63%	14%
	SD	5%	16%	17%	47%	10%	4%	73%	10%	17%
	TN	2%	7%	14%	13%	63%	2%	23%	63%	14%
	TX	52%	26%	7%	12%	0%	3%	93%	0%	7%
	UT	43%	28%	3%	20%	2%	5%	96%	2%	3%
	VT	7%	14%	46%	24%	8%	3%	47%	8%	46%
	VA	2%	7%	14%	12%	63%	2%	23%	63%	14%
	WA	46%	22%	0%	8%	23%	2%	77%	23%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	6%	17%	17%	46%	10%	4%	74%	10%	17%
	WY	28%	22%	14%	22%	8%	6%	78%	8%	14%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
2000	AL	9%	7%	14%	8%	63%	0%	23%	63%	14%
	AK	25%	20%	17%	22%	10%	6%	73%	10%	17%
	AZ	67%	20%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	62%	21%	11%	4%	1%	0%	88%	1%	11%
	CO	60%	27%	2%	8%	1%	2%	96%	1%	2%
	CT	8%	17%	44%	22%	6%	3%	50%	6%	44%
	DE	5%	14%	45%	25%	8%	3%	47%	8%	45%
	FL	47%	15%	23%	3%	12%	0%	66%	12%	23%
	GA	14%	9%	16%	8%	53%	0%	31%	53%	16%
	HI	57%	21%	0%	8%	12%	2%	88%	12%	0%
	ID	60%	25%	2%	10%	1%	2%	97%	1%	2%
	IL	6%	19%	12%	51%	7%	5%	81%	7%	12%
	IN	5%	16%	18%	45%	11%	4%	71%	11%	18%
	IA	6%	16%	17%	47%	10%	4%	73%	10%	17%
	KS	5%	17%	14%	51%	8%	5%	78%	8%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	9%	6%	15%	11%	58%	1%	27%	58%	15%
	ME	4%	12%	47%	26%	9%	3%	44%	9%	47%
	MD	6%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	12%	26%	10%	41%	6%	5%	85%	6%	10%
	MN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	49%	10%	5%	74%	10%	16%
	MT	30%	23%	4%	31%	3%	9%	93%	3%	4%
	NE	5%	17%	16%	48%	9%	5%	75%	9%	16%
	NV	69%	20%	3%	5%	2%	0%	95%	2%	3%
	NH	5%	13%	45%	26%	7%	3%	47%	7%	45%
	NJ	4%	13%	46%	26%	8%	3%	47%	8%	46%
	NM	67%	19%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	14%	46%	23%	8%	2%	47%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	20%	48%	12%	4%	67%	12%	20%
	OH	5%	17%	17%	46%	10%	5%	73%	10%	17%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	35%	20%	0%	11%	31%	3%	69%	31%	0%
	PA	3%	10%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	6%	51%	28%	12%	2%	37%	12%	51%
	SC	9%	7%	14%	7%	63%	0%	23%	63%	14%
	SD	5%	16%	17%	47%	10%	4%	73%	10%	17%
	TN	2%	7%	14%	13%	63%	2%	23%	63%	14%
	TX	52%	26%	7%	12%	0%	3%	93%	0%	7%
	UT	43%	28%	3%	20%	2%	5%	96%	2%	3%
	VT	7%	14%	46%	24%	8%	3%	47%	8%	46%
	VA	2%	7%	14%	12%	63%	2%	23%	63%	14%
	WA	46%	22%	0%	8%	23%	2%	77%	23%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	6%	17%	17%	46%	10%	4%	74%	10%	17%
	WY	28%	22%	14%	22%	8%	6%	78%	8%	14%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
2001	AL	9%	7%	14%	8%	63%	0%	23%	63%	14%
	AK	25%	20%	17%	22%	10%	6%	73%	10%	17%
	AZ	67%	20%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	62%	21%	11%	4%	1%	0%	88%	1%	11%
	CO	60%	27%	2%	8%	1%	2%	96%	1%	2%
	CT	8%	17%	44%	22%	6%	3%	50%	6%	44%
	DE	5%	14%	45%	25%	8%	3%	47%	8%	45%
	FL	47%	15%	23%	3%	12%	0%	66%	12%	23%
	GA	14%	9%	16%	8%	53%	0%	31%	53%	16%
	HI	57%	21%	0%	8%	12%	2%	88%	12%	0%
	ID	60%	25%	2%	10%	1%	2%	97%	1%	2%
	IL	6%	19%	12%	51%	7%	5%	81%	7%	12%
	IN	5%	16%	18%	45%	11%	4%	71%	11%	18%
	IA	6%	16%	17%	47%	10%	4%	73%	10%	17%
	KS	5%	17%	14%	51%	8%	5%	78%	8%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	9%	6%	15%	11%	58%	1%	27%	58%	15%
	ME	4%	12%	47%	26%	9%	3%	44%	9%	47%
	MD	6%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	12%	26%	10%	41%	6%	5%	85%	6%	10%
	MN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	49%	10%	5%	74%	10%	16%
	MT	30%	23%	4%	31%	3%	9%	93%	3%	4%
	NE	5%	17%	16%	48%	9%	5%	75%	9%	16%
	NV	69%	20%	3%	5%	2%	0%	95%	2%	3%
	NH	5%	13%	45%	26%	7%	3%	47%	7%	45%
	NJ	4%	13%	46%	26%	8%	3%	47%	8%	46%
	NM	67%	19%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	14%	46%	23%	8%	2%	47%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	20%	48%	12%	4%	67%	12%	20%
	OH	5%	17%	17%	46%	10%	5%	73%	10%	17%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	35%	20%	0%	11%	31%	3%	69%	31%	0%
	PA	3%	10%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	6%	51%	28%	12%	2%	37%	12%	51%
	SC	9%	7%	14%	7%	63%	0%	23%	63%	14%
	SD	5%	16%	17%	47%	10%	4%	73%	10%	17%
	TN	2%	7%	14%	13%	63%	2%	23%	63%	14%
	TX	52%	26%	7%	12%	0%	3%	93%	0%	7%
	UT	43%	28%	3%	20%	2%	5%	96%	2%	3%
	VT	7%	14%	46%	24%	8%	3%	47%	8%	46%
	VA	2%	7%	14%	12%	63%	2%	23%	63%	14%
	WA	46%	22%	0%	8%	23%	2%	77%	23%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	6%	17%	17%	46%	10%	4%	74%	10%	17%
	WY	28%	22%	14%	22%	8%	6%	78%	8%	14%

Table 8.8-2: Percentage Breakdown of Manure Management Systems for Dairy Cows and Dairy Heifers

Year	State	Dairy Cows						Dairy Heifers		
		Anaerobic Lagoon	Liquid/ Slurry	Daily Spread	Solid Storage	Pasture, Range, and Paddock	Deep Pit	Managed	Pasture, Range, and Paddock	Daily Spread
2002	AL	9%	7%	14%	8%	63%	0%	23%	63%	14%
	AK	25%	20%	17%	22%	10%	6%	73%	10%	17%
	AZ	67%	20%	10%	4%	0%	0%	90%	0%	10%
	AR	6%	5%	14%	12%	63%	1%	23%	63%	14%
	CA	62%	21%	11%	4%	1%	0%	88%	1%	11%
	CO	60%	27%	2%	8%	1%	2%	96%	1%	2%
	CT	8%	17%	44%	22%	6%	3%	50%	6%	44%
	DE	5%	14%	45%	25%	8%	3%	47%	8%	45%
	FL	47%	15%	23%	3%	12%	0%	66%	12%	23%
	GA	14%	9%	16%	8%	53%	0%	31%	53%	16%
	HI	57%	21%	0%	8%	12%	2%	88%	12%	0%
	ID	60%	25%	2%	10%	1%	2%	97%	1%	2%
	IL	6%	19%	12%	51%	7%	5%	81%	7%	12%
	IN	5%	16%	18%	45%	11%	4%	71%	11%	18%
	IA	6%	16%	17%	47%	10%	4%	73%	10%	17%
	KS	5%	17%	14%	51%	8%	5%	78%	8%	14%
	KY	1%	5%	14%	16%	63%	1%	23%	63%	14%
	LA	9%	6%	15%	11%	58%	1%	27%	58%	15%
	ME	4%	12%	47%	26%	9%	3%	44%	9%	47%
	MD	6%	13%	46%	25%	8%	3%	47%	8%	46%
	MA	5%	13%	46%	26%	8%	3%	46%	8%	46%
	MI	12%	26%	10%	41%	6%	5%	85%	6%	10%
	MN	5%	16%	19%	45%	11%	4%	70%	11%	19%
	MS	7%	6%	14%	9%	63%	0%	23%	63%	14%
	MO	5%	16%	16%	49%	10%	5%	74%	10%	16%
	MT	30%	23%	4%	31%	3%	9%	93%	3%	4%
	NE	5%	17%	16%	48%	9%	5%	75%	9%	16%
	NV	69%	20%	3%	5%	2%	0%	95%	2%	3%
	NH	5%	13%	45%	26%	7%	3%	47%	7%	45%
	NJ	4%	13%	46%	26%	8%	3%	47%	8%	46%
	NM	67%	19%	10%	4%	0%	0%	90%	0%	10%
	NY	7%	14%	46%	23%	8%	2%	47%	8%	46%
	NC	3%	8%	14%	10%	63%	2%	23%	63%	14%
	ND	3%	12%	20%	48%	12%	4%	67%	12%	20%
	OH	5%	17%	17%	46%	10%	5%	73%	10%	17%
	OK	30%	23%	5%	33%	0%	9%	95%	0%	5%
	OR	35%	20%	0%	11%	31%	3%	69%	31%	0%
	PA	3%	10%	48%	27%	10%	2%	42%	10%	48%
	RI	2%	6%	51%	28%	12%	2%	37%	12%	51%
	SC	9%	7%	14%	7%	63%	0%	23%	63%	14%
	SD	5%	16%	17%	47%	10%	4%	73%	10%	17%
	TN	2%	7%	14%	13%	63%	2%	23%	63%	14%
	TX	52%	26%	7%	12%	0%	3%	93%	0%	7%
	UT	43%	28%	3%	20%	2%	5%	96%	2%	3%
	VT	7%	14%	46%	24%	8%	3%	47%	8%	46%
	VA	2%	7%	14%	12%	63%	2%	23%	63%	14%
	WA	46%	22%	0%	8%	23%	2%	77%	23%	0%
	WV	4%	11%	47%	27%	9%	3%	44%	9%	47%
	WI	6%	17%	17%	46%	10%	4%	74%	10%	17%
	WY	28%	22%	14%	22%	8%	6%	78%	8%	14%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1990	AL	18%	3%	15%	30%	33%	0%	10%	80%	10%
	AK	100%	0%	0%	0%	0%	10%	12%	15%	63%
	AZ	3%	4%	9%	52%	32%	0%	0%	0%	100%
	AR	5%	4%	11%	46%	34%	0%	60%	40%	0%
	CA	13%	3%	8%	47%	29%	45%	3%	7%	45%
	CO	8%	5%	24%	17%	46%	0%	8%	4%	88%
	CT	100%	0%	0%	0%	0%	0%	0%	0%	100%
	DE	9%	5%	24%	17%	45%	0%	0%	0%	100%
	FL	46%	2%	15%	11%	26%	12%	6%	12%	70%
	GA	13%	4%	14%	36%	34%	64%	5%	1%	30%
	HI	36%	3%	18%	13%	30%	10%	0%	80%	10%
	ID	34%	3%	18%	13%	32%	0%	60%	0%	40%
	IL	8%	4%	26%	17%	45%	0%	0%	10%	90%
	IN	9%	4%	26%	16%	45%	0%	5%	0%	95%
	IA	7%	4%	22%	27%	41%	4%	4%	2%	90%
	KS	14%	4%	24%	15%	42%	0%	0%	0%	100%
	KY	18%	3%	16%	28%	34%	3%	33%	61%	3%
	LA	32%	3%	12%	26%	27%	5%	0%	95%	0%
	ME	100%	0%	0%	0%	0%	10%	9%	0%	81%
	MD	17%	4%	22%	16%	41%	0%	0%	0%	100%
	MA	39%	3%	17%	13%	29%	10%	9%	0%	81%
	MI	11%	4%	24%	17%	43%	9%	3%	3%	85%
	MN	9%	4%	25%	18%	43%	0%	25%	0%	75%
	MS	16%	3%	15%	33%	33%	10%	5%	85%	0%
	MO	15%	4%	24%	16%	41%	0%	20%	0%	80%
	MT	17%	4%	22%	15%	41%	0%	8%	4%	88%
	NE	10%	4%	25%	16%	44%	0%	0%	0%	100%
	NV	100%	0%	0%	0%	0%	25%	0%	0%	75%
	NH	100%	0%	0%	0%	0%	0%	0%	0%	100%
	NJ	48%	2%	14%	11%	24%	10%	9%	0%	81%
	NM	100%	0%	0%	0%	0%	25%	10%	20%	45%
	NY	40%	3%	16%	13%	28%	10%	30%	0%	60%
	NC	2%	4%	8%	54%	33%	50%	5%	30%	15%
	ND	23%	4%	21%	15%	37%	0%	5%	5%	90%
	OH	17%	4%	23%	16%	40%	0%	0%	0%	100%
	OK	26%	3%	10%	34%	27%	0%	20%	0%	80%
	OR	49%	2%	14%	11%	24%	0%	9%	11%	80%
	PA	11%	4%	24%	17%	43%	30%	5%	0%	65%
	RI	24%	3%	21%	16%	36%	10%	9%	0%	81%
	SC	18%	3%	15%	30%	33%	10%	0%	40%	50%
	SD	14%	4%	23%	17%	41%	0%	0%	20%	80%
	TN	23%	3%	17%	24%	33%	0%	90%	7%	3%
	TX	26%	3%	12%	31%	29%	50%	0%	40%	10%
	UT	54%	2%	13%	10%	21%	50%	0%	0%	50%
	VT	100%	0%	0%	0%	0%	10%	9%	0%	81%
	VA	10%	3%	11%	43%	32%	70%	0%	0%	30%
	WA	32%	3%	18%	13%	33%	0%	10%	0%	90%
	WV	69%	1%	9%	7%	15%	100%	0%	0%	0%
	WI	19%	4%	22%	16%	39%	40%	5%	0%	55%
	WY	40%	3%	16%	13%	28%	0%	8%	4%	88%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1991	AL	18%	3%	15%	30%	33%	0%	9%	76%	15%
	AK	100%	0%	0%	0%	0%	9%	11%	16%	64%
	AZ	3%	4%	9%	52%	32%	0%	0%	7%	93%
	AR	5%	4%	11%	46%	34%	0%	53%	36%	11%
	CA	13%	3%	8%	47%	29%	40%	3%	8%	50%
	CO	8%	5%	24%	17%	46%	0%	7%	10%	83%
	CT	100%	0%	0%	0%	0%	0%	0%	1%	99%
	DE	9%	5%	24%	17%	45%	0%	0%	1%	99%
	FL	46%	2%	15%	11%	26%	11%	5%	15%	69%
	GA	13%	4%	14%	36%	34%	57%	4%	6%	33%
	HI	36%	3%	18%	13%	30%	9%	0%	74%	17%
	ID	34%	3%	18%	13%	32%	0%	53%	7%	40%
	IL	8%	4%	26%	17%	45%	0%	0%	9%	91%
	IN	9%	4%	26%	16%	45%	0%	4%	0%	96%
	IA	7%	4%	22%	27%	41%	4%	4%	2%	91%
	KS	14%	4%	24%	15%	42%	0%	0%	0%	100%
	KY	18%	3%	16%	28%	34%	3%	29%	55%	13%
	LA	32%	3%	12%	26%	27%	4%	0%	91%	4%
	ME	100%	0%	0%	0%	0%	9%	8%	1%	83%
	MD	17%	4%	22%	16%	41%	0%	0%	1%	99%
	MA	39%	3%	17%	13%	29%	9%	8%	1%	83%
	MI	11%	4%	24%	17%	43%	8%	3%	3%	86%
	MN	9%	4%	25%	18%	43%	0%	22%	0%	78%
	MS	16%	3%	15%	33%	33%	9%	4%	82%	4%
	MO	15%	4%	24%	16%	41%	0%	18%	0%	82%
	MT	17%	4%	22%	15%	41%	0%	7%	10%	83%
	NE	10%	4%	25%	16%	44%	0%	0%	0%	100%
	NV	100%	0%	0%	0%	0%	22%	0%	0%	78%
	NH	100%	0%	0%	0%	0%	0%	0%	1%	99%
	NJ	48%	2%	14%	11%	24%	9%	8%	1%	83%
	NM	100%	0%	0%	0%	0%	22%	9%	24%	44%
	NY	40%	3%	16%	13%	28%	9%	27%	1%	64%
	NC	2%	4%	8%	54%	33%	44%	4%	31%	20%
	ND	23%	4%	21%	15%	37%	0%	4%	5%	91%
	OH	17%	4%	23%	16%	40%	0%	0%	0%	100%
	OK	26%	3%	10%	34%	27%	0%	18%	7%	76%
	OR	49%	2%	14%	11%	24%	0%	8%	13%	79%
	PA	11%	4%	24%	17%	43%	27%	4%	0%	69%
	RI	24%	3%	21%	16%	36%	9%	8%	1%	83%
	SC	18%	3%	15%	30%	33%	9%	0%	42%	49%
	SD	14%	4%	23%	17%	41%	0%	0%	18%	82%
	TN	23%	3%	17%	24%	33%	0%	80%	7%	13%
	TX	26%	3%	12%	31%	29%	44%	0%	37%	19%
	UT	54%	2%	13%	10%	21%	44%	0%	7%	49%
	VT	100%	0%	0%	0%	0%	9%	8%	1%	83%
	VA	10%	3%	11%	43%	32%	62%	0%	1%	37%
	WA	32%	3%	18%	13%	33%	0%	9%	1%	90%
	WV	69%	1%	9%	7%	15%	89%	0%	1%	11%
	WI	19%	4%	22%	16%	39%	36%	4%	0%	60%
	WY	40%	3%	16%	13%	28%	0%	7%	10%	83%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1992	AL	18%	3%	15%	30%	33%	0%	8%	72%	20%
	AK	100%	0%	0%	0%	0%	8%	9%	17%	66%
	AZ	3%	4%	9%	52%	32%	0%	0%	13%	87%
	AR	5%	4%	11%	46%	34%	0%	47%	31%	22%
	CA	13%	3%	8%	47%	29%	35%	2%	8%	55%
	CO	8%	5%	24%	17%	46%	0%	6%	16%	77%
	CT	100%	0%	0%	0%	0%	0%	0%	1%	99%
	DE	9%	5%	24%	17%	45%	0%	0%	1%	99%
	FL	46%	2%	15%	11%	26%	9%	5%	19%	67%
	GA	13%	4%	14%	36%	34%	50%	4%	10%	36%
	HI	36%	3%	18%	13%	30%	8%	0%	68%	24%
	ID	34%	3%	18%	13%	32%	0%	47%	13%	40%
	IL	8%	4%	26%	17%	45%	0%	0%	8%	92%
	IN	9%	4%	26%	16%	45%	0%	4%	0%	96%
	IA	7%	4%	22%	27%	41%	3%	3%	2%	92%
	KS	14%	4%	24%	15%	42%	0%	0%	0%	100%
	KY	18%	3%	16%	28%	34%	2%	26%	49%	23%
	LA	32%	3%	12%	26%	27%	4%	0%	87%	9%
	ME	100%	0%	0%	0%	0%	8%	7%	1%	84%
	MD	17%	4%	22%	16%	41%	0%	0%	1%	99%
	MA	39%	3%	17%	13%	29%	8%	7%	1%	84%
	MI	11%	4%	24%	17%	43%	7%	2%	3%	88%
	MN	9%	4%	25%	18%	43%	0%	19%	0%	81%
	MS	16%	3%	15%	33%	33%	8%	4%	79%	9%
	MO	15%	4%	24%	16%	41%	0%	16%	0%	84%
	MT	17%	4%	22%	15%	41%	0%	6%	16%	77%
	NE	10%	4%	25%	16%	44%	0%	0%	0%	100%
	NV	100%	0%	0%	0%	0%	19%	0%	0%	81%
	NH	100%	0%	0%	0%	0%	0%	0%	1%	99%
	NJ	48%	2%	14%	11%	24%	8%	7%	1%	84%
	NM	100%	0%	0%	0%	0%	19%	8%	29%	44%
	NY	40%	3%	16%	13%	28%	8%	23%	1%	68%
	NC	2%	4%	8%	54%	33%	39%	4%	33%	24%
	ND	23%	4%	21%	15%	37%	0%	4%	4%	92%
	OH	17%	4%	23%	16%	40%	0%	0%	0%	100%
	OK	26%	3%	10%	34%	27%	0%	16%	13%	71%
	OR	49%	2%	14%	11%	24%	0%	7%	14%	79%
	PA	11%	4%	24%	17%	43%	23%	4%	0%	73%
	RI	24%	3%	21%	16%	36%	8%	7%	1%	84%
	SC	18%	3%	15%	30%	33%	8%	0%	44%	48%
	SD	14%	4%	23%	17%	41%	0%	0%	16%	84%
	TN	23%	3%	17%	24%	33%	0%	70%	7%	23%
	TX	26%	3%	12%	31%	29%	39%	0%	34%	27%
	UT	54%	2%	13%	10%	21%	39%	0%	13%	48%
	VT	100%	0%	0%	0%	0%	8%	7%	1%	84%
	VA	10%	3%	11%	43%	32%	54%	0%	1%	44%
	WA	32%	3%	18%	13%	33%	0%	8%	3%	90%
	WV	69%	1%	9%	7%	15%	78%	0%	1%	21%
	WI	19%	4%	22%	16%	39%	31%	4%	0%	65%
	WY	40%	3%	16%	13%	28%	0%	6%	16%	77%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1993	AL	17%	3%	14%	33%	33%	0%	7%	67%	26%
	AK	100%	0%	0%	0%	0%	7%	8%	18%	67%
	AZ	4%	4%	9%	51%	33%	0%	0%	20%	80%
	AR	5%	4%	11%	47%	34%	0%	40%	27%	33%
	CA	12%	3%	8%	47%	30%	30%	2%	9%	59%
	CO	7%	5%	25%	17%	47%	0%	5%	23%	72%
	CT	92%	0%	2%	2%	4%	0%	0%	2%	98%
	DE	10%	5%	24%	17%	45%	0%	0%	2%	98%
	FL	49%	2%	14%	11%	24%	8%	4%	22%	66%
	GA	12%	4%	14%	36%	34%	43%	3%	15%	39%
	HI	36%	3%	18%	14%	30%	7%	0%	62%	32%
	ID	34%	3%	18%	13%	32%	0%	40%	20%	40%
	IL	7%	4%	26%	17%	46%	0%	0%	7%	93%
	IN	8%	4%	26%	16%	46%	0%	3%	0%	97%
	IA	6%	4%	20%	29%	40%	3%	3%	1%	93%
	KS	13%	4%	25%	15%	44%	0%	0%	1%	99%
	KY	16%	3%	16%	31%	34%	2%	22%	42%	34%
	LA	38%	3%	12%	22%	26%	3%	0%	83%	13%
	ME	100%	0%	0%	0%	0%	7%	6%	2%	86%
	MD	17%	4%	22%	16%	40%	0%	0%	2%	98%
	MA	40%	3%	17%	13%	28%	7%	6%	2%	86%
	MI	10%	4%	24%	17%	44%	6%	2%	3%	89%
	MN	8%	4%	25%	18%	44%	0%	17%	0%	83%
	MS	14%	3%	13%	37%	33%	7%	3%	77%	13%
	MO	13%	4%	24%	16%	43%	0%	13%	0%	87%
	MT	16%	4%	23%	16%	42%	0%	5%	23%	72%
	NE	9%	4%	26%	16%	45%	0%	0%	1%	99%
	NV	100%	0%	0%	0%	0%	17%	0%	0%	83%
	NH	93%	0%	2%	2%	3%	0%	0%	2%	98%
	NJ	48%	2%	14%	11%	24%	7%	6%	2%	86%
	NM	100%	0%	0%	0%	0%	17%	7%	33%	43%
	NY	39%	3%	17%	13%	29%	7%	20%	2%	72%
	NC	2%	4%	8%	54%	32%	33%	3%	34%	29%
	ND	22%	4%	21%	16%	38%	0%	3%	4%	93%
	OH	16%	4%	24%	16%	41%	0%	0%	0%	100%
	OK	21%	3%	9%	38%	28%	0%	13%	20%	67%
	OR	52%	2%	13%	10%	22%	0%	6%	16%	78%
	PA	10%	4%	24%	17%	44%	20%	3%	0%	77%
	RI	28%	3%	20%	15%	34%	7%	6%	2%	86%
	SC	16%	3%	14%	33%	33%	7%	0%	47%	47%
	SD	13%	4%	24%	17%	42%	0%	0%	14%	86%
	TN	21%	3%	16%	26%	33%	0%	60%	6%	34%
	TX	23%	3%	11%	34%	29%	33%	0%	31%	36%
	UT	44%	3%	15%	11%	27%	33%	0%	20%	47%
	VT	100%	0%	0%	0%	0%	7%	6%	2%	86%
	VA	9%	4%	10%	45%	32%	47%	0%	2%	52%
	WA	32%	3%	19%	13%	33%	0%	7%	4%	89%
	WV	64%	2%	10%	8%	17%	67%	0%	2%	32%
	WI	18%	4%	22%	16%	39%	27%	3%	1%	69%
	WY	33%	3%	18%	13%	32%	0%	5%	23%	72%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1994	AL	15%	3%	14%	35%	33%	0%	6%	63%	31%
	AK	100%	0%	0%	0%	0%	6%	7%	19%	68%
	AZ	4%	4%	10%	49%	33%	0%	0%	27%	73%
	AR	4%	4%	11%	47%	34%	0%	33%	22%	44%
	CA	11%	3%	8%	48%	30%	25%	2%	9%	64%
	CO	6%	5%	25%	17%	47%	0%	4%	29%	67%
	CT	84%	1%	4%	3%	7%	0%	0%	2%	98%
	DE	10%	5%	24%	17%	45%	0%	0%	2%	98%
	FL	52%	2%	13%	10%	23%	7%	3%	25%	64%
	GA	11%	4%	14%	37%	34%	36%	3%	19%	42%
	HI	36%	3%	18%	14%	30%	6%	0%	56%	39%
	ID	34%	3%	18%	13%	32%	0%	33%	27%	40%
	IL	7%	4%	26%	16%	46%	0%	0%	6%	94%
	IN	7%	4%	26%	16%	46%	0%	3%	0%	97%
	IA	5%	4%	19%	32%	39%	2%	2%	1%	94%
	KS	11%	4%	25%	15%	45%	0%	0%	1%	99%
	KY	14%	4%	16%	33%	34%	2%	18%	36%	44%
	LA	43%	2%	12%	19%	24%	3%	0%	79%	18%
	ME	100%	0%	0%	0%	0%	6%	5%	2%	87%
	MD	18%	4%	22%	16%	40%	0%	0%	2%	98%
	MA	40%	3%	16%	13%	28%	6%	5%	2%	87%
	MI	9%	5%	24%	17%	44%	5%	2%	3%	91%
	MN	7%	5%	25%	18%	45%	0%	14%	0%	86%
	MS	11%	4%	12%	40%	33%	6%	3%	74%	18%
	MO	11%	4%	25%	15%	44%	0%	11%	0%	89%
	MT	14%	4%	23%	16%	43%	0%	4%	29%	67%
	NE	8%	4%	26%	16%	45%	0%	0%	1%	99%
	NV	100%	0%	0%	0%	0%	14%	0%	0%	86%
	NH	85%	1%	4%	3%	7%	0%	0%	2%	98%
	NJ	49%	2%	14%	11%	24%	6%	5%	2%	87%
	NM	100%	0%	0%	0%	0%	14%	6%	38%	43%
	NY	37%	3%	17%	13%	30%	6%	17%	2%	76%
	NC	1%	4%	8%	55%	32%	28%	3%	35%	34%
	ND	20%	4%	22%	16%	39%	0%	3%	4%	94%
	OH	14%	4%	24%	16%	42%	0%	0%	0%	100%
	OK	17%	3%	9%	43%	29%	0%	11%	27%	62%
	OR	56%	2%	12%	9%	21%	0%	5%	17%	78%
	PA	9%	5%	25%	17%	45%	17%	3%	0%	81%
	RI	32%	3%	19%	14%	32%	6%	5%	2%	87%
	SC	14%	3%	14%	36%	33%	6%	0%	49%	46%
	SD	12%	4%	24%	17%	43%	0%	0%	12%	88%
	TN	19%	3%	16%	28%	33%	0%	50%	6%	44%
	TX	20%	3%	10%	37%	29%	28%	0%	28%	45%
	UT	34%	3%	18%	12%	33%	28%	0%	27%	46%
	VT	100%	0%	0%	0%	0%	6%	5%	2%	87%
	VA	8%	4%	10%	46%	32%	39%	0%	2%	59%
	WA	31%	3%	19%	14%	33%	0%	6%	5%	89%
	WV	58%	2%	12%	9%	20%	56%	0%	2%	42%
	WI	17%	4%	23%	17%	40%	22%	3%	1%	74%
	WY	26%	4%	20%	14%	36%	0%	4%	29%	67%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1995	AL	14%	3%	13%	37%	33%	0%	4%	59%	36%
	AK	100%	0%	0%	0%	0%	4%	5%	21%	70%
	AZ	5%	4%	10%	48%	33%	0%	0%	33%	67%
	AR	3%	4%	11%	48%	34%	0%	27%	18%	56%
	CA	11%	3%	8%	48%	30%	20%	1%	10%	69%
	CO	5%	5%	25%	17%	48%	0%	4%	35%	61%
	CT	76%	1%	7%	5%	11%	0%	0%	3%	97%
	DE	11%	5%	24%	17%	44%	0%	0%	3%	97%
	FL	55%	2%	12%	9%	21%	5%	3%	29%	63%
	GA	11%	4%	14%	38%	34%	28%	2%	24%	45%
	HI	36%	3%	18%	14%	30%	4%	0%	49%	46%
	ID	34%	3%	18%	13%	32%	0%	27%	33%	40%
	IL	6%	4%	27%	16%	47%	0%	0%	6%	94%
	IN	6%	4%	27%	16%	47%	0%	2%	0%	98%
	IA	5%	4%	18%	34%	39%	2%	2%	1%	96%
	KS	9%	4%	26%	15%	46%	0%	0%	1%	99%
	KY	12%	4%	15%	35%	35%	1%	15%	30%	54%
	LA	49%	2%	11%	15%	22%	2%	0%	76%	22%
	ME	100%	0%	0%	0%	0%	4%	4%	3%	89%
	MD	18%	4%	22%	16%	40%	0%	0%	3%	97%
	MA	41%	3%	16%	12%	28%	4%	4%	3%	89%
	MI	8%	5%	25%	17%	45%	4%	1%	2%	92%
	MN	6%	5%	25%	18%	46%	0%	11%	0%	89%
	MS	9%	4%	11%	44%	32%	4%	2%	71%	22%
	MO	9%	4%	26%	15%	46%	0%	9%	0%	91%
	MT	12%	5%	24%	16%	44%	0%	4%	35%	61%
	NE	7%	4%	26%	16%	46%	0%	0%	1%	99%
	NV	100%	0%	0%	0%	0%	11%	0%	0%	89%
	NH	78%	1%	6%	5%	10%	0%	0%	3%	97%
	NJ	49%	2%	14%	11%	24%	4%	4%	3%	89%
	NM	100%	0%	0%	0%	0%	11%	4%	42%	42%
	NY	35%	3%	18%	13%	31%	4%	13%	3%	79%
	NC	1%	4%	7%	56%	32%	22%	2%	37%	38%
	ND	18%	4%	22%	16%	40%	0%	2%	3%	94%
	OH	13%	4%	25%	16%	43%	0%	0%	0%	100%
	OK	12%	3%	8%	47%	30%	0%	9%	33%	58%
	OR	59%	2%	11%	9%	19%	0%	4%	19%	77%
	PA	8%	5%	25%	17%	45%	13%	2%	0%	84%
	RI	37%	3%	17%	13%	30%	4%	4%	3%	89%
	SC	12%	3%	13%	39%	33%	4%	0%	51%	44%
	SD	11%	4%	24%	17%	44%	0%	0%	10%	90%
	TN	17%	3%	16%	30%	34%	0%	40%	6%	54%
	TX	18%	3%	10%	40%	29%	22%	0%	24%	53%
	UT	23%	4%	20%	14%	38%	22%	0%	33%	44%
	VT	100%	0%	0%	0%	0%	4%	4%	3%	89%
	VA	7%	4%	10%	48%	32%	31%	0%	3%	66%
	WA	31%	3%	19%	14%	34%	0%	4%	7%	89%
	WV	53%	2%	13%	10%	22%	44%	0%	3%	53%
	WI	16%	4%	23%	17%	40%	18%	2%	1%	79%
	WY	19%	4%	22%	15%	40%	0%	4%	35%	61%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1996	AL	12%	4%	13%	39%	33%	0%	3%	55%	41%
	AK	100%	0%	0%	0%	0%	3%	4%	22%	71%
	AZ	6%	4%	11%	46%	33%	0%	0%	40%	60%
	AR	3%	4%	11%	49%	34%	0%	20%	13%	67%
	CA	10%	3%	8%	49%	30%	15%	1%	10%	74%
	CO	4%	5%	25%	17%	49%	0%	3%	41%	56%
	CT	68%	1%	9%	7%	15%	0%	0%	3%	97%
	DE	11%	5%	24%	16%	44%	0%	0%	3%	97%
	FL	58%	2%	11%	9%	19%	4%	2%	32%	61%
	GA	10%	4%	13%	39%	34%	21%	2%	28%	48%
	HI	36%	3%	18%	14%	30%	3%	0%	43%	53%
	ID	34%	3%	18%	13%	32%	0%	20%	40%	40%
	IL	5%	4%	27%	16%	48%	0%	0%	5%	95%
	IN	5%	4%	27%	16%	48%	0%	2%	0%	98%
	IA	4%	4%	17%	37%	38%	1%	1%	1%	97%
	KS	7%	4%	26%	14%	47%	0%	0%	1%	99%
	KY	9%	4%	15%	37%	35%	1%	11%	24%	64%
	LA	55%	2%	11%	12%	20%	2%	0%	72%	27%
	ME	100%	0%	0%	0%	0%	3%	3%	3%	90%
	MD	19%	4%	22%	16%	39%	0%	0%	3%	97%
	MA	42%	3%	16%	12%	27%	3%	3%	3%	90%
	MI	8%	5%	25%	17%	46%	3%	1%	2%	94%
	MN	4%	5%	26%	18%	47%	0%	8%	0%	92%
	MS	7%	4%	10%	48%	32%	3%	2%	68%	27%
	MO	7%	4%	27%	15%	48%	0%	7%	0%	93%
	MT	10%	5%	24%	16%	45%	0%	3%	41%	56%
	NE	6%	4%	26%	16%	47%	0%	0%	1%	99%
	NV	100%	0%	0%	0%	0%	8%	0%	0%	92%
	NH	70%	1%	8%	6%	14%	0%	0%	3%	97%
	NJ	49%	2%	14%	11%	24%	3%	3%	3%	90%
	NM	100%	0%	0%	0%	0%	8%	3%	47%	42%
	NY	33%	3%	18%	13%	33%	3%	10%	3%	83%
	NC	1%	4%	7%	57%	32%	17%	2%	38%	43%
	ND	16%	4%	23%	16%	41%	0%	2%	3%	95%
	OH	11%	4%	25%	16%	44%	0%	0%	0%	100%
	OK	7%	4%	7%	52%	30%	0%	7%	40%	53%
	OR	63%	2%	10%	8%	17%	0%	3%	20%	77%
	PA	7%	5%	25%	18%	46%	10%	2%	0%	88%
	RI	41%	3%	16%	12%	28%	3%	3%	3%	90%
	SC	10%	4%	12%	41%	33%	3%	0%	53%	43%
	SD	9%	5%	24%	17%	44%	0%	0%	8%	92%
	TN	15%	3%	16%	32%	34%	0%	30%	6%	64%
	TX	15%	3%	9%	43%	29%	17%	0%	21%	62%
	UT	13%	5%	23%	15%	44%	17%	0%	40%	43%
	VT	100%	0%	0%	0%	0%	3%	3%	3%	90%
	VA	6%	4%	9%	49%	32%	23%	0%	3%	73%
	WA	30%	3%	19%	14%	34%	0%	3%	8%	89%
	WV	47%	2%	15%	11%	25%	33%	0%	3%	63%
	WI	15%	4%	23%	17%	41%	13%	2%	1%	84%
	WY	12%	5%	23%	16%	44%	0%	3%	41%	56%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1997	AL	10%	4%	12%	41%	33%	0%	2%	50%	47%
	AK	100%	0%	0%	0%	0%	2%	3%	23%	72%
	AZ	6%	4%	12%	45%	34%	0%	0%	47%	53%
	AR	2%	4%	10%	50%	34%	0%	13%	9%	78%
	CA	10%	3%	8%	49%	30%	10%	1%	11%	78%
	CO	2%	5%	26%	17%	49%	0%	2%	48%	51%
	CT	60%	2%	11%	8%	19%	0%	0%	4%	96%
	DE	11%	5%	24%	16%	44%	0%	0%	4%	96%
	FL	62%	2%	11%	8%	18%	3%	1%	35%	60%
	GA	9%	4%	13%	40%	34%	14%	1%	33%	51%
	HI	36%	3%	18%	14%	30%	2%	0%	37%	61%
	ID	34%	3%	18%	13%	32%	0%	13%	47%	40%
	IL	4%	4%	27%	16%	48%	0%	0%	4%	96%
	IN	4%	4%	27%	16%	48%	0%	1%	0%	99%
	IA	3%	4%	16%	40%	38%	1%	1%	0%	98%
	KS	6%	4%	27%	14%	49%	0%	0%	2%	98%
	KY	7%	4%	15%	39%	36%	1%	7%	17%	75%
	LA	61%	2%	11%	8%	18%	1%	0%	68%	31%
	ME	100%	0%	0%	0%	0%	2%	2%	4%	92%
	MD	19%	4%	22%	16%	39%	0%	0%	4%	96%
	MA	42%	3%	16%	12%	27%	2%	2%	4%	92%
	MI	7%	5%	25%	17%	46%	2%	1%	2%	95%
	MN	3%	5%	26%	18%	48%	0%	6%	0%	94%
	MS	4%	4%	8%	52%	32%	2%	1%	66%	31%
	MO	5%	4%	27%	14%	49%	0%	4%	0%	96%
	MT	8%	5%	24%	17%	46%	0%	2%	48%	51%
	NE	5%	4%	27%	16%	47%	0%	0%	2%	98%
	NV	100%	0%	0%	0%	0%	6%	0%	0%	94%
	NH	63%	2%	10%	8%	17%	0%	0%	4%	96%
	NJ	49%	2%	14%	11%	24%	2%	2%	4%	92%
	NM	100%	0%	0%	0%	0%	6%	2%	51%	41%
	NY	32%	4%	18%	13%	34%	2%	7%	4%	87%
	NC	0%	4%	7%	58%	32%	11%	1%	39%	48%
	ND	14%	4%	23%	16%	42%	0%	1%	3%	96%
	OH	10%	4%	25%	16%	45%	0%	0%	0%	100%
	OK	2%	4%	7%	56%	31%	0%	4%	47%	49%
	OR	66%	1%	9%	7%	16%	0%	2%	22%	76%
	PA	6%	5%	25%	18%	46%	7%	1%	0%	92%
	RI	45%	2%	15%	12%	26%	2%	2%	4%	92%
	SC	9%	4%	11%	44%	33%	2%	0%	56%	42%
	SD	8%	5%	25%	17%	45%	0%	0%	6%	94%
	TN	13%	4%	15%	33%	35%	0%	20%	5%	75%
	TX	12%	3%	8%	46%	30%	11%	0%	18%	71%
	UT	3%	5%	26%	17%	49%	11%	0%	47%	42%
	VT	100%	0%	0%	0%	0%	2%	2%	4%	92%
	VA	5%	4%	9%	51%	32%	16%	0%	4%	81%
	WA	30%	3%	19%	14%	34%	0%	2%	9%	88%
	WV	42%	3%	16%	12%	27%	22%	0%	4%	74%
	WI	14%	4%	23%	17%	41%	9%	1%	2%	88%
	WY	5%	5%	25%	16%	48%	0%	2%	48%	51%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1998	AL	10%	4%	12%	41%	33%	0%	1%	46%	52%
	AK	100%	0%	0%	0%	0%	1%	1%	24%	74%
	AZ	6%	4%	12%	45%	34%	0%	0%	53%	47%
	AR	2%	4%	10%	50%	34%	0%	7%	4%	89%
	CA	10%	3%	8%	49%	30%	5%	0%	11%	83%
	CO	2%	5%	26%	17%	49%	0%	1%	54%	45%
	CT	60%	2%	11%	8%	19%	0%	0%	4%	96%
	DE	11%	5%	24%	16%	44%	0%	0%	4%	96%
	FL	62%	2%	11%	8%	18%	1%	1%	39%	59%
	GA	9%	4%	13%	40%	34%	7%	1%	37%	54%
	HI	36%	3%	18%	14%	30%	1%	0%	31%	68%
	ID	34%	3%	18%	13%	32%	0%	7%	53%	40%
	IL	4%	4%	27%	16%	48%	0%	0%	3%	97%
	IN	4%	4%	27%	16%	48%	0%	1%	0%	99%
	IA	3%	4%	16%	40%	38%	0%	0%	0%	99%
	KS	6%	4%	27%	14%	49%	0%	0%	2%	98%
	KY	7%	4%	15%	39%	36%	0%	4%	11%	85%
	LA	61%	2%	11%	8%	18%	1%	0%	64%	36%
	ME	100%	0%	0%	0%	0%	1%	1%	4%	93%
	MD	19%	4%	22%	16%	39%	0%	0%	4%	96%
	MA	42%	3%	16%	12%	27%	1%	1%	4%	93%
	MI	7%	5%	25%	17%	46%	1%	0%	2%	97%
	MN	3%	5%	26%	18%	48%	0%	3%	0%	97%
	MS	4%	4%	8%	52%	32%	1%	1%	63%	36%
	MO	5%	4%	27%	14%	49%	0%	2%	0%	98%
	MT	8%	5%	24%	17%	46%	0%	1%	54%	45%
	NE	5%	4%	27%	16%	47%	0%	0%	2%	98%
	NV	100%	0%	0%	0%	0%	3%	0%	0%	97%
	NH	63%	2%	10%	8%	17%	0%	0%	4%	96%
	NJ	49%	2%	14%	11%	24%	1%	1%	4%	93%
	NM	100%	0%	0%	0%	0%	3%	1%	56%	41%
	NY	32%	4%	18%	13%	34%	1%	3%	4%	91%
	NC	0%	4%	7%	58%	32%	6%	1%	41%	52%
	ND	14%	4%	23%	16%	42%	0%	1%	2%	97%
	OH	10%	4%	25%	16%	45%	0%	0%	0%	100%
	OK	2%	4%	7%	56%	31%	0%	2%	53%	44%
	OR	66%	1%	9%	7%	16%	0%	1%	23%	76%
	PA	6%	5%	25%	18%	46%	3%	1%	0%	96%
	RI	45%	2%	15%	12%	26%	1%	1%	4%	93%
	SC	9%	4%	11%	44%	33%	1%	0%	58%	41%
	SD	8%	5%	25%	17%	45%	0%	0%	4%	96%
	TN	13%	4%	15%	33%	35%	0%	10%	5%	85%
	TX	12%	3%	8%	46%	30%	6%	0%	15%	79%
	UT	3%	5%	26%	17%	49%	6%	0%	53%	41%
	VT	100%	0%	0%	0%	0%	1%	1%	4%	93%
	VA	5%	4%	9%	51%	32%	8%	0%	4%	88%
	WA	30%	3%	19%	14%	34%	0%	1%	11%	88%
	WV	42%	3%	16%	12%	27%	11%	0%	4%	84%
	WI	14%	4%	23%	17%	41%	4%	1%	2%	93%
	WY	5%	5%	25%	16%	48%	0%	1%	54%	45%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
1999	AL	10%	4%	12%	41%	33%	0%	0%	42%	57%
	AK	100%	0%	0%	0%	0%	0%	0%	25%	75%
	AZ	6%	4%	12%	45%	34%	0%	0%	60%	40%
	AR	2%	4%	10%	50%	34%	0%	0%	0%	100%
	CA	10%	3%	8%	49%	30%	0%	0%	12%	88%
	CO	2%	5%	26%	17%	49%	0%	0%	60%	40%
	CT	60%	2%	11%	8%	19%	0%	0%	5%	95%
	DE	11%	5%	24%	16%	44%	0%	0%	5%	95%
	FL	62%	2%	11%	8%	18%	0%	0%	42%	57%
	GA	9%	4%	13%	40%	34%	0%	0%	42%	57%
	HI	36%	3%	18%	14%	30%	0%	0%	25%	75%
	ID	34%	3%	18%	13%	32%	0%	0%	60%	40%
	IL	4%	4%	27%	16%	48%	0%	0%	2%	98%
	IN	4%	4%	27%	16%	48%	0%	0%	0%	100%
	IA	3%	4%	16%	40%	38%	0%	0%	0%	100%
	KS	6%	4%	27%	14%	49%	0%	0%	2%	98%
	KY	7%	4%	15%	39%	36%	0%	0%	5%	95%
	LA	61%	2%	11%	8%	18%	0%	0%	60%	40%
	ME	100%	0%	0%	0%	0%	0%	0%	5%	95%
	MD	19%	4%	22%	16%	39%	0%	0%	5%	95%
	MA	42%	3%	16%	12%	27%	0%	0%	5%	95%
	MI	7%	5%	25%	17%	46%	0%	0%	2%	98%
	MN	3%	5%	26%	18%	48%	0%	0%	0%	100%
	MS	4%	4%	8%	52%	32%	0%	0%	60%	40%
	MO	5%	4%	27%	14%	49%	0%	0%	0%	100%
	MT	8%	5%	24%	17%	46%	0%	0%	60%	40%
	NE	5%	4%	27%	16%	47%	0%	0%	2%	98%
	NV	100%	0%	0%	0%	0%	0%	0%	0%	100%
	NH	63%	2%	10%	8%	17%	0%	0%	5%	95%
	NJ	49%	2%	14%	11%	24%	0%	0%	5%	95%
	NM	100%	0%	0%	0%	0%	0%	0%	60%	40%
	NY	32%	4%	18%	13%	34%	0%	0%	5%	95%
	NC	0%	4%	7%	58%	32%	0%	0%	42%	57%
	ND	14%	4%	23%	16%	42%	0%	0%	2%	98%
	OH	10%	4%	25%	16%	45%	0%	0%	0%	100%
	OK	2%	4%	7%	56%	31%	0%	0%	60%	40%
	OR	66%	1%	9%	7%	16%	0%	0%	25%	75%
	PA	6%	5%	25%	18%	46%	0%	0%	0%	100%
	RI	45%	2%	15%	12%	26%	0%	0%	5%	95%
	SC	9%	4%	11%	44%	33%	0%	0%	60%	40%
	SD	8%	5%	25%	17%	45%	0%	0%	2%	98%
	TN	13%	4%	15%	33%	35%	0%	0%	5%	95%
	TX	12%	3%	8%	46%	30%	0%	0%	12%	88%
	UT	3%	5%	26%	17%	49%	0%	0%	60%	40%
	VT	100%	0%	0%	0%	0%	0%	0%	5%	95%
	VA	5%	4%	9%	51%	32%	0%	0%	5%	95%
	WA	30%	3%	19%	14%	34%	0%	0%	12%	88%
	WV	42%	3%	16%	12%	27%	0%	0%	5%	95%
	WI	14%	4%	23%	17%	41%	0%	0%	2%	98%
	WY	5%	5%	25%	16%	48%	0%	0%	60%	40%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
2000	AL	10%	4%	12%	41%	33%	0%	0%	42%	57%
	AK	100%	0%	0%	0%	0%	0%	0%	25%	75%
	AZ	6%	4%	12%	45%	34%	0%	0%	60%	40%
	AR	2%	4%	10%	50%	34%	0%	0%	0%	100%
	CA	10%	3%	8%	49%	30%	0%	0%	12%	88%
	CO	2%	5%	26%	17%	49%	0%	0%	60%	40%
	CT	60%	2%	11%	8%	19%	0%	0%	5%	95%
	DE	11%	5%	24%	16%	44%	0%	0%	5%	95%
	FL	62%	2%	11%	8%	18%	0%	0%	42%	57%
	GA	9%	4%	13%	40%	34%	0%	0%	42%	57%
	HI	36%	3%	18%	14%	30%	0%	0%	25%	75%
	ID	34%	3%	18%	13%	32%	0%	0%	60%	40%
	IL	4%	4%	27%	16%	48%	0%	0%	2%	98%
	IN	4%	4%	27%	16%	48%	0%	0%	0%	100%
	IA	3%	4%	16%	40%	38%	0%	0%	0%	100%
	KS	6%	4%	27%	14%	49%	0%	0%	2%	98%
	KY	7%	4%	15%	39%	36%	0%	0%	5%	95%
	LA	61%	2%	11%	8%	18%	0%	0%	60%	40%
	ME	100%	0%	0%	0%	0%	0%	0%	5%	95%
	MD	19%	4%	22%	16%	39%	0%	0%	5%	95%
	MA	42%	3%	16%	12%	27%	0%	0%	5%	95%
	MI	7%	5%	25%	17%	46%	0%	0%	2%	98%
	MN	3%	5%	26%	18%	48%	0%	0%	0%	100%
	MS	4%	4%	8%	52%	32%	0%	0%	60%	40%
	MO	5%	4%	27%	14%	49%	0%	0%	0%	100%
	MT	8%	5%	24%	17%	46%	0%	0%	60%	40%
	NE	5%	4%	27%	16%	47%	0%	0%	2%	98%
	NV	100%	0%	0%	0%	0%	0%	0%	0%	100%
	NH	63%	2%	10%	8%	17%	0%	0%	5%	95%
	NJ	49%	2%	14%	11%	24%	0%	0%	5%	95%
	NM	100%	0%	0%	0%	0%	0%	0%	60%	40%
	NY	32%	4%	18%	13%	34%	0%	0%	5%	95%
	NC	0%	4%	7%	58%	32%	0%	0%	42%	57%
	ND	14%	4%	23%	16%	42%	0%	0%	2%	98%
	OH	10%	4%	25%	16%	45%	0%	0%	0%	100%
	OK	2%	4%	7%	56%	31%	0%	0%	60%	40%
	OR	66%	1%	9%	7%	16%	0%	0%	25%	75%
	PA	6%	5%	25%	18%	46%	0%	0%	0%	100%
	RI	45%	2%	15%	12%	26%	0%	0%	5%	95%
	SC	9%	4%	11%	44%	33%	0%	0%	60%	40%
	SD	8%	5%	25%	17%	45%	0%	0%	2%	98%
	TN	13%	4%	15%	33%	35%	0%	0%	5%	95%
	TX	12%	3%	8%	46%	30%	0%	0%	12%	88%
	UT	3%	5%	26%	17%	49%	0%	0%	60%	40%
	VT	100%	0%	0%	0%	0%	0%	0%	5%	95%
	VA	5%	4%	9%	51%	32%	0%	0%	5%	95%
	WA	30%	3%	19%	14%	34%	0%	0%	12%	88%
	WV	42%	3%	16%	12%	27%	0%	0%	5%	95%
	WI	14%	4%	23%	17%	41%	0%	0%	2%	98%
	WY	5%	5%	25%	16%	48%	0%	0%	60%	40%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
2001	AL	10%	4%	12%	41%	33%	0%	0%	42%	57%
	AK	100%	0%	0%	0%	0%	0%	0%	25%	75%
	AZ	6%	4%	12%	45%	34%	0%	0%	60%	40%
	AR	2%	4%	10%	50%	34%	0%	0%	0%	100%
	CA	10%	3%	8%	49%	30%	0%	0%	12%	88%
	CO	2%	5%	26%	17%	49%	0%	0%	60%	40%
	CT	60%	2%	11%	8%	19%	0%	0%	5%	95%
	DE	11%	5%	24%	16%	44%	0%	0%	5%	95%
	FL	62%	2%	11%	8%	18%	0%	0%	42%	57%
	GA	9%	4%	13%	40%	34%	0%	0%	42%	57%
	HI	36%	3%	18%	14%	30%	0%	0%	25%	75%
	ID	34%	3%	18%	13%	32%	0%	0%	60%	40%
	IL	4%	4%	27%	16%	48%	0%	0%	2%	98%
	IN	4%	4%	27%	16%	48%	0%	0%	0%	100%
	IA	3%	4%	16%	40%	38%	0%	0%	0%	100%
	KS	6%	4%	27%	14%	49%	0%	0%	2%	98%
	KY	7%	4%	15%	39%	36%	0%	0%	5%	95%
	LA	61%	2%	11%	8%	18%	0%	0%	60%	40%
	ME	100%	0%	0%	0%	0%	0%	0%	5%	95%
	MD	19%	4%	22%	16%	39%	0%	0%	5%	95%
	MA	42%	3%	16%	12%	27%	0%	0%	5%	95%
	MI	7%	5%	25%	17%	46%	0%	0%	2%	98%
	MN	3%	5%	26%	18%	48%	0%	0%	0%	100%
	MS	4%	4%	8%	52%	32%	0%	0%	60%	40%
	MO	5%	4%	27%	14%	49%	0%	0%	0%	100%
	MT	8%	5%	24%	17%	46%	0%	0%	60%	40%
	NE	5%	4%	27%	16%	47%	0%	0%	2%	98%
	NV	100%	0%	0%	0%	0%	0%	0%	0%	100%
	NH	63%	2%	10%	8%	17%	0%	0%	5%	95%
	NJ	49%	2%	14%	11%	24%	0%	0%	5%	95%
	NM	100%	0%	0%	0%	0%	0%	0%	60%	40%
	NY	32%	4%	18%	13%	34%	0%	0%	5%	95%
	NC	0%	4%	7%	58%	32%	0%	0%	42%	57%
	ND	14%	4%	23%	16%	42%	0%	0%	2%	98%
	OH	10%	4%	25%	16%	45%	0%	0%	0%	100%
	OK	2%	4%	7%	56%	31%	0%	0%	60%	40%
	OR	66%	1%	9%	7%	16%	0%	0%	25%	75%
	PA	6%	5%	25%	18%	46%	0%	0%	0%	100%
	RI	45%	2%	15%	12%	26%	0%	0%	5%	95%
	SC	9%	4%	11%	44%	33%	0%	0%	60%	40%
	SD	8%	5%	25%	17%	45%	0%	0%	2%	98%
	TN	13%	4%	15%	33%	35%	0%	0%	5%	95%
	TX	12%	3%	8%	46%	30%	0%	0%	12%	88%
	UT	3%	5%	26%	17%	49%	0%	0%	60%	40%
	VT	100%	0%	0%	0%	0%	0%	0%	5%	95%
	VA	5%	4%	9%	51%	32%	0%	0%	5%	95%
	WA	30%	3%	19%	14%	34%	0%	0%	12%	88%
	WV	42%	3%	16%	12%	27%	0%	0%	5%	95%
	WI	14%	4%	23%	17%	41%	0%	0%	2%	98%
	WY	5%	5%	25%	16%	48%	0%	0%	60%	40%

Table 8.8-3: Percentage Breakdown of Manure Management Systems for Swine and Poultry Layers

Year	State	Swine					Poultry Layers			
		Pasture	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Deep Pit	Solid Storage	Liquid/ Slurry	Anaerobic Lagoon	Poultry without bedding
2002	AL	10%	4%	12%	41%	33%	0%	0%	42%	57%
	AK	100%	0%	0%	0%	0%	0%	0%	25%	75%
	AZ	6%	4%	12%	45%	34%	0%	0%	60%	40%
	AR	2%	4%	10%	50%	34%	0%	0%	0%	100%
	CA	10%	3%	8%	49%	30%	0%	0%	12%	88%
	CO	2%	5%	26%	17%	49%	0%	0%	60%	40%
	CT	60%	2%	11%	8%	19%	0%	0%	5%	95%
	DE	11%	5%	24%	16%	44%	0%	0%	5%	95%
	FL	62%	2%	11%	8%	18%	0%	0%	42%	57%
	GA	9%	4%	13%	40%	34%	0%	0%	42%	57%
	HI	36%	3%	18%	14%	30%	0%	0%	25%	75%
	ID	34%	3%	18%	13%	32%	0%	0%	60%	40%
	IL	4%	4%	27%	16%	48%	0%	0%	2%	98%
	IN	4%	4%	27%	16%	48%	0%	0%	0%	100%
	IA	3%	4%	16%	40%	38%	0%	0%	0%	100%
	KS	6%	4%	27%	14%	49%	0%	0%	2%	98%
	KY	7%	4%	15%	39%	36%	0%	0%	5%	95%
	LA	61%	2%	11%	8%	18%	0%	0%	60%	40%
	ME	100%	0%	0%	0%	0%	0%	0%	5%	95%
	MD	19%	4%	22%	16%	39%	0%	0%	5%	95%
	MA	42%	3%	16%	12%	27%	0%	0%	5%	95%
	MI	7%	5%	25%	17%	46%	0%	0%	2%	98%
	MN	3%	5%	26%	18%	48%	0%	0%	0%	100%
	MS	4%	4%	8%	52%	32%	0%	0%	60%	40%
	MO	5%	4%	27%	14%	49%	0%	0%	0%	100%
	MT	8%	5%	24%	17%	46%	0%	0%	60%	40%
	NE	5%	4%	27%	16%	47%	0%	0%	2%	98%
	NV	100%	0%	0%	0%	0%	0%	0%	0%	100%
	NH	63%	2%	10%	8%	17%	0%	0%	5%	95%
	NJ	49%	2%	14%	11%	24%	0%	0%	5%	95%
	NM	100%	0%	0%	0%	0%	0%	0%	60%	40%
	NY	32%	4%	18%	13%	34%	0%	0%	5%	95%
	NC	0%	4%	7%	58%	32%	0%	0%	42%	57%
	ND	14%	4%	23%	16%	42%	0%	0%	2%	98%
	OH	10%	4%	25%	16%	45%	0%	0%	0%	100%
	OK	2%	4%	7%	56%	31%	0%	0%	60%	40%
	OR	66%	1%	9%	7%	16%	0%	0%	25%	75%
	PA	6%	5%	25%	18%	46%	0%	0%	0%	100%
	RI	45%	2%	15%	12%	26%	0%	0%	5%	95%
	SC	9%	4%	11%	44%	33%	0%	0%	60%	40%
	SD	8%	5%	25%	17%	45%	0%	0%	2%	98%
	TN	13%	4%	15%	33%	35%	0%	0%	5%	95%
	TX	12%	3%	8%	46%	30%	0%	0%	12%	88%
	UT	3%	5%	26%	17%	49%	0%	0%	60%	40%
	VT	100%	0%	0%	0%	0%	0%	0%	5%	95%
	VA	5%	4%	9%	51%	32%	0%	0%	5%	95%
	WA	30%	3%	19%	14%	34%	0%	0%	12%	88%
	WV	42%	3%	16%	12%	27%	0%	0%	5%	95%
	WI	14%	4%	23%	17%	41%	0%	0%	2%	98%
	WY	5%	5%	25%	16%	48%	0%	0%	60%	40%