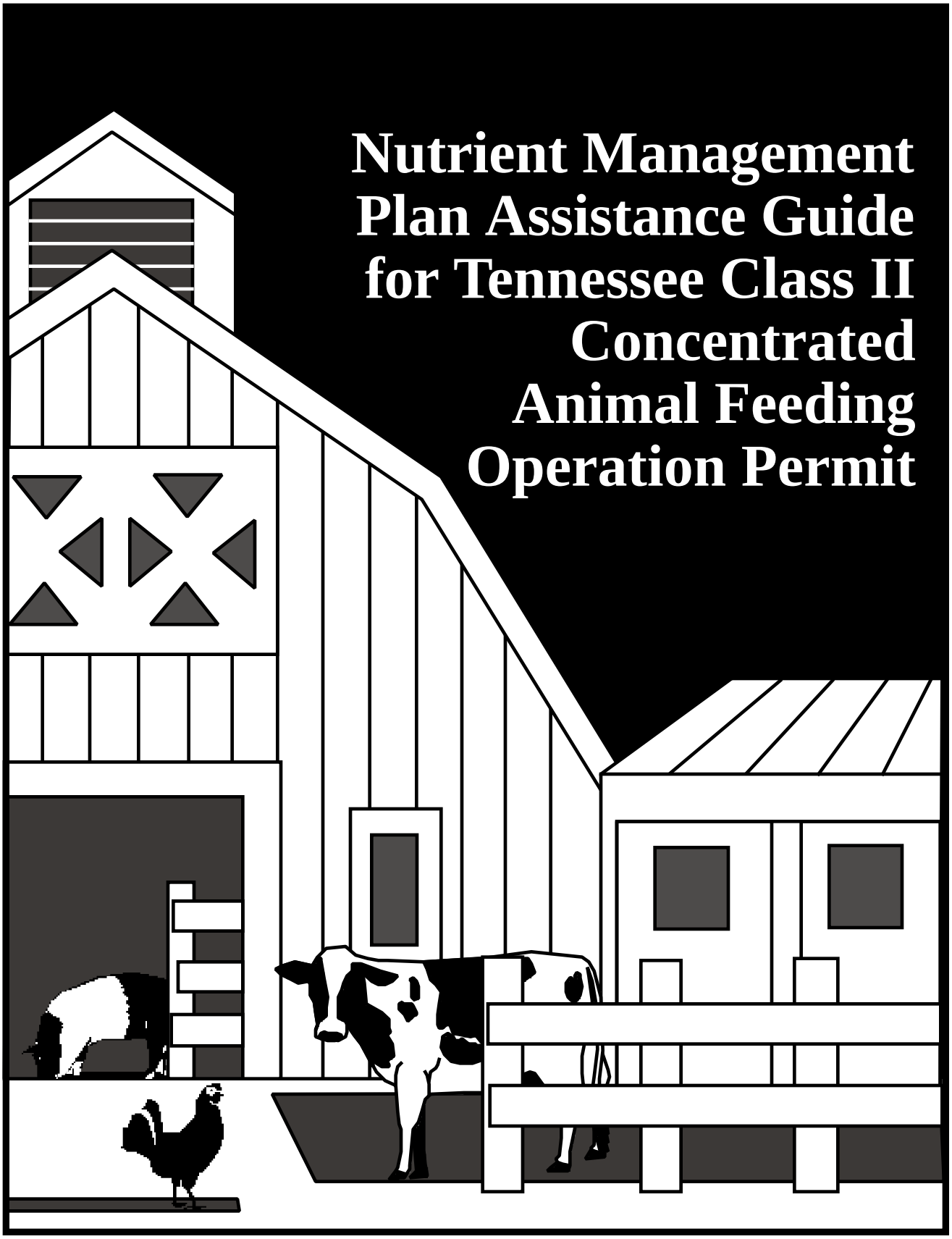
Agricultural Extension Service
The University of Tennessee
PB 1635

Nutrient Management Plan Assistance Guide for Tennessee Class II Concentrated Animal Feeding Operation Permit



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Nutrient Management Plan Assistance Guide for Tennessee Class II Concentrated Animal Feeding Operation Permit

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Introduction

This publication is designed to assist you in preparing the Nutrient Management Plan (NMP) to be submitted to the Tennessee Department of Agriculture (TDA) for animal feeding operations permitted under the Tennessee Class II General Concentrated Animal Feeding Operation (CAFO) designation.

Permit Requirements

The following seven items must be submitted to TDA under the NMP requirements of the Class II General Permit:

1. Map showing fields where animal manure will be applied and the location of nearby streams, lakes, wetlands and sinkholes.
2. Current and planned crop rotations.
3. Identification of non-application buffer strips around application areas as needed to protect water quality.
4. Soil test results for phosphorous and potassium from planned application fields.
5. Nitrogen budget for application fields that accounts for all applied sources and realistic yield expectations.
6. Proposed application method(s) and application schedule.
7. Description of dead animal disposal method

The five basic sections of this publication are intended to assist you in assembling all seven of the required items. The five basic sections are

1. Application Area Map
2. Field Information Sheet
3. Nitrogen Planning and Utilization Budget
4. Dead Animal Disposal Method Description
5. Putting It All Together -NMP Submission

Using This Guide

The information sheets and worksheets at the end of this document will comprise the majority of your NMP submission. The only additional item required is your marked aerial photograph or map your farm. This guide is designed to assist you in assembling the required information and completing the worksheets. It does not provide educational information concerning specific topics such as buffer strips or equipment calibration, or strategies for proper management of nutrients. Contact your county Extension office or Natural Resources Conservation Service (NRCS) office for other publications that provide more detailed educational information on specific topics that can help you better understand and implement your nutrient management plan.

Record Keeping

The purpose of the NMP submission outlined in this guide is to provide basic information about whether or not your farm has adequate land resources to operate in an environmentally sound manner. As a result of preparing the regulatory NMP, you may learn a great deal about things that must be done in your operation to properly manage nutrients. However, the regulatory NMP submission information is only a starting point. It will not provide adequate guidance for managing nutrients on a continuing basis.

Sound management practices, as well as your CAFO permit, require that nutrients in the manure produced by animals on your farm be used as fertilizer for crops grown on your farm, as cattle feed on your farm (in the case of poultry manure nutrients that are fed to confined beef animals, the cattle manure must be included in the NMP as well) or be transported off your farm for similar use at another site. Your CAFO permit will require that you keep certain records documenting how animal-manure nutrients were actually managed on a year-to-year basis. The records you keep will document nutrient management decisions you make and will likely reflect variations in cropping and animal production strategies over time.

While you are not required to submit such records, they are very important for multiple reasons. In an on-going operation, proper management of nutrients requires knowledge of how nutrients were previously managed on your farm. Such knowledge requires good records. If your nutrient management is ever questioned in a regulatory or other legal action, it will be your records or lack thereof that represent the nutrient management strategies you have implemented.

Your Class II CAFO permit requires that the following records be maintained for a period of two years:

1. Soil test results and recommended nutrient application rates.
2. Quantities and sources of all nutrients applied to manure application sites.
3. Dates and methods of nutrient application.
4. Type of crop(s) and date planted.
5. Harvest dates and yields.
6. Manure nutrient analyses.
7. Any certificates, licenses or permits that may be required.
8. Quantities of manure transported off-site (recipient, date, volume, final destination and end use).
9. Notification of any discharges or overflows to waters of the state.
10. Records of freeboard* required to prevent discharge through a 25-year 24-hour rainfall event.
11. Sampling results of pollutants discharged to waters of the state.

**Freeboard is the vertical depth of storage required to provide adequate emergency storm storage volume.*

Section 1 -Maps

The Tennessee Class II CAFO general permit requires that aerial site photographs, or maps and soil maps showing animal waste application fields, the location of all nearby streams, lakes, wetlands, known sinkholes and non-application buffer strips around application areas as needed to protect water quality, be submitted as part of the NMP. While a variety of maps and aerial photographs could be used for this purpose, the 1" = 660' scale aerial photographs available at Farm Service Agency (FSA) county offices will work well for identifying the NMP requirements. Each area where animal waste will be applied should be identified on the aerial photograph or map.

The Tennessee Class II CAFO permit requires that non-application buffer strips sufficient to protect water quality be identified around fields where animal waste will be applied. The area designated as non-application area should be subtracted from the total field acreage. The current Natural Resources Conservation Service (NRCS) non-application buffer widths are given in Table 1. These values are provided as suggested guidelines for sizing non-application areas. Outline each application field or location and designate each with an identification number or description (1, 2, or whatever identification makes sense to you). This number will be used in Section 2 to link the correct field information to each field indicated on the map. The location of all nearby streams, lakes, wetlands and known sinkholes should marked as well. (See Class II general permit for definition of sinkholes and wetlands.)

Table 1. NRCS Non-Application Buffer Widths*

Object/Site	Situation	Buffer Width (feet) from Object/Site
Well	Located up-slope of application site	150
Well	Located down-slope of application site provided conditions warrant application	300
Waterbody or stream	Predominant slope < 5% with good vegetation	30
Waterbody or stream	Predominant slope 5-8% with good vegetation	50
Waterbody or stream	Poor vegetative cover or predominant slope > 8%	100
Waterbody or stream	Cultivated land, low erosion	30
Public road	Irrigated wastewater	50
Public road	Solids applied with spreader truck	50
Dwelling	Other than producer	300
Public use area	All	300
Property line	Located down-slope of application site	30

Waterbody includes pond, lake, wetland or sinkhole.
Open sinkholes should be protected the same way as a well.
Stream includes both perennial and intermittent streams.
Good vegetation refers to a well-managed, dense stand that is not over-grazed.

*Source-NRCS Conservation Practice Standard 590, Nutrient Management

Section 2 -Field Information Sheet

The following information should be entered into the Field Information Worksheet (page 15) provided with this document for each application field.

Field Identification and Size

The same field identification number or name that you assigned each field when marking your map or aerial photograph should be used here to identify each field. Record the size of the field in acres, after subtracting any non-application area from it, in the appropriate column.

Crop production sequence and rotation

For each application field, indicate the current production scenario or rotation. (For example, corn silage, corn/wheat rotation, fescue pasture, etc).

Soil test results for phosphorus and potassium

For each application field, record your most recent soil test results for phosphorus and potassium in these columns. Depending on the lab doing the soil test, results may be provided in terms of low, medium, high or very high, or in numerical units. If numerical units are given, be sure to include the units as well (parts per million or lbs/acre for example).

Application Method

In this column, list the method that will be used to apply animal manure to this field. Application methods are described on page 10. List the method that most closely matches your application method.

Application Timing

In the last column, indicate when you plan to apply manure to the listed field (For example - March and September).

Section 3 -Nitrogen Planning and Utilization Budget

This section will assist you in estimating the crop production area required to use the manure nutrients produced on your farm. Since the three main nutrients required for plant growth (nitrogen, phosphorus and potassium) are all found in animal manure, a different land area requirement could be calculated based upon each nutrient. Nutrient management plans, for regulatory purposes, have traditionally been based on nitrogen, due to the potential for nitrate to reach ground water supplies under conditions of excessive nitrogen application. There is currently concern that excessive phosphorus application could result in surface water pollution. While this publication calculates needed land area based on crop nitrogen needs, it also contains the information required to estimate the annual farm production of phosphorus and potassium associated with animal manure. Crop phosphorus and potassium application rates associated with balancing applications on nitrogen requirements can also be estimated. When manure application rates are based upon nitrogen, phosphorus and potassium application rates typically exceed crop requirements. However, the application rates of phosphorus and potassium should still be calculated to determine that crop phosphorus and potassium have been supplied. To calculate the crop production area required to effectively use the nitrogen generated by your operation, two quantities must be estimated: the mass of plant-available nitrogen (PAN) gener-

ated at the facility and the nitrogen requirements of the crop(s) to be grown. When these values have been estimated, a simple budget can be used to balance available manure nitrogen with crop production needs.

Annual Mass of Nutrients Produced

Table 2 lists the mass (in pounds) of nitrogen, phosphorus and potassium excreted per day per 1000 pounds of animal weight. The information is broken down by animal species (swine, dairy, beef and poultry, etc.) and animal type (cow, sow, boar, broiler, etc.). The nitrogen must be multiplied by an availability factor to determine units of plant-available nitrogen (PAN). The phosphorus and potassium values are given as P_2O_5 and K_2O respectively, so that they are equivalent to units of inorganic fertilizer and can be directly compared to soil test recommendations. Worksheet 1 (Annual Nitrogen Production page 16) is used to estimate the plant-available nitrogen for your farm on an annual basis. Indicate the animal type in column 1 and the number of these animals confined in column 2.

Table 2. Pounds Nutrient Excreted/1000-Lb Live Weight/Day

	Total Nitrogen	**Total P as P_2O_5**	**Total K as K_2O**
Beef Cow	0.33	0.28	0.31
Beef Feeder Cattle	0.31	0.22	0.29
Beef Cattle	0.30	0.23	0.24
Dairy Cow – Lactating	0.45	0.16	0.31
Dairy Cow – Dry	0.36	0.11	0.28
Dairy Heifer	0.31	0.09	0.29
Swine – Grower/Finisher	0.42	0.37	0.26
Swine – Nursing/Nursery Pig	0.60	0.57	0.42
Swine – Gesating Sow	0.19	0.14	0.14
Swine – Lactating Sow	0.47	0.34	0.36
Swine – Gilt	0.24	0.18	0.16
Swine – Boar	0.15	0.11	0.12
Poultry – Broiler	0.10	0.78	0.55
Poultry – Pullet	0.62	0.55	0.31
Poultry – Layer/Breeder	0.83	0.71	0.41
Ducks	0.70	0.69	0.60
Turkeys	0.74	0.64	0.34
Horses	0.28	0.11	0.23
Sheep and lambs	0.45	0.16	0.36

Adapted from the Natural Resources Conservation Service *National Field Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook (AWMFH).*

Number of Animals

The number of animals entered should represent the maximum number that will be confined at any one time, not the cumulative or annual production total. For example, if a poultry producer operated two broiler houses, each with a 22,000-bird capacity, he or she should enter 44,000 here.

Average Weight

In column 3 enter the average weight for an animal of this type on your farm. For example, a herd of lactating dairy cattle may have an average weight of 1200 pounds each, and this value would be entered into column 3. For operations where animal weight increases throughout a production cycle, simply average the weight over that period. For example, a swine grower/finisher may begin a production cycle with animals weighing 50 pounds each and complete it at 250 pounds each. The average weight of 150 pounds should be entered in column 3 for this case (50 lbs + 250 lbs = 300 lbs and 300 lbs ÷2 = 150 pounds). If a poultry broiler starts as a chick and is sold at 4 lbs, an average weight of 2 pounds should be entered.

Confinement Period

The total number of days that animals are confined on an annual basis should be entered into column 4. For example, a swine finish operation with buildings occupied 350 days per year would enter 350 in column 4. For a dairy that confines lactating animals year-round in a freestall barn, then 365 would be entered in column 4. For a dairy where cows are confined only while in the milking parlor, only the actual confinement time should be considered for the purpose of calculating manure nutrients collected. For example, if a dairy only confined cows for three hours twice per day while being milked (i.e. the only manure collected was during this six-hour period), then each day of operation would equal 1/4 day of confinement time, or 92 days per year. Only the time when animals are confined in a manner so that manure is collected should be considered for this document.

Nitrogen Availability

Select the appropriate nitrogen production rate from Table 2 (page 7) and enter it in column 5. The nitrogen available to a crop from the application of livestock manure is less than the total nitrogen produced by the livestock. This is due to handling, storage and application losses, as well as the rate of breakdown from an organic form to the plant-available forms of nitrate and ammonia. To account for these factors, an estimation of plant-available nitrogen must be made; this is done by using a nitrogen availability factor. A nitrogen-availability factor should be entered in column 6. Table 3 (page 9) lists estimated nitrogen-availability factors by storage system type and application method. As an aid to selecting the nitrogen-availability estimate that best represents your production practices, a description of storage system types and application methods is given on pages 9 and 10. Select the appropriate value from Table 3 and enter it into column 6. Complete the line by calculating the plant-available nitrogen (PAN) (column 2 x (column 3 ÷ 1000) x column 4 x column 5 x column 6) and enter the value in column 7. Complete an additional line for each additional animal type on your farm. When all animal types have been entered, add the PAN from each line and enter it in the Total PAN line at the bottom of column 7 in Worksheet 1, Annual Nitrogen Production.

Storage System Types

Daily Haul

Systems where manure is scraped into a pile and then hauled to the field on a frequent basis (every day or every few days). Examples would include any operation where manure is loaded into a manure spreader and applied daily or semi-daily (no extended manure storage). Commonly used on confined beef and small dairy operations.

Dry Stack

Systems where manure and bedding are scraped or transported into a covered storage facility and handled as a solid. Manure is usually stored for a 30- to 180-day period and then land-applied as a solid using a manure spreader. Commonly used with beef and dairy operations.

Litter

Systems where animal manure and litter are retained in the animal housing area and then handled as a solid. Examples would be poultry broiler operations and swine hoop housing.

Slurry

Pit systems where manure is stored in a pit, usually under the animal confinement area. While the manure is handled as a liquid in these systems, the solids content is usually high. Examples would include deep pit storage swine facilities and covered concrete or metal tanks at swine or dairy operations.

Table 3. Nitrogen Availability following Handling, Storage and Application[1]

Storage System Type	Application Method			
	Broadcast / no incorporation	Broadcast with incorporation within 12 hours	Knife or sweep injected	Irrigate / no incorporation
Daily Haul	0.40	0.50		
Dry Stack	0.40	0.50		
Litter	0.40	0.50		
Slurry Pit	0.45	0.60	0.65	0.45
Holding Pond	0.40	0.50	0.60	0.40
Anaerobic Lagoon	0.15	0.25	0.25	0.15

[1]The values given in this table are intended to be used with fresh or as excreted manure nitrogen values, as provided in Table 2 of this document. These availability factors include handling, storage and application losses. Lab analysis of samples taken from stored manure before application would require an availability factor that did not include handling and storage losses, because these losses would have already occurred.

Adapted from the Natural Resources Conservation Service *National Field Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook (AWMFH).*

Holding Pond

Systems where manure and minimal dilution water are stored in a pond. Storage time usually ranges from 180 – 365 days. Holding ponds are the most common swine and dairy waste storage system in Tennessee. Holding ponds are usually mixed and emptied on an annual or semi-annual basis.

Anaerobic Lagoon

Systems designed to provide a degree of anaerobic treatment for waste. These lagoons are very large and dilute compared to holding ponds; liquid will look more like pond water than manure. True anaerobic lagoons are designed to have liquid removed every 180 – 360 days and have sludge removed at intervals of 2 – 25 years. Many systems commonly called lagoons in Tennessee are holding ponds. If the common practice is to agitate or mix the pond wastes and remove them at each clean-out event, the pond is a holding pond and not a lagoon. A lagoon must have a sludge storage capacity of at least two years.

Application Methods

Broadcast -no incorporation

Manure applied to the soil's surface and left. Examples would be manure spreader applications and slurry tank applications where no incorporation (chisel-plowing, disking, etc.) occurs immediately following the manure application.

Broadcast -incorporation within 12 hours

Manure applied to the soil s surface and worked into the soil following application. Examples would be manure spreader applications and slurry tank applications where incorporation (chisel-plowing, disking, etc.) occurred within 12 hours following the application.

Knife or sweep injected

Liquid manure applied below the soil s surface using injection knives or sweeps. These systems are coupled with slurry tanks and with umbilical cord systems which pump liquid manure to a chisel-plow type implement equipped with injection lines. No-till versions are also available.

Irrigated -no incorporation

Liquid manure applied using irrigation equipment. Examples include big gun and center pivot irrigation systems applying manure slurries or lagoon supernatant.

Phosphorus and Potassium Availability

To calculate the mass of phosphorus and potassium produced annually on your farm, complete worksheets 2 and 3 (pages 17-18). These worksheets are completed similarly to worksheet 1 (page 16). The mass values for phosphorus and potassium from Table 2 should be entered in columns 12 and 18, respectively, in these worksheets. There is no availability factor used for these nutrients. They are assumed to be conserved, and to become available over the long term in cropping systems. These worksheets are not required to be submitted with your NMP. They are optional and for your information only.

Table 4. Suggested Nitrogen Rates and Timing Guidelines for Manure Use: Field and Forage Crops [2,3]

Crop/Yield Level–	Rate Lbs. N/Acre	Application Time
Field Crops		
Corn/Grain		
100-125 bu.	120	at planting
125-150 bu.	150	"
150-175 bu.	180	"
175-200 bu.	210	"
200-225 bu.	240	"
Corn/Silage		
15-18 tons	120	"
19-25 tons	150	"
above 25 tons	180	"
Small grain for grain		
30-70 bu/acre	60	Feb. 15 - Mar. 15
Grain sorghum		
50-100 bu/acre	90	at planting
Canola/Rape	110	early to mid March before bolting
Tobacco	200	at planting
Warm-season Forages		
Bermuda Maintenance		
Common Pasture		
1-2 tons/acre	60	May 1
3-6 tons/acre	180	May 1
Hybrid Pasture		
1-4 tons/acre	120	May 1
5-6 tons/acre	180	May 1
Hybrid Hay		
1-6 tons/acre	120	May 1
7-12 tons/acre–	400	Split total into 3 applications May 1, June 1, July
Summer Annual Grass		
Seeded before June 20	120	at planting
Seeded after June 20	60	
Cool-season Forages		
Fescue Pasture		
Establishment	30	at planting
Maintenance		
spring pasture only (1-2 tons/acre)	45	March
spring pasture and fall stockpiling	105	Split total application half in March and half in July
Fescue Hay		
Establishment	30	at planting
Maintenance		
spring hay only (Up to 3 tons/acre)	105	March
spring hay and fall stockpile–	165	Split total application 2/3 in March and 1/3 in July
Timothy or Orchardgrass hay		
Up to 3 tons/acre	120	March
Small Grain and/or Ryegrass		
Fall grazing	60	at planting
Spring grazing	45	March 1
Spring hay or silage	60	March 1

[2]Producer must select the correct yield level based on a knowledge of yield potential for field soil type or field yield history from farm records.
[3]Adapted from: P&SS Information Sheet #185, Lime and Fertilizer Recommendations for the Various Crops of Tennessee.

Nutrient Use

The most common use of nutrients is as fertilizer for crop production. Worksheet 4 (page 19) provides lines for calculating the amount of nitrogen used by the cropping practices on your farm. Enter the appropriate field ID at the start of each line. In column 20 enter the type of crop to be grown in each field. In column 21 enter the yield potential that you expect considering the crop, location and management. This value should be a realistic target that you would expect to make if conditions are favorable for the crop at this given location. Column 22 is the nitrogen requirement of the crop. Table 4 (page 11) lists suggested manure nitrogen rates and application timing for most Tennessee field and forage crops. These values are consistent with University of Tennessee soil test recommendations. Select the appropriate nitrogen rate in pounds acre and enter it into column 22. Enter the field acreage in column 23. Multiply the N requirement (column 22) by acres (column 23) and place this value in column 24, Lbs of N used. Column 25 is the fraction of the total N available that which is used by the crop in this field. It is calculated by dividing Lbs of N used (column 24) by Total PAN (sum of column 7 from worksheet 1). Enter this value as a decimal number. Complete worksheet 4 by completing a line for each field where manure will be used as fertilizer. If animal manure is used for cattle feed or leaves the farm, the fraction should be indicated in the lines provided below the fertilizer listings in worksheet 4. Total the fraction of total N (column 25). If the total of column 25 (fraction of total N) is less than 1, then you are not accounting for all of the nitrogen produced on your farm. Additional copies of worksheets 1, 2, 3 and 4 are provided at the end of this publication document if additional room is required to enter more information than would fit on one sheet.

Section 4 -Dead Animal Disposal Method

The Tennessee Class II CAFO general permit requires that a description of the dead animal disposal method used on your farm be included with your NMP submission. CAFOs are required to provide appropriate disposal of dead animals by any of the following means: composting, rendering, incineration, disposal in a Class 1 permitted landfill or on-site burial. Check the method(s) you use in the Dead Animal Disposal Method Description information sheet (page 20.) If more than one method is used, indicate the estimated percentage (on a mass basis) of your total mortalities handled by each method. Use the area provided at the bottom of the information sheet to provide additional information concerning your dead animal disposal, such as incinerator type, name and location of rendering plant, or location of Class 1 permitted landfill used.

Section 5 -Putting It All Together -NMP Submission

Existing operations (those feeding animals before May 1, 1999) that meet the Class II CAFO permit requirements must submit a copy of their NMP to TDA on or before May 1, 2001. New facilities (those that begin feeding animals after May 1, 1999) must submit a copy of their NMP 30 days before they begin feeding animals. After working through this guide, you should have all of the information assembled for your NMP submission. Following this guide, assemble the information in the following order:

1. Nutrient Management Plan Submission Cover Sheet (page 14 of this publication).
2. Map(s) or Aerial Photo(s) marked as required FSA 1" = 660' aerial photograph suggested.
3. Field Information Worksheet (page 15 of this publication.)
4. Nutrient Budget Worksheet # 1. Annual Nitrogen Production (page 16 of this publication).
5. Nutrient Budget Worksheet # 4. Nutrient Utilization (page 19 of this publication).
6. Dead Animal Disposal Method Description (page 20 of this publication).

Make a copy of the final document when it is assembled. Keep the original for your records and submit a copy to:

Class II CAFO NMP
Tennessee Department of Agriculture
P.O. Box 40627 Ellington Agricultural Center
Nashville, TN 37204

Reminder: If you have a liquid waste system, you will also need to submit a Waste Handling System Plan and a history of system performance. The University of Tennessee Agricultural Extension Service publication entitled Liquid Waste System Description and Performance Review Assistance Guide for Tennessee Class II Concentrated Animal Feeding Operation Permit is available to assist you in the preparation of this information.

If You Need Additional Help

If you have questions concerning this guide or need additional help in completing the information sheets or worksheets, contact The University of Tennessee Agricultural Extension Service office in your county.

Nutrient Management Plan Submission Cover Sheet

Name: _____

Facility Mailing Address:

_____

_____

_____

_____

County: _____

Is this facility: ☐ new or ☐ existing (see Tennessee Class II CAFO permit for explanations of "new" and "existing" facilities

Animal Type(s) _____ _____ _____

Contact Person: _____

Mailing Address (If different than above)

_____

_____

_____

_____

Telephone: _____

Submission Date:_____

Field Information Worksheet

(Refer to Section 2, page 6 for instructions)

Field Identification	Acres	Crop or Rotation Description	Soil Test P	Soil Test K	Manure Application Method[4]	Application Timing (List months in which application occurs)

[4]See page 10, for method listing and descriptions.

Nutrient Budget Worksheet 1. Annual Nitrogen Production

1 Animal Type	2 Number[5]		3 Average Weight[6]		4 Confinement[7] period (days/year)		5 (Table 2 Page 7) Lbs TKN/day per 1000 lb. of animal		6 (Table 3 Page 9) N Availability Factor		7 PAN (lbs/year) (column 2 x (column 3÷1000) x column 4 x column 5 x column 6)
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	
		x		÷ 1000 x		x		x		=	

Total PAN ______________

[5]See page 8 for explanation of animal numbers.
[6]See page 8 for explanation of average animal weight.
[7]See page 8 for explanation of confinement period.

Nutrient Budget Worksheet 2. Annual Phosphorus Production

8 Animal Type	9 Number		10 Average Weight		11 Confinement period (days/year)		12 (Table 2) Lbs P_2O_5/day per 1000 lb.of animal		13 P_2O_5/day per (column 9 x (column 10 ÷1000) x column 11 x column 12)
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______
______	______	x	______	÷ 1000 x	______	x	______	=	______

Total P as P_2O_5 ______

Nutrient Budget Worksheet 3. Annual Potassium Production

14 Animal Type	15 Number		16 Average Weight		17 Confinement period (days/year)		18 (Table 2) Lbs K_2O/day per 1000 lb.of animal		19 K_2O (lbs/year) (column 15 x (column 16 ÷ 1000) x column 17 x column 18)
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________
________	________	x	________	÷ 1000 x	________	x	________	=	________

Total K as K_2O ________

Nutrient Budget Worksheet 4. Nutrient Utilization

Use	Field ID	20 Crop	21 Yield Potential (Table 4)	22 N Requirement Table 4 value less other nitrogen sources.		23 Acres		24 Lbs of N Used (column 22 x column 23)	25 Fraction of total N (column 24 ÷ total PAN from box on page 16)
Fertilizer	_____	_____	_____	_____	x	_____	=	_____	_____
Fertilizer	_____	_____	_____	_____	x	_____	=	_____	_____
Fertilizer	_____	_____	_____	_____	x	_____	=	_____	_____
Fertilizer	_____	_____	_____	_____	x	_____	=	_____	_____
Fertilizer	_____	_____	_____	_____	x	_____	=	_____	_____
Fertilizer	_____	_____	_____	_____	x	_____	=	_____	_____
Fertilizer	_____	_____	_____	_____	x	_____	=	_____	_____

Sub-total = _____ (Fraction used for fertilizer)

Sold or Given Away + _____ (Fraction sold or given away)

Poultry Manure Fed to Cattle + _____ (Fraction used as feed)

Total _____ Total must be 1.0 or more

Dead Animal Disposal Method Description

Check method(s) utilized and indicate percentage of total mortalities handled with this method.

Method	Percentage (weight basis)
❑ Composting	_____
❑ Rendering	_____
❑ Incineration	_____
❑ Disposal in Class 1 permitted landfill	_____
❑ Burial on-site	_____

Additional information (incinerator type, rendering plant, class 1 landfill name, address, etc.)

_____

_____

_____

_____

_____

_____

_____

_____

_____

Useful Conversions

1 ft^3 = 7.48 gallons

1 yd^3 = 27 ft^3

1 yd^3 = 21.7 bushels

1 acre - inch = 27,152 gallons

1 acre = 43,560 ft^2

1 yd^2 = 9 ft^2

1 ton = 2,000 lbs

density of water 62.4 $\frac{lbs}{ft^3}$ @ 60° F

1 gallon of water weighs 8.3 lbs

If you have questions concerning
Tennessee Concentrated Animal Feeding Operation (CAFO)
permits or other state environmental regulations,
you can contact your nearest
Tennessee Department of Environment and
Conservation Environmental Assistance Center by calling:
1-888-891-TDEC (1-888-891-8332)

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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
The University of Tennessee Institute of Agriculture, U.S. Department of Agriculture,
and county governments cooperating in furtherance of Acts of May 8 and June 30, 1914.
Agricultural Extension Service
Billy G. Hicks, Dean