Livestock and Poultry Environmental Stewardship (LPES) curriculum

CAFO Fact Sheet series

Fact Sheet #13C: CAFO Requirements for Veal Operations

By Glenn Carpenter, USDA-NRCS; Don Jones, Purdue University; Karl VanDevender, University of Arkansas; and Peter Wright, Cornell University

Introduction

The U.S. Environmental Protection Agency (EPA) has released new rules defining and clarifying the Concentrated Animal Feeding Operation (CAFO) regulations. They also notified states that these rules need to be implemented. Producers who in the past have not known about or responded to these rules may now need to meet them.

Large veal farms with wet manure handling systems have previously been regulated as CAFOs and will continue to be regulated in addition to operations of sufficient size with dry manure handling systems.

The new rule requires ALL large CAFOs to obtain a permit from the regulating agency or to formally demonstrate "no potential to discharge," as outlined in the rule. Farms that fall under the CAFO rules (see *CAFO Fact Sheet #2: Do I Need an NPDES Permit for My Livestock or Poultry Operation?*) need to implement a Nutrient Management Plan (NMP), and control the contamination from their production facilities and from land application areas. This fact sheet will provide information about the best way to do this.

Requirements for Veal Operations

- The Effluent Limitation Guidelines (ELG) for veal applies only to those operations that have a one-time capacity of 1,000 veal calves or more.
- An operation with at least 300 veal calves will be considered a CAFO when a man-made ditch or pipe carries manure or wastewater, or if the animals come in contact with surface water running through the area in which they are confined. More infor-

Continued on next page

mation on the applicability of the new CAFO regulations can be found in *CAFO Fact Sheet #2* of this series.

- The basic technology standard for veal CAFOs prohibits discharges of manure or process-generated wastewater from the production area.

Any time manure or wastewater is released from the production area, it is considered an illegal discharge unless certain requirements are met:

1. Rainfall causes the discharge **AND** the production area was designed, built, operated, and maintained to contain all of the manure, process wastewater, direct rainfall, and contaminated runoff resulting from a 25-year, 24-hour rainfall event.

AND

2. The CAFO is otherwise complying with the inspection, monitoring, record-keeping, and mortality-disposal provisions in the rule.

Producer Compliance Checklist

The checklist below is designed to help you determine if your veal operation is in compliance with the new federal CAFO regulations. Depending on your answer to any of these questions, you may not be in compliance with the new rules and may need to take corrective action. States may have additional requirements, so check with your state permitting authority to identify the requirements for your facility.

Veal Production*

To produce a small, tender animal in as short a time as possible, veal producers typically purchase Holstein bull calves at about 100 pounds, feed them for 14 to 16 weeks, and then sell them at 320 to 370 pounds. The feed and environment are entirely different for producing veal calves than for producing dairy heifers. The techniques for manure management described in this fact sheet are also specific to veal production.

Producer Compliance Checklist

Item	Action	Check Yes	Check No
1	Determine if your operation is a CAFO (see *CAFO Fact Sheet #2*).		
2	Determine if you have a wet or dry manure handling system.		
3	Determine if you have a discharge during a 24-hr, 25-yr storm.		
4	If you have a wet manure handling system, determine if it can be: a. Eliminated? b. Reduced in volume of expected handling? c. Modified for increased capacity?		
5	Do you control the outside clean water a. From roof areas? b. Surface flow? c. Subsurface flow? d. Overflowing waterers?		
6	Do you catch the manure and waste-water runoff?		
7	Do you treat the stored manure and waste-water runoff appropriately?		

*Information on veal production and manure management is taken directly from Meyer, D.J., and R.E. Graves, 1987. Animal Manure–Veal Calf Management, Penn Pages Fact Sheet 087016.

Veal calves spend their entire growing-out period on a liquid diet composed of a dry formula mixed with warm water. Daily rations range from about 5 ounces of formula in 5 pounds of water at the start to 50 ounces of formula in 20 pounds of water at the end. Total consumption of dry formula during this grow-out period is about 400 pounds per calf. Calves also drink up to 16 pounds of additional water if it is available, especially in the summer.

Calves generally are grouped by age, and each room in an environmentally controlled building is devoted to a single age group. Groups of 50 calves may be kept in large bedded pens that require a solid manure-handling system.

Calves also may be kept in group pens with slotted floors or in individual crates, also called elevated stalls, which require a liquid-manure system. Liquid manure systems are the most common but also the most problematic in terms of waste-water handling. They will be the focus of the remainder of this fact sheet.

Veal Manure

Veal feces are very fluid, having the consistency of a sloppy mortar mix. Table 1 below shows the annual production of veal manure per 1,000-pound animal weight. In liquid systems, the feces are diluted by various volumes of wash water used to remove them from the building.

Best Management Practices

Good managers keep very tight control over sanitation and other factors that can affect animal health. Wash water can account for a large portion of the wastewater generated in a veal facility. Calves' manure, hair, and feed are regularly washed from under the crates to reduce ammonia, odor, and fly levels in the room. Managers use different frequencies or patterns of washing, which can affect the manure-handling system. From 10% to 30% of the wastewater comes from scrubbing the rooms and crates after the calves have been shipped to market.

Catch the Manure and Wastewater

The most common method for handling manure and wash water is a sloping gutter under the rear of the stalls. Most gutters drain continuously into the manure storage system. A gas trap between the gutter and manure storage prevents the ventilation system from pulling gases back into the barn. Flushing a wide gutter several times a day with a large volume of water is not successful, since veal manure is extremely sticky.

Store the Manure and Wastewater

Tanks, pits, and basins are used to store manure until it is spread on fields. (Storage basins should not be mistaken for treatment lagoons, or treatment basins.) A concrete tank usually is placed beside the building so that gutters drain directly into the tank. A metal roof over the wastewater storage may be used to protect against rainwater and control odor. Manure storage pits may also be built directly under buildings. While such pits decrease the need for washing because manure drops directly into them, the building has higher levels of ammonia and other pit gases, requiring increased ventilation and higher fuel costs in the winter.

Table 1. Annual raw manure production per 1,000-pound animal weight

Animal Type	Manure Production		Percent Solids	Nutrient Content					
	Tons/-yr	Gal/-yr		N	P_2O_5	K_20	N	P_2O_5	K_20
				Lbs/ton			Lbs/1,000 gal		
Veal	11.5	2,738	8.4	8.7	2.1	9.0	36.5	8.8	37.8

Source: Ohio State University Extension Bulletin 604; Ohio Livestock Manure and Wastewater Management Guide

The use of a water flow meter is recommended to determine the actual volume of water used. If water usage must be estimated, the storage facility should be designed to handle a minimum of 32 to 56 gallons of wastewater per week per calf plus a 15% safety factor. The washing interval and duration determine the capacity needed for a particular design. **Note: Take precautions when agitating a storage unit located under the calves or connected to the building through the drain system. Even in low concentrations, the hydrogen sulfide gas released during agitation is toxic.** Ventilation fans should be operating at high capacity during and immediately after agitation, and humans should stay out of the building. If possible, calves on a slotted floor over a deep pit should be removed when the pit is agitated. These precautions are especially important during the first 10 minutes of agitation. Pipes or drain openings between rooms and the outside storage should be gas trapped or sealed.

Most tanks and pits are emptied with a vacuum tank, which has a suction pump operated by the tractor's power takeoff. Liquid manure is pulled into the tank via suction rather than with a waste-water pump located in the pit. Earthen basins also may be used to store veal manure if the distance from nearby residences adequately allows odors to dilute. Proper lining of the basin prevents leakage into groundwater. The lining can be either geomembrane or soil that does not allow leakage to travel over three feet per year. Check state regulations of procedures for local lining requirements. Basins should be sized to handle manure, wash water, rainfall, and runoff. All clean runoff from outside the building should be diverted away from the storage. With this type of storage, obnoxious odors can be a problem in spring, summer, and fall.

Treat the Runoff

Manure and wastewater is sometimes treated to control odor before it is applied at agronomic rates to cropland. For dilute wastewater, hydraulic loading rates need to be utilized to determine application rates. *CAFO Fact Sheet #25: Making Decisions About Application Rates* describes this process. The nutrient contents of manure may vary considerably so multiple samples may be needed to determine the appropriate loading rates. Wastewater can be treated in vegetated filter areas, constructed wetlands, or other treatment systems. These systems must be designed to prevent the varying concentrations and volumes of runoff from causing pollution.

Aerobic treatment

Manure can be stored and treated in aerobic or anaerobic treatment basins either with or without pretreatment by a settling tank. Aerobic treatment basins can be aerated naturally or mechanically. A naturally aerated basin can be only 3 to 5 feet deep and thus requires a large land area. The design loading is 20 pounds of 5-day biochemical oxygen demand (BOD5) per acre per day. A typical 200-veal calf facility, which would generate an average of 20 pounds of BOD5 per day, requires 1 acre of naturally aerated basin.

A mechanically aerated basin uses pumps to mix oxygen with the wastewater and can be made deeper to reduce the area required. The area of the basin depends on the storage volume required, and the horsepower required for aeration pumps depends on both the basin's area and the amount of biodegradable organic matter present. Usually the basin is designed to accommodate 6 months of manure and wash water. The storage volume for any time period should accommodate 32 to 56 gallons per calf per week plus a 15% safety factor. An extra 3 feet of depth, including the bottom foot that cannot be aerated, should also be maintained in the treatment basin because aerators cannot operate when the basin is empty.

Anaerobic treatment

Anaerobic treatment lagoon must have sufficient volume to minimize odors and allow microorganisms to degrade solids. This volume should result in minimal odors during most of the year. However, even a properly sized basin undergoes an inversion in spring and produces odor until the temperature stabilizes. A lagoon that receives wastewater should always be

kept full enough–usually one-third full–to maintain anaerobic activity. The design of lagoons is highly site and climate specific and should be performed by professionally licensed engineers or your local Natural Resources Conservation Service (NRCS) office.

Settling tanks

Settling tanks for pretreatment, or settling out of the heavier solids, can reduce the required size of aerobic and anaerobic treatment basins by up to 30%. Wastewater enters the covered settling tank at the top of one side; the overflow leaves at the top of the opposite side. A tee extending 12 inches below the maximum liquid level or a baffled outlet (as in septic tanks) prevents scum from blocking the pipes. Based on a 1.76% proportion of solids, a 50% safety factor, and experience with swine manure, the settling tank volume should be 1 to 2 gallons per calf per week. Be sure that an additional volume for storage of settled solids is provided in the design of a settling basin.

Most of the fertilizer value and odor remains in the solids in the settling tank. The effluent from the basin overflows to a long-term storage where it is held until it is periodically irrigated onto cropland. Solids in settling tanks must be removed when the volume reserved for solids storage becomes full. To check for the amount of solids, probe the tank periodically with a rod. To determine the appropriate spreading rate for fields, test both the solids in the settling tank and the effluent in the storage basin for nitrogen (N), phosphorus (P), and potassium (K) fertilizer value.

Adequate design capacity

Planning the location and the size of operations can reduce the pollution potential and the costs required to lower the pollution potential to desired levels. Many of the problems of diverting or controlling outside surface water and catching and treating dirty barnyard runoff can be reduced or eliminated by locating the animal facility in the right place. Moving planned facilities to higher ground or away from a stream can help prevent pollution potential while avoiding the increased costs that outside water control systems would require.

Keeping the Clean Water Clean

Extra water from barn roofs, overflowing waterers, and/or uphill overland flow can increase the flow of pollutants offsite. The location of barnyards that are adjacent to or even include a stream or a depressed area can create significant threats to the environment.

Keeping clean water clean is vital to good management. Leaking waterers stress an operation's manure storage capacity. Maintaining waterers so that they do not overflow is part of good management.

Roof water can be controlled by using rain gutters or a drip trench. Barn roofs are much larger than most roofs. The rain gutters and downspouts need to be designed to carry the amount of water that these large areas can provide. The size of the gutters, their slope, and the placement and size of the downspouts all depend on the amount of rain water to be carried. The 5-minute, 10-year storm is a common design storm for rain gutters, which need to be protected against snow and ice damage. Hanging the gutters lower than the projected roofline prevents snow and ice from sliding off barn roofs and knocking the gutters down. Extra hangers for the gutter, as closely spaced as 16 inches, or ice-breaking obstacles on the roof that stop sliding snow are often required to keep the gutters up.

Drip trenches that collect falling roof water and direct it to a ditch or tile to be carried away from the barnyard are often longer lasting and cheaper than roof gutters. A gravel trench with a tile line is placed under the drip line of the roof. To avoid contaminating the clean water with manure, the drip trench needs to be fenced out of the barnyard.

Diversions or land grading can prevent uphill surface flow from running through the barnyard. Tile inlets with small storage structures can be used when the surface water cannot be easily moved around the barnyard. Subsurface drainage should be used to prevent groundwater from surfacing in the barnyard, adding to the contaminated runoff water. A competent conservation contractor, Soil and Water Conservation District

(SWCD) or NRCS employee, or a professionally licensed agricultural engineer should design these structures.

Inspections

The storage sites need to be maintained and monitored. The operators of large CAFOs are required to perform weekly inspections of all storm water diversion devices, runoff collection structures, waste storage structures, and manure or runoff transporting systems. To prevent inadvertent overflows onto barnyards, water lines need to be inspected daily. For large CAFOs, depth markers or staff gauges need to be installed (see *CAFO Fact Sheet #15: Liquid Level Markers for Uncovered Manure Storages and Lagoons*) in each surface and liquid impoundment to determine the amount of storage volume remaining, thus ensuring that a 25-year, 24-hour storm will not overtop the structure and that there is adequate freeboard. Any deficiencies or discharges need to be recorded and addressed as soon as possible. In addition, mortalities must be kept from the waste-water system. The CAFO operator must keep a complete copy of these records for the last five years (see *CAFO Fact Sheet #6: What CAFO Reports Must I Submit?).*

Is Cost Sharing Available?

Technical and financial assistance may be available. Contact your local SWCD for details.

Time Line for Compliance with Production Area Provisions of the New CAFO Rule

The time line for compliance with the new rules is fairly complex. Some provisions took effect upon adoption of the rule in April 2003; others do not take effect until as late as the year 2006. *CAFO Fact Sheet #3: How Soon Must I Apply for an NPDES Permit?* details these compliance deadlines and provides a means for you to determine what deadlines your CAFO faces. States may have earlier deadlines and more stringent requirements. Check also with your permitting authority to determine the requirements of your facility.

Supporting Sections

40 CFR Part 412.30-47 Effluent Limitations Guidelines–Concentrated Animal Feeding Operations (CAFO) Point Source Category.

- Subpart D: Swine, Poultry and Veal Calves.

Summary

Some large veal operations have previously been regulated and will continue to be regulated by CAFO regulations. The new rules broaden the requirements for designation as a CAFO. These new rules also now require all CAFOs to apply for a permit with the regulatory agency and to develop and implement an NMP. This fact sheet discusses issues that producers must consider when operating veal facilities. ●

Definition of Terms

Best Management Practices (BMPs)–Practices that help prevent pollution. Often have standards developed by the NRCS.

CAFO–Concentrated Animal Feeding Operation. Large animal feeding operation that the Federal government regulates under the reauthorized Clean Water Act.

Drip trench–A system of channels and berms that collects roof water at the base of the roof, preventing clean water from entering a barnyard and polluted water from the barnyard from mixing with the clean roof runoff.

NMP–Nutrient Management Plan. A plan that considers the source and fate of facility nutrients and is designed to minimize nutrient losses to the environment.

Authors
Glenn Carpenter, a senior agricultural economist at USDA-NRCS-AHCWP, can be reached at glenn.carpenter@usda.gov, and Don Jones, an agricultural and biological engineering professor at Purdue University, can be reached at jonesd@purdue.edu. Karl VanDevender, an extension engineer at the University of Arkansas, can be reached at kvan@uaex.edu, and Peter Wright, a manure management specialist at Cornell University, can be reached at pew2@cornell.edu.

Reviewers
The authors wish to thank William Bowers, State Engineer for Pennsylvania, USDA-NRCS, and Robert Gibson, Pennsylvania Department of Environmental Protection, for their review of this fact sheet.

For More Information

Environmental Regulations Related Resources

EPA CAFO Phone Line–202-564-0766

http://www.epa.gov/npdes/caforule/–To obtain copy of regulations

http://www.epa.gov/npdes/afo/statecontacts/–To obtain state environmental agency contacts

http://www.epa.gov/agriculture/animals.html/–To obtain compliance assistance information from EPA

http://cfpub.epa.gov/npdes/contacts.cfm?program_id=7&type=REGION/–To obtain EPA Region Animal Feeding Operation contacts

Land-Grant University Resources

The local contact for your land-grant university Cooperative Extension program is listed in the phone book under "Cooperative Extension" or "*(county name)* County Cooperative Extension."

http://www.reeusda.gov/1700/statepartners/usa.htm/–To obtain state Cooperative Extension contacts

http://www.lpes.org/–To view the Livestock and Poultry Environmental Stewardship (LPES) curriculum resources

USDA Farm Bill Resources

To obtain more information about the Farm Bill 2002, see the USDA-NRCS website at http://www.nrcs.usda.gov/programs/farmbill/2002/. You can also contact your local USDA Service Center, listed in the phone book under "U.S. Department of Agriculture," or your local conservation district.

The LPES educational materials were developed with support from the USDA-CSREES, the U.S. EPA's National Agriculture Compliance Assistance Center, and the University of Nebraska Cooperative Extension at Lincoln, under Cooperative Agreement Number 97-EXCA-3-0642.

MWPS (MidWest Plan Service), headquartered at Iowa State University, is the primary distributor of LPES curriculum materials. To order the materials online, access their website at <http://www.mwpshq.org> and visit the catalog section.

Discounts are offered on LPES materials purchased as package deals or in bulk.