Appendix A - ***Animal Nutrition and Feed Management***

Established Practices – pages 2 - 7

Animal Nutrition and Feed Management- Lactating Dairy Cows

Description: The purpose of this practice is to maximize ration conversion into milk, thereby minimizing urinary nitrogen excretion, the principal source of ammonia emissions from dairy farms. This practice applies to lactating cows only and emission reductions must be apportioned accordingly.

Beneficial practices that maximize feed-use efficiency include, among others:

- Matching nutrient supply with animal requirements
- Feeding only enough rumen-undegraded protein (RUP) to meet cows' metabolizable protein requirements
- Reducing particle size to increase ruminal digestion of grain starch and increase microbial protein formation (so long as ruminal pH is not depressed)
- Monitor milk urea nitrogen (MUN) levels.

To calculate the annual MUN average, first calculate a monthly MUN average based on all bulk tank MUN values generated during the month, for every month in the calendar year (January through December). Then average the 12 monthly MUN bulk tank averages to create an annual MUN average. The annual MUN average is the value to be compared to the emission reduction performance measures noted below, under Air Toxic Emission Reductions.

Rationale: Ration crude protein (CP) above recommended levels (16.5% of ration dry matter) is excreted entirely in urine as nitrogen. This increases ammonia emissions from dairy housing, from manure storage facilities and after manure has been land applied. Rations that are not balanced for CP and energy are poorly digested, which increases nitrogen losses by dairy cows.

Conventional Baseline Practice: The baseline practice for comparison is an annual average MUN of 14 mg/dl or greater

☒ Established ☐ Demonstration

Farm Component:

- ☒ Nutrition and/or Feed Management
- ☐ Housing
- ☐ Storage & Treatment
- ☐ Open Lots/Corrals
- ☐ Land Application

Notes: These reductions will be realized through manure handling, storage and land application

Animal Type:

- ☒ Bovine
- ☐ Swine
- ☐ Poultry

Notes: For lactating cows, specifically

Air Toxic Emission Reductions - specific to farm component

- ☒ Ammonia % Notes: 20% reduction for annual average MUN of 10 or less; 10% reduction for MUN 10-12
- ☐ Hydrogen Sulfide % Notes:

Other Air Quality Considerations

Reduces GHGs

Engineering, O&M requirements:

Confirmation that BMP is working:

☒ Record Keeping Notes:See below on milk urea nitrogen (MUN)

- ☐ O&M Frequency:
- ☐ Design/construction documents
- ☒ Other specify Nutritionist and/or vet visits Frequency: varies
- ☐ Visual Inspection Frequency:

☒ Monitoring Notes:

Parameter: MUN Frequency:bulk tank, annual average based on 12 monthly bulk tank averages

Parameter: Frequency:

Additional Considerations, references:

See NRCS Conservation Practice Standard 592 - Feed Management and Nutrient Management Technical Note #5

Lower MUN, and other specialized veterinarian formulated diets, results in lower manure nitrogen excretion and hence ammonia reduction. MUN relationships to manure nitrogen excretion are well established in Wisconsin literature.

Animal Nutrition and Feed Management - Poultry and Swine

Description: Animal nutrition and feed management practices directly reduce the excretion of nitrogen and/or sulfur compounds in animal waste.

Formulate feeds to match the animals amino acid needs.
- Use phase or split sex feeding
- Use feed formulated on an available nutrient basis, including for sulfur
- Reduce sulfur in water supply, where applicable
- The goal for feed particle size is a medium grind, 700 micron diameter or about 0.03 inches. An accetptable range is 650 to 750 microns. Feed particle size should be measured regularly.

Nutrient levels fed swine or poultry is determined by a trained nutritionist, who formulates the feeds, based on the amino acid needs of the animal, as compared to formulating rations that target the animal's crude protein needs or feeding an unbalanced ration. The result is a reduction in the protein levels in the feed ration, leading to less nitrogen in the manure and less ammonia emissions. Typically this is accomplished by adding synthetic amino acids to the ration but various other combinations of ingredients can be used.

Rationale: Feed management can reduce excretion of nutrients in manure. Since the animal is a primary initial source of nutrient excretions and odors from animal operations, diet manipulation is a practical way to control excess nutrient excretion and reduce air emissions.

Conventional Baseline Practice: The baseline practice for comparison is swine or poultry fed rations formulated primarily on the basis of crude protein.

☒ Established ☐ Demonstration

Farm Component:
- ☒ Nutrition and/or Feed Management
- ☐ Housing
- ☐ Storage & Treatment
- ☐ Open Lots/Corrals
- ☐ Land Application

Notes:

Animal Type:
- ☐ Bovine
- ☒ Swine
- ☒ Poultry

Notes:

Air Toxic Emission Reductions - specific to farm component

☒	Ammonia	40 %	Notes:	Ammonia reduction applies to both swine and poultry.
☒	Hydrogen Sulfide	20 %	Notes:	Hydrogen sulfide reduction is associated with swine production only.

Other Air Quality Considerations

Engineering, O&M requirements:

Confirmation that BMP is working:

☒ Record Keeping Notes:written records documenting the types of feed used with the associated nutrient analysis, ages of animals, quantity fed, dates fed, nutritionist name and person verifying the process. The protein reduction in the finished feed can be confirmed and documented through lab analysis of the feed.

- ☐ O&M Frequency:
- ☐ Design/construction documents
- ☒ Other specify Annual letter from Animal Nutritionist summarizing feeding program Frequency: Annual
- ☐ Visual Inspection Frequency:

☒ Monitoring Notes:

Parameter: feed nutrients Frequency:monthly or as needed to know feed formulations correct

Parameter: Frequency:

Additional Considerations, references: See NRCS Conservation Practice 592 - Feed Management and related support fact sheets. See also NRCS Nutrient Management Technical Notes No. 3 (swine) and No. 4 (poultry)

Silage Storage

Description: Silage should be managed in a manner that conserves forage quality.

- Cover silage piles and bunkers with an effective barrier that eliminates feed spoilage. For example, apply two layers of 5 mil plastic with the black side down or a minimum of one layer of 5 mil plastic installed with black side down in conjunction with an oxygen barrier.
- All feed unsuitable for re-feeding on site must be removed daily to an appropriate location to minimize emissions due to feed decomposition (e.g., waste feed may be actively composted or land applied).
- When feeding, disturb only the required bunker face area.
- Store all dry feed in a dry place such as a commodity building or grain bin.
- Collect and store leachate from feed in a holding tank or manure storage structure.

Rationale: Wet silage and decomposing feed emit ammonia and hydrogen sulfide.

Conventional Baseline Practice: The baseline practice for comparison is improperly managed silage that results in spoilage.

☒ Established ☐ Demonstration

Farm Component:

- ☒ Nutrition and/or Feed Management
- ☐ Housing
- ☐ Storage & Treatment
- ☐ Open Lots/Corrals
- ☐ Land Application

Notes:

Animal Type:

- ☒ Bovine
- ☐ Swine
- ☐ Poultry

Notes:

Air Toxic Emission Reductions - specific to farm component

☒	Ammonia	20	%	Notes:
☒	Hydrogen Sulfide	10	%	Notes:

Other Air Quality Considerations PM, VOC reductions

Engineering, O&M requirements:

Confirmation that BMP is working:

☒ Record Keeping Notes: In particular, include design & construction plans for silage leachate management.

☐ O&M Frequency:
☒ Design/construction documents
☒ Other specify Spoiled feed removal Frequency: Daily
☒ Visual Inspection Frequency: Routine

☐ Monitoring Notes:
Parameter: Frequency:
Parameter: Frequency:

Additional Considerations, references: