Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

FORAGE HARVEST MANAGEMENT

CODE 511

(ac)

DEFINITION

The timely cutting and removal of forages from the field as hay, green-chop, or ensilage.

PURPOSE

This practice is used to accomplish one or more of the following purposes–

- Optimize the economic yield of forage at the desired levels
- Promote vigorous plant re-growth
- Maintain stand life
- Manage for the desired species composition
- Use forage plant biomass as a soil nutrient uptake tool
- Control insects, diseases, and weeds
- Maintain and/or improve wildlife habitat

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where machine harvested forage crops are grown.

CRITERIA

General Criteria Applicable to All Purposes

Harvest forage at a frequency and height to maintain a desired healthy plant community. Use State Cooperative Extension Service (CES) forage harvest recommendations based on stage of maturity, moisture content, length of cut, stubble height, and harvest interval to meet the following criteria.

a. Stage of Maturity

Harvest forage at the stage of maturity that provides the desired quality and quantity. Delay harvest if prolonged or heavy precipitation is forecast that would seriously damage cut forage.

b. Moisture Content

Harvest silage/haylage crops within the optimum moisture range for the type of storage structure(s) being utilized. Use CES recommendations for optimum moisture content and levels as well as methods and techniques to monitor and/or determine moisture content and levels. Treat direct cut hay crop silage (moisture content > 70 percent) with chemical preservatives or when moisture is above 40 percent. To preserve forage quality and quantity, bale field cured at 15 to 20 percent moisture and bale force air dried hay at 20 to 35 percent moisture. Rake hay at 30 to 40 percent moisture. Turn or invert swaths when moisture is above 40 percent.

c. Length of Cut

When harvested for ensilage, chop forage to a size appropriate for type of storage structure (high moisture wrapped or tubed bales) that allows adequate packing to produce the anaerobic conditions necessary to ensure the proper ensiling process.

d. Contaminants

Ensure contanimants levels in forage are not conducive to illness, death, or rejection of the offered forage.

Additional Criteria to Improve or Maintain Stand Life, Plant Vigor, and Forage Species Mix

a. Stage of Maturity and Harvest Interval

Cut forage plants at a stages of maturity or harvest interval ranges that provide adequate food reserves and/or basal or auxiliary tillers or buds for re-growth and/or reproduction to occur without loss of plant vigor. Cut reseeding annuals at a stage of maturity and frequency that ensures the production of viable seed or ample carryover of hard seed to maintain desired stand density. If plants show signs of short-term environmental stress, adjust management to ensures continued health and vigor of stand.

b. Stubble Height

Cut forage plants at heights that promote the vigor and health of the desired species. Leave adequate residual leaf area; adequate numbers of terminal, basal, or auxiliary tillers or buds; insulation from extreme heat or cold; and/or unsevered stem bases that store food reserves needed for full, vigorous recovery. Manipulate timing and cutting heights of harvest to ensure germination and establishment of reseeding or seeded annuals.

Additional Criteria to Use as a Nutrient Uptake Tool

Employ a harvest regime that utilizes the maximum amount of available or targeted nutrients.

Additional Criteria to Control Disease, Insect, and Weed Infestations

Schedule harvest periods to control disease, insect, and weed infestations. When a pesticide is used to control disease, insects, or weeds, adhere to the pesticide label. Evaluate pest management options by planning Conservation Practice 595, Pest Management. Lessen incidence of disease, insect damage, and weed infestation by managing for desirable plant vigor. Plan and schedule removal of invasive plants.

Additional Criteria to Improve Wildlife Habitat Values

If client objectives include providing suitable habitat for desired wildlife specie(s), manage harvest schedule(s), cover patterns, and plant height to provide suitable habitat for the desired specie(s). Refer to Conservation Practices 645, Upland Wildlife Habitat Management, or 644, Wetland Wildlife Habitat Management.

CONSIDERATIONS

Where applicable, coordinate this practice with the current Conservation Practice 528, Prescribed Grazing.

When nutrients or other soil amendments are applied, coordinate this practice with the current Conservation Practices 590, Nutrient Management, or 633, Waste Utilization, as appropriate. An excess or improper balance of nutrients such as nitrogen can produce plant material that causes toxicity in some animals.

To control forage plant diseases, insects, and movement of weeds, clean harvesting equipment after harvest and before storing. Cut forages after dew, rain, or irrigation water on leaves has evaporated.

Care should be taken to produce stored forages of the quality needed for optimum performance of the animal being fed. For instance, immature legume forages can be too low in fiber and lead to metabolic disorders in ruminants and an economic loss to the producer due to lowered animal performance.

Direct cut grass and legume silage can create silage leachate (seepage). Consider the collection, storage, and disposal of this leachate as part of an agricultural waste management system.

In conjunction with harvest options, explore storage and feeding options that will retain acceptable forage quality and minimize digestible dry matter loss.

Consider storage location for large square or round bales/balage with regards to inside vs. outside, along hedgerows, winter/mud considerations, etc.

Where weather conditions make it difficult to harvest the desired quality of forage, use mechanical or chemical conditioners and/or ensile.

In regions where rainfall and/or humidity levels cause unacceptable forage quality losses, consider green chopping or ensiling the forage to reduce or eliminate field drying time. Other options are: the use of desiccants, preservatives, conditioners, macerating implements, or barn curing techniques to reduce field-drying time. These techniques can improve the timeliness of harvest and preserve forage quality.

To reduce safety hazards, avoid operating harvesting and hauling equipment on field slopes over 25 percent, particularly on cross slope traffic patterns.

PLANS AND SPECIFICATIONS

Place the detailed specifications in a sitespecific job or design sheet or in the practice narrative in the conservation plan.

These plans and specifications shall be consistent with this standard and shall describe the requirement for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

Before forage harvest, clear fields of debris that could damage machinery, or if ingested by livestock, leads to sickness (for example, hardware disease) or death.

Monitor weather conditions and take action accordingly before and after cutting to optimize forage wilting or curing time to preserve feed quality and prevent forage swaths or windrows from smothering underlying plants.

Inspect and repair harvesting equipment following manufacturer’s preventative maintenance procedures.

All shields shall be in place during machine operation to prevent injury or death. Shut off machinery before working on or unplugging moving parts.

Select equipment sizes and capacities that will, in a timely and economically feasible manner, handle the acreage normally harvested.

Operate all forage harvesting equipment at the optimum settings and speeds to minimize loss of leaves.

Set shear-plate on forage chopper to the proper theoretical cut for the crop being harvested. Keep knives well sharpened. Do not use recutters or screens unless forage moisture levels fall below recommended levels for optimum chopping action.

Regardless of silage/haylage storage method, ensure good compaction and an airtight seal to exclude oxygen and mold formation.

REFERENCES

Ball, D. M., C. S. Hoveland, & G. D. Lacefield. Southern Forages. 1991. Potash & Phosphate Institute, Norcross, GA.

Barnes, R. F., D. A. Miller, & C. J. Nelson. Forages, The Science of Grassland Agriculture, Fifth Edition. 1995. Iowa State University Press, Ames, IA.

Hanson, A. A., D. K. Barnes, & R. R. Hill, Jr. Alfalfa and Alfalfa Improvement. 1988. American Society of Agronomy, Madison, WI.

Ishler, V. A. Et al. Harvesting and Utilizing Silage. 1991. Penn State University Circular 396. University Park, PA.

Matches, A. G. Anti-Quality Components of Forages. 1973. Crop Science Society of America Special Pub. No. 4, Madison, WI.

Pitt, R. E. Silage and Hay Preservation. 1990. Northeast Regional Agricultural Engineering Service. Ithaca, NY.

Serotkin, N., Ed. The Penn State Agronomy Guide, 1995-1996. Pennsylvania State University. 1994. University Park, PA.

Smith, D. Forage Management in the North, Third Edition. 1975. Kendall/Hunt Publishing Company, Dubuque, IA.

Taylor, N. L. Clover Science and Technology. 1985. American Society of Agronomy, Madison, WI.