



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 yield and quality of forage at the desired levels
- Promote vigorous plant re-growth
- 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

Forage will be harvested at a frequency and height that optimizes the desired forage stand, plant community, and stand life. Follow State Cooperative Extension Service (CES) recommendations for forage harvest based on stage of maturity, moisture content, length of cut, stubble height and harvest interval. The following criteria must be met:

Stage of Maturity

Harvest forage at the stage of maturity that provides the desired quality and quantity without compromising plant vigor and stand longevity.

Moisture Content

Harvest silage/haylage crops within the optimum moisture range for the type of storage method(s) or structure(s) being utilized.

Use Extension recommendations to determine optimum moisture content and levels as well as methods and techniques to monitor and/or determine moisture content and levels.

Avoid fermentation and seepage losses of digestible dry matter from direct cut hay crop silage (moisture content >70%) by treatment with chemical preservatives or add dry feedstuffs.

For optimal dry hay quality, rake hay at 30 to 40 percent moisture and ted or invert swaths when moisture is above 40 percent.

To preserve forage quality and quantity, bale field cured hay at 15 – 20 percent moisture and bale force air-dried hay and 20 – 35 percent moisture.

Length of Cut

When harvested for ensilage forage will be chopped to a size appropriate for type of storage structure used and optimal effective fiber. The length of chop selected will allow adequate packing to produce the anaerobic conditions necessary to ensure the proper ensiling process.

A shorter chop length on very dry silage may help to ensure good packing and adequate silage density.

Stubble Height

Cut forage plants at a height that will promote the vigor and health of the desired species. Cutting heights will provide 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. Follow CES recommendations for proper stubble heights to avoid winterkill of forage species in cold climates.

Contaminants

Forage shall not contain contaminants that can cause illness or death to the animal or rejection of the offered forage. Check Extension contaminant notices, cautions and recommendations for the specific harvest site location and area.

Minimum Cutting Heights

Minimum cutting heights by species and growth stage are included in the following table.

Species	Growth Stage	Min. Cutting Height
Alfalfa	Early Bloom	2"
Grass/Legume	Boot/Early Bloom	3"
Tall Grass	Boot	6"
Mid Grass	Boot	3"

Additional Criteria to Promote Vigorous Plant Re-Growth and Manage for the Desired Species Composition

Stage of Maturity and Harvest Interval

Harvest management is the primary method by which managers can influence the nutritional quality of forage as well as forage yield and stand life. For alfalfa, total yields will continue to increase past the bud stage, however, crude protein and total digestible nutrients decline rapidly and most of the additional biomass is stem material. Carbohydrate content of roots continues to increase up until about full bloom, allowing the plant to re-grow following harvest. Managers need to be aware of stand longevity versus forage digestibility, and balance their animal feed needs with crop rotation.

Cut forage plants at a stage of maturity or harvest interval range that will provide adequate food reserves and/or basal or auxiliary tillers or buds for regrowth 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 ample viable seed or carryover of hard seed to maintain desired stand density.

If plants show signs of short-term environmental stress, apply management in a manner that encourages the continued health and vigor of the stand. Follow Extension recommendations in these cases.

Manipulate timing and cutting heights of harvest to ensure germination and establishment of reseeding or seeded annuals.

Additional Criteria for Use Forage Plant Biomass as a Soil Nutrient Uptake Tool

Employ a harvest regime that utilizes the maximum amount of available or targeted nutrients. Harvests that are more frequent may be required to increase plant nutrient uptake.

Additional Criteria to Control Insects, Diseases and Weeds

Use Extension recommendations, when available, to control disease, insect and weed infestations in forage.

Schedule harvest periods to control disease, insect and weed infestations. Adhere to pesticide-label-specific harvest intervals when using pesticides to control diseases, insects or weeds.

To decrease the incidence of disease, insect damage and weed infestations, manage harvests to maintain a full, vigorous, dense forage stand.

Cut forages only after dew, rain, or irrigation water on the leaves has evaporated.

Additional Criteria to Maintain and/or Improve Wildlife Habitat

If client objectives include providing suitable habitat for desirable wildlife species, implement and maintain appropriate harvest schedules, cover patterns and minimum plant heights to provide suitable habitat.

Refer to CO Biology Tech Note No. 8, Wildlife Habitat Evaluation Guide-Hayland, for site-specific planning requirements.

Plan and apply Upland Wildlife Habitat Management (645), as applicable.

CONSIDERATIONS

Continuous cutting at an immature growth stage can cause a stand to deteriorate prematurely by decreasing food reserves in the roots.

Where applicable, plan and apply Prescribed Grazing (528), in conjunction with Forage Harvest Management.

Well-fertilized plants can withstand more intense harvest schedules and may produce a higher quantity and quality of forage.

When nutrients or other soil amendments are applied, plan and apply Nutrient Management (590) to avoid an excess or improper balance of plant nutrients, which can cause toxicity in some animals.

Produce stored forages of the quality needed for optimum livestock performance. Feeding legume forages that are too low in fiber can lead to metabolic disorders in ruminants and an economic loss to the producer. Consider analyzing harvested forages for feed quality. Plan and apply Feed Management (592), to balance feed rations with animal requirements.

Direct cut grass and legume silage can create silage leachate (seepage) in storage. Consider use of practice standards Runoff Management System (570) and Waste Storage Facility (313).

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

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

Consider delaying harvest if forecast prolonged or heavy precipitation can decrease forage quality.

In regions where rainfall and/or humidity levels can cause unacceptable forage quality losses, consider green chopping or ensiling the forage to reduce or eliminate field-drying time. Other options include the use of desiccants, preservatives or macerating implements to reduce field-drying time.

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

Consider Harvesting Forages in the afternoon to optimize water-soluble carbohydrates and nutritional quality.

Avoid harvesting forage when soil moisture conditions are such that soil compaction becomes detrimental to plant and soil health.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the Criteria and Operation and Maintenance sections of this Standard.

Specifications shall describe the requirements for applying this practice to meet the intended purpose.

Record practice specifications on the Colorado Forage Harvest Management 511, Conservation Practice Job Sheet.

Specifications shall include the following, as a minimum.

- Stated purpose for planning and application of the practice
- Forage species to be harvested

For each dominant forage species harvested include:

- Method of harvest
- Stage of maturity
- Optimal harvest moisture content
- Length of cut
- Stubble height to be left
- Harvest interval including late harvest if applicable
- Contaminant avoidance recommendations

OPERATION AND MAINTENANCE

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

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

To control forage plant diseases, insects and movement of weeds, clean harvesting equipment after harvest and before storing.

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

Follow equipment manufacturers' safety recommendations when operating forage- harvesting equipment.

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

Dispose of the plastic wrap or bags used to store forage in an environmentally sound manner.

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