

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FORAGE HARVEST MANAGEMENT

(Ac.)

CODE 511

DEFINITION

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

PURPOSE

- Optimize yield and quality 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

According to Attachment III of the State Level Agreement between the Maine Historic Preservation Commission and NRCS, this practice is an undertaking which is exempt from cultural resource reviews with the SHPO in Maine. Complete the necessary portions of the ME-CR-1 worksheet.

Forage will be harvested at a frequency and height that will maintain a desired healthy plant community. State Cooperative Extension Service (CES) forage harvest

recommendations based on state of maturity, moisture content, length of cut, stubble height and harvest interval should be used to meet the following criteria (see **Table 1**).

Stage of Maturity. Harvest forage at the stage of maturity that provides the desired quality and quantity and stand persistence.

Delay harvest if prolonged or heavy precipitation is forecast that would seriously damage cut forage.

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

When foliar diseases or insect infestations lower forage quality below what is needed for feed for the intended livestock, before proper harvest stage or maturity is reached, then harvest earlier before excess leaf loss.

When managing for multiple use objectives other than usage as livestock feed only, harvesting at a later date is acceptable. Feed later harvested forage to livestock class and type with lower nutritional needs and balance the feed ration.

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

State Cooperative Extension Service recommendations for optimum moisture content and levels as well as methods and techniques to monitor and/or determine moisture content and levels will be used.

Treat direct cut hay crop silage (moisture content > 70%) with chemical preservatives or add dry feed stuffs to avoid fermentation and

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service. Contact Paul Hughes, NRCS Agronomist at 207-990-9562 or email concerns to paul.hughes@me.usda.gov.

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seepage losses of digestible dry matter.

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

To preserve dry hay forage quality/quantity:

- bale (small rectangular bales) field cured hay at 15 to 20 percent moisture,
- bale (large round bales) field cured hay at 12 to 18 percent moisture,
- bale (small bales only) force air dried hay at 20 to 35 percent moisture.

Harvest ensilage at optimum levels to preserve forage quality and quantity. Approximate optimum moisture should be as follows:

- Top unload upright (tower), bunker and horizontal bag silos, baleage – 60 to 68 percent moisture.
- Bottom unload upright silos – 45 to 55 percent moisture.
- All corn silage regardless of storage structure – 63 to 68 percent moisture.

Critical components for any silage system (to avoid toxic organisms and chemicals) are to ensure air tight forage containment and proper moisture content.

Making baleage has resulted in varied success because it requires high levels of moisture management. Moisture content and the quality of the air tight bale containment are critical.

Length of Cut. When harvested for ensilage forage will be chopped 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.

Contaminants. Forage shall not contain contaminants that can cause illness or death to the animal being fed or rejection of the offered forage.

Contaminants are any objectionable matter or toxin that can cause illness, death or rejection of the offered forage i.e. poisonous plants, hardware (wire), alkaloid or endophyte

containing forages and drought stressed or frosted hydrocyanogenic forages.

When green chopping summer annual grasses containing hydrocyanic acid (HCN), such as sorghum-sudangrass hybrids, delay harvest until grass is greater than 18 inches tall. Test these forages for HCN if stressed by drought or frost prior to green chopping. When Birdsfoot Trefoil and White Clover are stressed, they should be tested before green chopping as well. When forages to be ensiled exhibit high levels of nitrates (>2500 ppm), delay feeding of ensilage for at least six weeks.

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

Stage of Maturity and Harvest Interval. 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 (see **Table 1**).

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, management will be applied in a manner that encourages the continued health and vigor of the stand (i.e. not harvesting the last cutting due to drought stress if plants have not reached their over-wintering heights).

Do not harvest alfalfa for at least 30-45 days prior to the mean killing frost date.

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 (see **Table 1**).

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

Additional Criteria for Use as a Nutrient Uptake Tool

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

Forages may be planned for harvest that are known to have high uptake rate of soil nutrients, such as sorghum-sudangrass taking up large amounts of nitrogen, phosphorus, and potassium from the former grazing sacrifice paddock areas.

Test for K levels in forages harvested from fields testing high in soil K. Do not feed high K forages to livestock susceptible to nutrient imbalances, such as dry ruminants. This may lead to milk fever or other serious illnesses.

When producing forages on high fertility/sludge program, test soils for heavy metals and test forages for same if soil tests indicate levels exceeding EPA and/or state limitations.

Additional Criteria to Control Disease, Insect, Weed and Invasive Plant 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 specified days to harvest period stated on the pesticide label. Evaluate pest management options by planning conservation practice standard Pest Management (595).

Lessen incidence of disease, insect damage, and weed infestation by managing for desirable plant vigor. This can be done through proper cutting and harvest schedules, maintaining a comprehensive nutrient management plan and focusing on soil health.

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) then appropriate harvest schedule(s), cover patterns, and plant height to provide suitable habitat for the desired specie(s) should be maintained.

If wildlife is a major goal of the land manager, avoid harvesting until mid-late July to protect nesting birds.

CONSIDERATIONS

When pastures produce forage in excess of livestock demand during high growth rate periods, consider preserving forage quality by machine harvesting a portion of the standing crop. Coordinate this practice with the current Maine NRCS practice standard for Prescribed Grazing (528).

When nutrients or other soil amendments are applied, coordinate this practice with the current Maine NRCS conservation practice standard for Nutrient Management (590) or Waste Utilization (633) 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. Do not cut forages until 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. Also 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 site-specific 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.

The following shall be considered:

1. Plan Maps - Outline the area on the conservation plan maps or separate maps.
2. Soil Maps – Outline the area on the conservation plan soil maps or on separate maps.
3. Acres planned to be harvested.
4. Storage method planned.
5. Operation and Maintenance Plan.

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.

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.

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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 handle the acreage normally harvested in a timely and economically feasible manner.

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 re-cutters 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:

Griffin Tim, . [Alfalfa Winterkill and forage Options](#). 1992. University of Maine Cooperative Extension Fact Sheet. Orono, ME.

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Pitt, R. E. [Silage and Hay Preservation](#). 1990. Northeast Regional Agricultural Engineering Service, Cornell Cooperative Extension. NRAES - 5. Ithaca, NY.

USDA NRCS GLCI-PA. [Haylage](#). 2000. East Region Technology Web Page.

Table 1. Stage of Growth and Minimum Cutting Height for Harvest

Species	Harvest Period	Growth Stage	Minimum Height after cutting
Orchardgrass	First	Boot to early head stage	2-3"
	Second	After 8-10" recovery growth	2-3"
Smooth Bromegrass	First	Full head	2-3"
	Second	When basal sprouts appear at soil surface	2-3"
Timothy and Reed Canarygrass (low alkaloid varieties)	First	Late boot to early head	2-3"
	Second	When basal sprouts appear at soil surface	2-3"
Alfalfa	First, Second, and Third	Full bud, ¼ bloom or after a 5-6 week recovery period	1-2"
Birdsfoot Trefoil (Upright Type)	First	¼ bloom	2-3"
	Second	¼ bloom or after a 6-8 week recovery period	2-3"
Birdsfoot Trefoil (Prostrate Type)	All	Same as upright type	1-2"
Ladino Clover	First and Second	¼ to ½ bloom or 8-10" high	2"
Red and Alsike Clover	First	¼ to ½ bloom	2"
	Second	¼ bloom	2"