

**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
- 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 recommendations for forage harvest based on stage of maturity, moisture content, length of cut, stubble height and harvest interval. (See Table 1) 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.

Cooperative Extension recommendations must be followed for 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 providing adequate drying and wilting in field. When drying time or conditions has not been adequate, add dry feedstuffs or treat with chemical preservatives to reduce losses.

For optimal dry hay quality, forage must be dried as rapidly as possible. To improve drying conditions and minimize field losses, mow in wide swaths, ted at moisture levels below 40%, and rake hay at 30 to 40 percent moisture.

To preserve forage quality and quantity, bale field cured hay at 15 – 20 percent moisture (12-15% for round bales) and bale force air-dried hay and hay that will receive propionic based preservatives at 20 – 25 percent moisture.

Harvest all corn silage, regardless of storage structure at 63 to 68 percent moisture.

**Length of Cut.** When harvested for silage that will be stored in upright or bunker silos, forage should be chopped to a size appropriate for type of storage structure used and optimal effective fiber for the animal. The length of chop selected will allow adequate packing to produce the anaerobic conditions necessary to ensure the proper ensiling process. Generally, a “theoretical cut length” of

3/8- 3/4 inch is the ideal for both proper ensiling and animal health.

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 Extension recommendations for proper stubble heights to avoid winterkill of forage species in cold climates.

**Contaminants.** Forage should not contain contaminants that can cause illness or death to the animal being fed or rejection of the offered forage. Check Extension contaminant notices, cautions, and recommendations for the specific harvest site location and area (for example, warnings about ergot poisoning in grass forage crops during wet years.)

**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.

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

Where annuals are utilized, 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.

**Additional Criteria for Use as a Nutrient Uptake Tool**

Employ a harvest regime that utilizes the maximum amount of available or targeted nutrients. Using this practice for this purpose

may require more frequent harvests to increase uptake rather than managing for stand longevity.

**Additional Criteria to Control Disease, Insect, Weed and Invasive Plant Infestations**

Follow Extension guidelines when available for control of disease, insect, weed and invasive plant infestations to forage.

Schedule harvest periods to control disease, insect, and weed infestations. When a pesticide is used to control disease, insects or weed infestations, adhere to the specified days to harvest period stated on the pesticide label. Evaluate pest management options by planning conservation practice standard Integrated Pest Management (595) and/or Herbaceous Weed Control (315) for all forage areas to be harvested.

Lessen incidence of disease, insect damage, and weed infestation by managing harvests to maintain a full, vigorous, dense forage stand.

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

**Additional Criteria to Improve Wildlife Habitat Values**

If client objectives include providing suitable habitat for desired wildlife species(s) then appropriate harvest schedule(s), cover patterns, and minimum plant heights to provide suitable habitat for the desired specie(s) should be implemented and maintained.

Time harvests to benefit the desired wildlife species by following state guidelines.

Coordinate this practice with conservation practice standard Upland Wildlife Habitat Management (645) and accompanying job sheets.

**CONSIDERATIONS**

Where applicable coordinate this practice with NRCS practice standard Prescribed Grazing (528).

When nutrients or other soil amendments are applied, coordinate forage harvests with NRCS practice standard Nutrient Management (590) and/or Waste Utilization (633) as appropriate. An excess or improper balance of nutrients

such as nitrogen can produce plant material that causes toxicity or metabolic problems in some animals.

Produce stored forages of the quality needed for optimum performance of the animal being fed. Legume forages too low in fiber can lead to metabolic disorders in ruminants and an economic loss to the producer due to lowered animal performance. Analyze harvested forages for feed quality.

Direct cut grass and legume silage can create silage leachate (seepage) in storage. Consider use of practice standards Waste Treatment (629).

In conjunction with harvest options, consider storage and feeding options that will retain acceptable forage quality and minimize digestible dry matter loss. Silo management is an important factor in feed quality.

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 making silage.

Consider delaying harvest if prolonged or heavy precipitation is forecast that would reduce 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.

Plans and Specifications must include as minimum for the forage harvest operations:

1. Goals, objectives, specific purpose (such as high forage quantity and quality or nutrient uptake, etc.)
2. Forage species to be harvested

By each dominant forage species harvested show:

3. Method of harvest
4. Stage of maturity
5. Optimal harvest moisture content
6. Length of cut for silage
7. Stubble height to be left
8. Harvest interval including late harvest if applicable
9. Contaminant avoidance recommendations.

These plans and specifications shall be available through appropriate job sheets and other materials 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, 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 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.

Follow all agricultural equipment manufacturers' safety measures 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.

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

<b>Species</b>	<b>Harvest Period</b>	<b>Growth Stage</b>	<b>Minimum Height after cutting</b>
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"

**REFERENCES:**

Penn State Agronomy Guide, Section 8 –  
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**\*Determining Forage Moisture**

**Concentration**, Virginia Cooperative

Extension: <http://pubs.ext.vt.edu/442/442-106/442-106.html>

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Dakota State University:

<http://www.ag.ndsu.edu/pubs/ansci/dairy/as1252w.htm>

Corn silage Production and Management,  
Penn State University:

<http://cropsoil.psu.edu/extension/facts/agronomy-facts-18>

Large Round Bale Silage, Penn State  
University:

<http://cropsoil.psu.edu/extension/facts/agronomy-facts-9>

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