

**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

- Manage forage for the desired quality and quantity
- Promote vigorous plant re-growth
- Improve or maintain plant vigor and stand life for the desired time period
- 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
- Harvest biomass for energy production

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 Illinois Agronomy Handbook 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. Refer to Table 1 in the Illinois 511 Job Sheet for stage of harvest recommendations.

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

Structure Type	Haylage (% moisture)	Silage (% moisture)
Upright or tower-conventional	60-65	63-68
Upright or Tower-oxygen limiting	40-55	55-60
Bunker or horizontal	65-70	65-70
Bag silo (plastic tube)	50-60	65-70
Balage (plastic wrapped round bales)	50-60	

Treat direct cut hay crop silage (moisture content >70%) with chemical preservatives or add dry feedstuffs to avoid fermentation and seepage losses of digestible dry matter.

For optimal dry hay quality and to avoid leaf loss, rake hay at 30-40% moisture and ted or invert swaths when moisture is above 40%.

To preserve forage quality and quantity; bale field cured hay at 15–20% moisture. Small square bales should be baled at 18-20% moisture, medium square bales at 16%, large square bales (1 ton bale) at 14% moisture, and large round bales at 16-18% moisture.

Length of Cut. When harvested for ensilage

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

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forage will be chopped to a size appropriate for type of storage structure used. 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 un-severed stem bases that store food reserves needed for full, vigorous recovery. Refer to Table 1 in the Illinois 511 Job Sheet for minimum stubble height recommendations.

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

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.

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, harvests will be adjusted in a manner that encourages the continued health and vigor of the stand.

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. Using this practice for this purpose

may require more frequent harvests to increase uptake instead of managing for stand longevity.

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

Follow University of Illinois guidelines and the Forage Field Guide from Purdue Extension, Purdue University 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 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) for all forage areas to be harvested.

Lessen incidence of disease, insect damage, and weed infestation by managing harvests to maintain plant vigor. Plan and schedule removal of invasive plants and noxious weeds.

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.

Harvest forage, in a manner than allows wildlife to flush and escape.

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

Additional Criteria for Biomass Harvest for Energy Production

Cutting height: Harvest biomass crops at a height that will retain sufficient carbohydrate and nutrient reserves to ensure adequate stand survival and regrowth. For native warm season grasses the minimum stubble height

should be consistent with guidelines in Table 1 of the 511 Job Sheet.

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 NRCS practice standard Prescribed Grazing (528).

Well-fertilized plants withstand more intense harvest schedules and typically produce a higher quantity and quality of forage. When nutrients or other soil amendments are applied coordinate forage harvests with NRCS practice standard Nutrient Management (590) as appropriate. An excess or improper balance of nutrients such as nitrogen can produce plant material that causes toxicity in some animals.

Reseeding or Interseeding may be necessary to re-establish, maintain or improve the stand. Select cultivars that are suitable for the harvest regime, species mix, and forage quality desired. See conservation practice standard Forage and Biomass Planting (Practice Code 512).

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

Consider testing harvested forages for feed quality. 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.

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 (i.e. covered vs. uncovered, placement away from hedgerows or trees, placement of feed in dry locations during winter/mud conditions, etc.).

Consider harvesting forages in the afternoon to optimize water soluble carbohydrates and nutritional 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 ensiling.

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

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, or macerating implements to reduce field-drying time.

Consider timely removal of bales from fields to avoid smothering of the re-growing crop.

To reduce safety hazards, avoid operating harvesting and hauling equipment on field slopes over 25 percent, particularly on cross slope traffic patterns. Extreme caution should be exercised when ejecting large round bales on steeper slopes as they can roll and cause damage to structures and equipment or cause physical injury.

Consider delaying harvest, leaving field edges, corners or odd areas un-harvested to provide critical nesting and brood rearing habitat for a variety of wildlife.

PLANS AND SPECIFICATIONS

Place detailed specifications in the site-specific 511 job sheet for applying the practice to achieve the intended purpose.

Plans and specifications must include the following minimum items for the forage harvest operations:

1. Identify the specific purpose(s) (such as high forage quantity and quality or nutrient uptake, etc.) for applying the practice.
2. Forage species to be harvested
3. Method of harvest
4. Stage of maturity
5. Optimal harvest moisture content

6. Stubble height to be left
7. Harvest interval including late harvest if applicable
8. Contaminant avoidance recommendations.
9. Length of cut when ensiling.
10. Wildlife species and recommendations if managing for wildlife.

OPERATION AND MAINTENANCE

Before forage harvest, clear fields of debris that could damage machinery or if ingested by livestock, lead to sickness 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 consider cleaning harvesting equipment after each 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 harvest 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.

Control silage/haylage leachate from running into water sources.

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