

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FORAGE HARVEST MANAGEMENT

(Acre)
CODE 511

DEFINITION

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

PURPOSES

- Optimize the economic yield of forage at the desired quality and quantity
- Promote vigorous plant regrowth
- Maintain stand life for the desired time period
- Maintain desired species composition of the stand
- Use forage plant biomass as a 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 will maintain a desired healthy plant community through its life expectancy.

a. Stage of Maturity

Harvest forage at the stage of maturity that provides the desired quality and quantity. Refer to Table 1, Recommended Stages to Harvest Various Hay Crops.

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.

b. Moisture Content

Harvest silage/haylage crops at the ideal moisture range for the type of storage structure(s) being utilized. Refer to Table 2, Moisture Content for Silage/Haylage Crops.

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

For optimal forage quality, rake, ted, or invert swaths, and bale when hay has sufficient moisture to prevent leaf loss.

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

- Bale field cured hay at 15 to 20 percent moisture.
- Rake hay at 30 to 40 percent moisture.
- Ted or invert swaths when moisture is above 40 percent.

c. Length of cut

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

When harvested for ensilage, forage will be chopped to a size that allows adequate packing to produce the anaerobic conditions necessary to ensure the proper ensiling process. Silage should be chopped to a length of 0.5 to 1.5 inches.

d. Contaminants

Forage shall not contain contaminants at levels injurious to the health of the livestock class and type being fed.

Contaminants are any objectionable matter or toxin that can cause 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 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. Refer to Table 1, Recommended Stages to Harvest Various Hay Crops and Table 3, Management to Maintain Stand Life, Plant Vigor, and Forage Species Mix

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, apply management in a manner that ensures continued health and vigor of stand.

b. 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. Refer to Table 4, Stubble Heights of Various Hay Crops.

Manipulate timing and cutting heights of base grass harvest to ensure germination and establishment of reseeding or overseeded annuals. Base grasses should be grazed, mowed, or hayed to approximately 1-2 inches on sod-forming grasses

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and 3-4 inches on bunch type grasses to allow adequate sunlight to reach the ground for germination of the annuals.

Additional criteria to use as a nutrient uptake tool

Employ a harvest regime that utilizes the maximum amount of available or targeted nutrients. Refer to Agricultural Waste Management Field Handbook, Section 651.0606, Nutrient Removal by Harvesting of Crops.

Additional criteria to control disease, insect, and weed infestations

If a foliar disease, insects, or weeds threaten stand survival or production objective, schedule harvest periods as needed to control disease, insect, and weed infestations.

Lessen incidence of disease, insect damage, and weed infestation by managing for desirable plant vigor.

Additional criteria to improve wildlife habitat values

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

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 Prescribed Grazing (528A).

Well-fertilized plants withstand more intense harvest schedules and may produce a higher quantity and quality of forage. Coordinate this practice with Nutrient Management (590).

Select cultivars that are suitable for the harvest regime, species mix, and forage quality desired. For specific nutrient uptake, select species that can maximize uptake. See Pasture and Hay Planting (512) and Nutrient Management (590).

When insect and disease outbreaks exceed economic thresholds and are uncontrollable by harvest management, pesticide applications may be needed. Another option is to select a resistant

cultivar when the stand is replaced. See Pest Management (595) and/or Texas Agricultural Extension Service publication Integrated Pest Management Guide for Texas Forage Crops (B-1401).

When weed infestation exceeds the economic threshold and is uncontrollable by forage harvest management alone, weed management should be planned and applied. See Pest Management (595).

Coordinate herbicide applications with harvest schedules to allow no adverse effects to livestock from herbicide residue in sprayed forages being fed. Consult herbicide labels for restrictions for harvest or livestock feeding.

Take care not to produce stored forages whose quality is not that needed for optimum performance of the animal being fed. For instance, immature legume forages can be too low in fiber and may 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.

In regions where rainfall and/or humidity levels cause unacceptable forage quality losses in at least one harvest during the year, consider 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, greenchopping, or grazing. These techniques can improve the timeliness of harvest and preserve forage quality.

To reduce safety hazard, 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. As a minimum, the plan should contain stage of maturity at harvest and/or harvest interval, stubble height, appropriate moisture content, and management to maintain stand life and vigor as appropriate.

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.

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.

To control forage plant diseases, insects, and weeds, clean harvesting equipment after harvest and before storing. Do not cut forages until dew, rain, or irrigation water on leaves has evaporated.

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

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Table 1. Recommended Stages to Harvest Various Hay Crops

Plant Species	Time of Harvest
Alfalfa	Bud stage for first cutting, one-tenth bloom for second and later cuttings. For spring seedings, allow the first cutting to reach mid-to full bloom.
Arrowleaf, Ball, Berseem, Crimson, Red Clover	Early Bloom or if with a companion grass, cut at correct stage for the companion grass
Ladino or White Clover	Cut at correct stage for companion grass
Sericea Lespedeza	Height of 15 to 18 inches
Soybean	Mid-to full bloom and before bottom leaves begin to fall
Oats, Barley, Wheat	Boot to early head stage
Sudangrass, sorghum-sudan hybrids, millet	At preboot stage (about 30 to 40 inches tall)
Bahiagrass	At 4 week intervals
Hybrid Bermudagrass	15 to 18-inch height for first cutting, thereafter every 4 to 5 weeks or when 12 - 15 inches tall
Orchard grass, Tall Fescue, Tall Wheatgrass	Boot to early head stage for first cut, subsequent cuts at 4 to 6 week intervals.
Bluestems, Kleingrass, and Tall Bunchgrasses	At boot stage or pre-boot

Table 2. Moisture Content for Silage/Haylage Crops

Crop	Mositure Percent Range
Green chop	70-85%
Silage	60-70%
Haylage	40-60%

Table 3. Management to Maintain Stand Life, Plant Vigor, and Forage Species Mix

Plant Species	Management Technique
Alfalfa	Allow 4-6 weeks between last harvest and first killing frost
Sericea Lespedeza	Cut no later than mid-August to build carbohydrate reserves; with good moisture conditions, can cut again in mid-October
Orchard grass, Tall Fescue, Tall Wheatgrass	Do not cut from mid-June to October
Bluestems , Kleingrass, and Tall Bunchgrasses	Allow 30-45 days between last harvest and first killing frost
Native Prairie	Generally cut only one time per year, preferably July 15 - Aug 1. Alternate with June cutting if cool-season grasses begin to dominate plant composition.

Table 4. Stubble Heights of Various Hay Crops

Plant Species	Recommended Stubble Height
Legumes:	
Alfalfa	3.0 - 6.0 inches
Clovers: Arrowleaf, Berseem, Crimson, Ladino, Red, White	Cut at correct stubble height for companion grass
Sericea Lespedeza	3.0 - 5.0 inches
Grasses:	
Bahiagrass, Common Bermudagrass, Dallisgrass	2.5 - 4.0 inches
Hybrid Bermudagrass	3.0 - 8.0 inches
Tall Fescue	4.0 - 5.0 inches
Bluestems: Caucasion, Plains, WW Spar, WW Ironmaster, WW B. Dahl, K.R., O.W. T-587; Kleingrass 75, Lovegrass: Weeping, Common, Ermelo, Wilman; Tall Wheatgrass	4.0 - 6.0 inches
Bluestems: Sand, Big; Indiangrass, Switchgrass, Eastern Gamagrass	6.0 - 8.0 inches
Johnsongrass, Sudangrass, Sorghum- Sudan hybrids, Millet	6.0 - 10.0 inches

