

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 Alabama Cooperative Extension System (ACES) recommendations for forage harvest based on stage of maturity, moisture content, length of cut, stubble height and harvest interval (see <http://www.aces.edu/pubs/docs/indexes/anrag.php#forages> and the book "Southern Forages" as noted in the references.)

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 and Table 2 for stage to harvest for acceptable quality and yield.

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

ACES 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 treatment with chemical preservatives or add dry feedstuffs.

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

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

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 ACES recommendations for proper stubble heights to avoid winterkill of forage species in cold climates. Table 1 contains minimum cutting heights for forages commonly grown in Alabama. Manipulate timing and cutting heights of forage to ensure germination and establishment of reseeding or seeded annuals.

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

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. Follow ACES recommendations in these cases.

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

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 forages, use mechanical or chemical conditioners and/or ensile.

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 CES 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 weeds, adhere to the specified days to harvest period stated on the pesticide label. When herbicides are used, follow Alabama NRCS conservation practice standards, Brush Management – Code 314 or Herbaceous Weed Control – Code 315. Evaluate pest management hazards to the environment using the Pest Management Worksheet and implement appropriate mitigations and practices to offset negative impacts or change to acceptable pesticides. Also plan and schedule removal of invasive plants and noxious weeds.

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 specie(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 Alabama NRCS conservation practice standard, Upland Wildlife Habitat Management – Code 645 and accompanying job sheets.

CONSIDERATIONS

When pastures produce forage in excess of livestock demand, consider coordinating this practice along with Alabama NRCS conservation practice standard, Prescribed Grazing – Code 528.

Consider implementing Alabama conservation practice standard, Integrated Pest Management – Code 595, to control unwanted pests.

When nutrients or other soil amendments are applied coordinate forage harvests with Alabama NRCS conservation practice standards, Nutrient Management - 590 and/or Waste Utilization – Code 633 as appropriate. An excess or improper balance of nutrients such as nitrogen can produce plant material that causes toxicity 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. Consider analyzing harvested forages for feed quality.

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

In warm season grasses, consider grazing the last cutting of hay instead of mechanically harvesting it. Grazing should be done shortly after a killing frost.

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 a 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:

1. Method of harvest
2. Stage of maturity
3. Optimal harvest moisture content
4. Length of cut
5. Stubble height to be left
6. Harvest interval including late harvest if applicable
7. 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.

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.

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.

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Table 1. Hay Harvesting Guide			
SPECIES	HARVEST	STAGE TO HARVEST FOR ACCEPTABLE QUALITY & YIELD	MINIMUM CUTTING HEIGHT (inches)
Alfalfa	1st cutting	Full bud	3
	Other cuttings	1/10 bloom	3
Arrowleaf Clover	Only one cutting	Early bloom	2
Bahia grass	1st cutting	Boot to bloom	2
	Other cuttings	Every 4 - 5 weeks or when 12 inches high	2
Bermudagrass, Hybrid	1st cutting	15 to 18 inches height	2
	Other cuttings	Every 4 to 5 weeks or when regrowth is 15 inches high	2
Dallisgrass	Usually only one cutting	Boot to Bloom	3
Eastern Gamagrass*	All cuttings	Boot to early head	8
Fescue, Tall	1st cutting	Boot to early head	3
	Other cuttings	Every 4 - 6 weeks or when regrowth is 10 inches high	3
Perennial peanut	All Cuttings	Early to mid-Bloom Repeat every 4 – 6 weeks Two to three cuttings per year	4
Ryegrass	Usually one cutting	Boot to early head	2
Small Grains	Only one cutting	Boot to early head	2
Sericea*	All cuttings	15 to 18 inches high	4
Sudangrass & Sorghum Sudan Hybrids	All cuttings	Height of 30 to 40 inches	6
Switchgrass*	All cuttings	Boot	8

*The last cutting should be early enough to allow for regrowth to build-up carbohydrates in the root systems before frost. After frost, the regrowth may be cut for hay or grazed.

Table 2. Green-Chop and Ensilage Harvesting Guide*		
SPECIES	HARVEST	STAGE TO HARVEST FOR ACCEPTABLE QUALITY & YIELD
Alfalfa	1st cutting	Bud to early bloom
	Other cuttings	1/10 bloom
Bermudagrass, Hybrid	1st cutting	15 inches height
	Other cuttings	Every 4-6 week or when regrowth is 15 inches high
Cool season grasses	1st cutting	Boot to early head
Orchardgrass & tall fescue	After first cutting	Every 4 - 6 weeks or when regrowth is at least 10 inches
Corn	One cutting	Full dent stage
Eastern Gamagrass**	All cuttings	Boot to early head
Johnsongrass**	All cuttings	Boot
Millet, Pearl	All cuttings	30 to 40 inches
Ryegrass	One cutting usually	Boot to early head
Small Grains	One cutting	Boot to early head
Sorghum, grain	One cutting usually	Milk to dough, before leaf blade begin to die
Sorghum, forage	All cuttings	40 inches to late boot
Sorghum, sweet	One cutting	Milk to dough, before leaf blades begin to die
Sorghum-Sudan hybrids	All cuttings	40 inches to boot, whichever come first
Soybeans	One cutting	Late bloom - seed forming in pods & before leaves began to drop.

*For perennial crops and annual crops that will be harvested by more than one cutting refer to the minimum cutting height in Table 1.

**The last cutting should be early enough to allow for regrowth to build-up carbohydrates in the root systems before frost. After frost, the regrowth may be cut for hay or grazed.