Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

FORAGE HARVEST MANAGEMENT

CODE 511

(ac)

DEFINITION

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

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Optimize quantity and quality of forage at the desired levels while promoting vigorous plant regrowth
- Manage the species composition to enhance desirable species
- Reduce excess soil nutrients
- Reduce pest pressure (insects, disease, weeds, invasive plants or plant toxins)
- Improve or protect wildlife and their habitat
- Optimize soil microbial life and aggregate stability
- Reduce soil compaction

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where forage is machine harvested.

CRITERIA

General Criteria Applicable to All Purposes

Harvest forage at a frequency and height that optimizes the desired forage stand, plant community, and stand life. Follow State cooperative extension service (CES) recommendations, when available, for forage harvest based on stage of maturity, moisture content, stubble height, length of cut, and harvest interval.

Stage of maturity

Plan forage harvest at the stage of maturity that provides the desired quality and quantity without compromising plant vigor and stand longevity.

Moisture content

Plan silage/haylage crop harvest within the optimum moisture range for the type of storage method(s) or structure(s) being utilized.

Follow CES recommendations and methods to determine and monitor optimum moisture content of the harvested crop.

Use chemical preservatives or additional dry feedstuffs to avoid fermentation and seepage losses of direct cut hay or crop silage (70% moisture content). Where containment or treatment of leachate is an issue,

evaluations are to be made in accordance with NRCS Conservation Practice Standards (CPSs) Waste Storage Facility (Code 313), Vegetated Treatment Area (Code 635), and/or Filter Strip (Code 393).

Remove harvested forage from the field within a feasible time to not jeopardize regrowth.

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 axillary tillers or buds; insulation from extreme heat or cold; and/or unsevered stem bases that store food reserves needed for full, vigorous recovery. Allow for proper regrowth after last harvest to avoid winterkill of forage species in cold climates.

Contaminants
Forage must not contain contaminants that can cause illness or death to the animal being fed or rejection of the offered forage. Contaminants could include, but are not limited to, prussic acid, nitrates, hardware (e.g., wire, etc.), and poisonous plants. Consult CES notices and cautions during extreme weather events or conditions, such as drought, that may cause the forage to accumulate nitrates, prussic acid, or other plant toxins. Follow specific recommendations for the event or conditions.

Length of cut
When harvested for ensilage, chop forage to a size appropriate for type of storage method used and optimal effective fiber.

A shorter chop length on very dry silage may help to ensure good packing and adequate silage density.

Additional Criteria to Manage the Species Composition to Enhance Desirable Species

To maintain desired stand density of reseeding annuals, harvest at a stage of maturity and frequency that ensures the production of ample viable seed or carryover of hard seed.

Harvest at optimal timing and height for the desired species.

Refer to NRCS CPS Pasture and Hay Planting (Code 512) for the desired species composition at planting.

Base frequency of harvest on the physiological conditions and regrowth of the desired species.

Additional Criteria to Reduce Excess Soil Nutrients

Employ a species and harvest schedule that removes and exports the maximum amount of targeted nutrients. Using this practice for this purpose may require more frequent harvests to increase uptake instead of managing for stand longevity. Refer to NRCS CPS Pasture and Hay Planting (Code 512) to select the best species for this purpose.

When forage harvests are managed to remove excess nitrogen or potassium from the soil, test the harvested material for levels of nitrate or potassium for possible danger to livestock. Divert the harvested material to nonfeed uses if toxicity is verified.

Additional Criteria to Reduce Pest Pressure (insects, disease, weeds, invasive plants, or plant toxins)

Follow CES guidelines when available for control of insect, disease, weed, invasive plant infestations, or plant toxins in forage.

Schedule harvest periods to aid in the control of insect, disease, weed, and invasive plant infestations and plant toxins in forage. Plan and schedule removal of invasive plants and noxious weeds. When a pesticide is used to control insects, disease, weeds, or invasive plants adhere to the specified days to harvest period stated on the pesticide label. When unwanted pests are found in the forage stand, evaluate pest

management options by planning NRCS CPS Pest Management Conservation System (Code 595) for all forage areas to be harvested.

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

Mitigate impacts to pollinators when using peticides.

Refer to NRCS CPSs Herbaceous Weed Treatment (Code 315) and Brush Management (Code 314) for controlling unwanted plants in the stand.

Additional Criteria to Improve or Protect Wildlife and Their Habitat

When client objectives include providing suitable habitat for desired wildlife species, implement and maintain appropriate harvest schedule(s), refuge or escape areas, and minimum plant heights to provide suitable habitat for the desired species. Obtaining guidance from a wildlife biologist could improve wildlife habitat.

To provide wildlife protection, utilize specialized harvest techniques such as flushing bars, nontrapping harvesting sequences, and harvesting during daylight. The timing of harvest should allow the potential for pollinator forage, habitat needs, and benefits.

Time and manage harvests to benefit the desired wildlife species by utilizing a State-developed Wildlife Habitat Evaluation Guide (WHEG) or habitat evaluation to improve or protect wildlife and their habitat.

When used for this purpose, coordinate this practice with NRCS CPS Upland Wildlife Habitat Management (Code 645).

Additional Criteria to Optimize Soil Microbial Life and Aggregate Stability

Cut forage plants at a height that will reduce recovery period, maintain cooler soil temperatures, and increase root growth. These cutting heights will provide adequate residual leaf area for vigorous recovery. Schedule harvests to ensure sufficient regrowth periods for all desired species in the forage stand.

Additional Criteria to Reduce Soil Compaction

Harvest when soil moisture conditions are dry enough to lessen the risk of soil compaction.

CONSIDERATIONS

When forage will also be grazed, coordinate this practice with NRCS CPS Prescribed Grazing (Code 528). Consider timing of grazing or mechanical harvest based on management goals and purpose.

When nutrients or other soil amendments are applied, coordinate forage harvests with NRCS CPS Nutrient Management (Code 590) and/or Waste Recycling (Code 633), as appropriate. An excess or improper balance of nutrients can produce plant material that causes toxicity in some animals.

Produce stored forages at 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. Coordinate this practice with NRCS CPS Feed Management (Code 592).

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 forecasted weather and climatic conditions prior to harvest that may result in potential reduction or loss of desired species.

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

Cut forages after dew, rain, or irrigation water on the leaves has evaporated, where appropriate, unless moisture is needed to reduce leaf loss.

Consider cutting forages in the afternoon to optimize water soluble carbohydrates and nutritional quality.

Consider all possible antiquality factors (e.g., ergovaline, alkaloids, nitrates, prussic acid, etc.) and how timing and conditions prior to harvest and storage method will influence forage quality and feed safety. For example, endophyte infected tall fescue dry hay typically has less ergovaline content than when ensiled, and drought or frost can increase nitrate or prussic acide content of some forages.

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 proper storage of harvested forage to maintain desired quality.

To enhance soil health, consider using a diverse mixture of deep-rooted and fibrous-rooted species, selected from multiple plant families including, but not limited to, grasses and legumes. Cut at a time of year when expected temperatures and rainfall are most favorable for regrowth of the greatest number of desired species. In hotter or drier regions, cut early in the year when weather is cooler. Not harvesting a field every year can protect forage vigor and diversity which enhances soil health.

PLANS AND SPECIFICATIONS

At a minimum, plans and specifications must include—

- Goals, objectives, and specific purposes (e.g., high forage quantity and quality, nutrient uptake, etc.).
- Forage species to be harvested.

For each dominant forage species harvested, show—

- Method of harvest.
- Stubble height to be left.
- Length of cut if ensiling forage.
- Stage of maturity.
- Optimal harvest moisture content.
- Harvest interval, including late harvest if applicable.
- Contaminant avoidance recommendations.

These plans and specifications will be available through implementation requirements, appropriate job sheets, and/or other information for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

Include the following items in an operation and maintenance plan:

- Before forage harvest, clear fields of debris that could damage machinery, or if ingested by livestock, lead to sickness (e.g., hardware disease) or death.
- Operate all forage harvesting equipment at the optimum settings and speeds to minimize loss of leaves.

- To control insects, diseases, and spread of weeds, clean equipment between fields as needed and before storing.
- Set shear-plate on forage chopper to the proper theoretical cut for the crop being harvested. Keep knives sharp. Do not use recutters or screens unless forage moisture levels fall below recommended levels for optimum chopping action.
- Follow all agricultural equipment manufacturer's 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 plastic wrap, bags, or string used to store forage in an environmentally sound manner or reuse if possible.

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