FORAGE HARVEST MANAGEMENT

Conservation Practice Jobsheet *511*

Natural Resources Conservation Service (NRCS) **April 2009**

Landowner _____

WHAT IS FORAGE HARVEST MANAGEMENT
Forage harvest management is the timely cutting and removal of forages from the field as hay, green-chop, or ensilage

PURPOSE
Forage harvest management may be applied as part of a conservation management system to accomplish one or more of the following objectives:

- 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

WHERE THE PRACTICE APPLIES
Forage harvest management is applicable on all land uses where machine harvested forage crops are grown.

GENERAL CRITERIA AND CONSIDERATIONS
Forage will be harvested at a frequency and height that will maintain a desired and healthy plant community through its life expectancy (Table 1)

Forage will be harvested at the stage of maturity that provides the desired quality and quantity of the plant material, while maintaining optimum regrowth conditions (Table 1)

Forage will be harvested at or as near to optimum moisture levels as possible to preserve forage quality and quantity. Do not cut forages until dew, rain, or irrigation water on the leaves has evaporated.

Harvest silage/haylage crops at the ideal moisture range for the type of storage structure(s) being utilized. 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
- Bale forced air dried hay at 20 to 35 percent moisture
- Rake hay at 30 to 40 percent moisture
- Ted or invert swaths when moisture is above 40 percent

Consider storage and feeding options that will retain acceptable forage quality and minimize digestible dry matter losses. The following are suggestions to minimize losses when feeding or storing hay:

- Store hay on gently sloping, well-drained sites
- Store hay in sunny areas, avoid areas with trees or other objects that are slow drying after rains
- Minimize loss during feeding by storing hay close to the areas where it will be fed
- The flat ends of bales should be butted together, but the rounded sides should not touch
- Preferable for bale rows to run north and south rather than east and west.

Fields maintained in forage crops shall be protected from soil erosion during harvest intervals

Forage harvesting removes nutrients from hayland fields. The Nutrient Management Practice (590) should be used to ensure fertility in the field or pasture is maintained. When used for nutrient uptake, a harvest regime will be employed that utilizes the maximum amount of available or targeted nutrients

Forage harvest management strategies shall consider wildlife populations within the harvest unit. Requirements of food, water, cover, nesting, and breeding habitats, and escape routes during mechanical harvest can be met during the application of this practice.

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

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 lead to metabolic disorders in ruminants and an economic loss to the producer due to lowered animal performance.

OPERATION AND MAINTENANCE

Before forage harvest, clear fields of debris that could damage machinery, or if ingested by livestock, lead to sickness 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

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.

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

Importance of proper forage harvesting height, rest period, and maturity stage at cutting. To help ensure plant survival and rapid regrowth, it is important to leave an adequate amount of leaf area on the plant after harvest. Harvesting forages below the recommended minimum cutting height will slow regrowth and increase the potential for weed encroachment. Continued harvest below the recommended level will reduce productivity and may result in die out of the stand. Another important component of Forage Harvest Management is the amount of time forage is allowed to regrow before it is harvested again. If this period is too short, the plant will not have enough time to restore carbohydrate reserves necessary for regrowth.

One of the most important producer-controlled factors influencing hay or silage quality is stage of maturity at harvest. Fertilization and weathe conditions at time of harvest also impact hay quality and quantity, while type of crop stored, moisture content, fertilization and length of chop are important factors affecting silage quality and quantity. Stage of maturity at harvest influences palatability, crude protein content and digestibility. Plants that are early in their growth cycle usually contain higher levels of crude protein. Delaying forage harvest past the recommended stage of maturity can result in high fiber content and low digestible energy. While quantity of harvested material may increase with delayed harvest, quality and resulting animal performance may decrease.

Table 1. Recommended Hay Harvesting Guide

SPECIES	MINIMUM HEIGHTS	RECOMMENDED STAGE TO HARVEST	AVERAGE RECOVERY PERIODS[1/]
Bermuda grass, common (*Cynodon dactylon)*	**2"**	**Boot to Flower**	**18-24 days**
Bermuda grass, hybrid *(Cynodon dactylon)*	**3"**	**15 to 18 inch height for first cutting and subsequent cutting every 4 to 5 weeks or when regrowth is15"**	**18-24 days**
Bahiagrass (*Paspalum notatum*)	**2"**	**Boot to bloom for first cutting; Subsequent cutting every 4 to 5 weeks or when regrowth is12"**	**20-26 days**
Dallisgrass (*Paspalum dilatatum)*	**2"**	**Boot to bloom (usually on one cutting)**	**18-24 days**
Johnsongrass *(Sorghum halepense)*	**6"**	**Boot (all cuttings)**	**21-30 days**
Carpetgrass *(Axonopus affinis.)*	**2"**	**Boot to Flower**	**18-24 days**
Tall Fescue (*Lolium arundinaceum)*	**3"**	**Boot to early headstage for 1st cut; aftermath cuts at 4 to 6 week intervals**	**21-30 days**
Sudangrass *(Sorghum bicolor)*	**6"**	**Height of 30" to 40 " (all cuttings)**	**21-30 days**
Ryegrass *(Lilium perenne.)*	**2"**	**Boot to early headstage (usually only one cutting)**	**14-21 days**
Millet, Pearl *(Pennisetum glaucum)*	**4"**	**Height of 30" to 40 " (all cuttings)**	**21-30 days**
Small Grains	**3"**	**Boot to early headstage (usually only one cutting)**	**14-25 days**
Big Bluestem (*Andropogon gerardii)*	**6"**	**Boot (all cuttings)**	**21-35 days**
Indiangrass *(Sorghastrum nutans)*	**6"**	**Boot (all cuttings)**	**21-35 days**
Switchgrass *(Panicum virgatum)*	**6"**	**Boot (all cuttings)**	**24-38 days**
Eastern Gamagrass *(Tripsacum dactyloides)*	**8"**	**Boot (all cuttings)**	**24-38 days**
Alyce Clover *(Alysicarpus vaginalis)*	**2"**	**Early Bloom**	**18-25 days**
Crimson Clover *(Trifolium incarnatum)*	**2"**	**Early Bloom**	**16-24 days**
Persian Clover *(Trifolium resupinatum)*	**2"**	**Cut at correct stage for companion grass**	**16-24 days**
Red Clover *(Trifolium pratense)*	**2"**	**Early Bloom**	**16-24 days**
Subterranean Clover *(Trifolium subterraneum)*	**2"**	**Early Bloom**	**14-21 days**
White Clover *(Trifolium repens)*	**2"**	**Cut at correct stage for companion grass**	**14-21 days**

[1/] Based on favorable growing conditions for the plant. Longer recovery periods will be needed during stress periods. Shorter recovery periods may be needed during fast growth conditions.

[2/] Do not hay tall fescue from May 15 to September 15. This plant is a cool season perennial and the persistence of this plant can be severely reduced by defoliation during this period.

FORAGE HARVEST MANAGEMENT – SPECIFICATIONS SHEET

Landowner/Cooperator _____

Field Office _____

Plan Number _____ **Location** _____

Purpose/Objective of the Practice (Check all that apply)		
	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	
	Other:	

Site Information - The fields planned for forage harvest management are indicated below (see Table 1 to complete columns D, E, and F)

(A) Field No.	(B) Field Acres	(C) Forage Species[1]	(D) Stage to Harvest	(E) Minimum Stubble Height (inches)	(F) Recovery or Rest Period[2] (days)

[1] Refers to the dominant species in the stand

[2] Approximate recovery periods is dependent on local weather conditions

Operation and Maintenance

- Before forage harvest, clear fields of debris that could damage machinery, or if ingested by livestock, lead to sickness 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
- 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 the loss of leaves
- Regardless of silage/haylage storage method, ensure good compaction and an airtight seal to exclude oxygen and mold formation

Additional Specifications and Notes

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Practice Design Certification (To be completed after jobsheet is complete and before practice installation)

By signing below, I certify that:

- the site specific requirements for the installation, operation, and maintenance of the practice on the client's treatment unit, as recorded in this jobsheet, have been prepared in accordance with the 511 Forage Harvest Management Practice Standard and the guidance in the 511 Forage Harvest Management Practice Specification

Signature _____ **Date** _____

Practice Installation Certification (To be completed after practice installation and check out)

By signing below, I certify that:

- The practice has been installed according to the site specific installation requirements

Signature _____ **Date** _____