

Forage Harvest Management

Iowa Job Sheet

Natural Resources Conservation Service (NRCS)
Des Moines, Iowa

Iowa Conservation Practice 511
August 2009

Definition

Forage Harvest Management is the management of grasses and legumes so when machine harvested and treated appropriately, they provide the quantity and quality to meet the objectives of the producer

Purpose

- » To obtain the quantity and quality of forage to meet the objectives of the producer and the nutritional needs of the animals.
- » To control insects, diseases, and weeds.
- » To manage for the desired species composition to promote vigorous plant re-growth.
- » To maintain or improve wildlife habitat.

General specifications

Harvest forage:

- » at a frequency and height that will maintain a desired and healthy plant community through its life expectancy.
- » at the stage and maturity that provides the desired quality and quantity of the plant material, while maintaining optimum re-growth conditions.
- » at optimum moisture levels to preserve forage quality and quantity.

Harvesting forage early improves quality, but may reduce stand life if done continually. Harvesting later lowers quality but increases yield, builds food reserves, allows basal buds to break dormancy and increases stand life. More frequent harvests tend to decrease overall yield, reduce plant vigor, and lead to progressive stand decline.

Stage of growth

The single most important producer controlled factor influencing hay or silage quality is stage of maturity at harvest. Additionally, fertilization and weather conditions at time of harvest dramatically 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.



When grasses and legumes are grown together, the legume stage of maturity is used to time the harvest, except in the case of birdsfoot trefoil, Ladino clover and white clover, which tend to maintain their quality because they are indeterminate in their growth habit.

Stage of maturity at harvest influences palatability, crude protein content, and digestibility. Forage plants tend to produce higher quality forage when harvested before they are mature. Plants early in their growth cycle usually contain higher levels of crude protein. Delaying forage harvest past the recommended stage of maturity can result in higher fiber content and low digestible energy. While quantity of harvested material may increase with delayed harvest, quality and resulting animal performance may decrease.

Not all livestock require the same quality of hay to meet their dietary needs. Hay is rated by its Relative Feed Value (RFV) – a higher value means higher quality. Table 1 on Page 3 shows the quality of feed needed by animals at various reproductive stages. A forage test is the most reliable method to determine forage quality and ensure livestock dietary needs are met.

Operation and Maintenance

Before forage harvest clear fields of debris that could damage machinery or be ingested by livestock, which could lead to sickness (i.e. hardware disease) or death.

Operate all forage harvesting equipment at the optimum settings and speeds to minimize loss of leaves.

Keep forage chopper knives well sharpened. Do not use re-cutters or screens unless forage moisture levels fall below recommended levels for optimum chopping action.

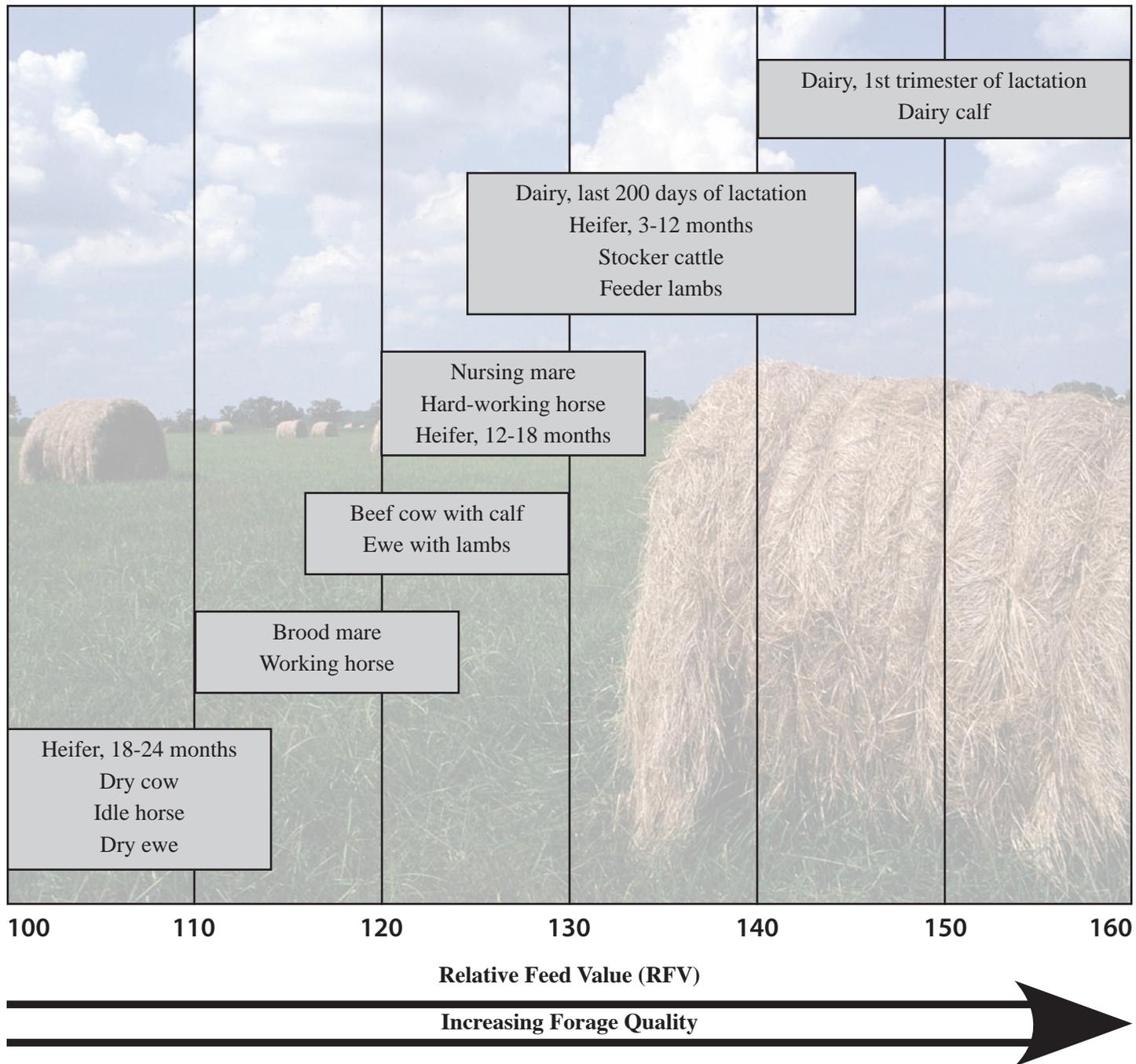
Regardless of silage/haylage storage method, ensure good compaction and an airtight seal to exclude oxygen and mold formation.

Growth Stage Descriptions for Grasses and Legumes:

Stage of Maturity	Definition
Legumes	
Late Vegetative	No visible buds, flowers or seed pods
Early bud	1% of stems have 1 visible flower bud
Mid bud	50% of the stems have at least one bud
Late bud	75% of the stems have at least one bud, no visible flowers
First bloom	Flowers on at least 1% of stems brown
Mature	Seed pods brown to black, can harvest as moisture permits
Grasses	
Vegetative	Leaves only, stems not elongated, no seed heads
Late vegetative	Stems not elongating
Boot	Seed bearing stem elongated, top of stem swollen
Heading	Flower head (seed heads) emerged or emerging, but not shedding pollen
Full bloom	Most seed heads emerged, peak pollen shed
Milk stage	All seed heads emerged, seed is forming but soft and immature
Dough stage	Seed becoming harder but dough like consistency
Mature	Seed ripe, ready for harvest, leaves green to yellow brown
Early bloom	10% of stems have at least one flower
Mid bloom	50% of the stems have at least one flower
Full bloom	75% of the stems have at least one flower, no visible seed pods
Early seed	Green seed pods visible on a few flowers
Late seed	Many green and brown seed pods apparent, some pods turning

Forage Quality Needs of Cattle, Sheep and Horses

Table 1.



Forage Harvesting Guidelines for Established Stands

Plant Species	Harvest Period	Growth Stage for Harvest	Average Number of Cuttings	Minimum Height at First Killing Frost
Legumes				
Alfalfa	1st cutting	Late bud to early bloom	3 - 5	The next to last cutting of legumes each season should be timed to allow at least 45 days of re-growth prior to the first anticipated killing frost. The final cutting of the season can be done just before or immediately after the first killing frost.
	2nd & successive cuttings	Early bloom		
Birdsfoot Tefoil	1st cutting	Early bloom	3	
	2nd cutting	Mid to late bloom		
Ladino Clover	All cuttings	Early to mid bloom	3	
Red or Alsike Clover	1st cutting	First to early bloom	3	
	2nd cutting	Late bud to early bloom		
Cool Season Grasses				
Orchardgrass, Fescue & other non-jointed grasses	1st cutting	Boot stage	2 - 3	5 - 6 inches
	Successive cuttings	After 8-10 inch recovery		
Smooth Brome, Timothy & other jointed grasses	1st cutting	Smooth Brome - medium to full head; All others - early to full head	2 - 3	5 - 6 inches
	Successive cuttings	Wait six weeks and cut again. Timothy usually won't produce a second cut until fall.		
Warm Season Grasses				
Eastern Gama Grass	1st cutting	Late boot stage	3	8 - 10 inches
	Successive cuttings	Add N and cut again in 6-8 weeks. Caution: leave 8-inch stubble.		
Switchgrass, Big Bluestem, Indiangrass	All cuttings	Late boot stage. Caution: leave 4-6 inch stubble	Typically 1 cutting, sometimes 2	8 inches
Summer annual grasses (Sudan Grass or Sudan/Sorghum crosses)	All cuttings	Sudangrass: 18-24 inches tall. Sorghum x sudangrass: typically 24-30 inches for hay. Delay green chopping until grass is 18 inches in height or taller to avoid adverse effects of prussic acid. Caution: leave 4-6 inch stubble.	2 - 3 (Sorghum only once)	Frosted forage should not be grazed for at least a week after frost to allow prussic acid content to dissipate.