MONTANA STATE UNIVERSITY
EXTENSION SERVICE
MONTGUIDE

MT199704 AG reprinted 1/03

Determining Forage Production and Stocking Rates: A Clipping Procedure for Rangelands

by Larry Brence, Fallon-Carter County Extension Agent, and Roger Sheley, Extension noxious weeds specialist, MSU-Bozeman.

How to calculate forage production using a hoop, grass shears and scale. Includes worksheet.

Stocking rates are determined by balancing the amount of forages available with the amount needed by livestock. These rates are the number of animals and the duration they can graze a pasture or management unit without overgrazing or underutilizing the forage.

Stocking rates are measured in Animal Unit Months (AUMs) which is the amount of forage necessary for sustenance of a 1,000-pound cow and its calf (under four months old) or the equivalent for a period of one month. For example, a stocking rate of 100 AUMs indicates 100 cow-calf pairs can use a pasture for one month, or 50 cow-calf pairs can graze the same area for two months.

Animals differ in their forage requirements. Some suggested animal unit conversion factors are presented in Table 1. This MontGuide provides a simple method for converting actual measurements of forage production into stocking rates using AUMS.

Materials needed

- Hoop
- Grass clippers
- Hand-held spring scale that weighs in grams. A 500-gram scale works best.
- Small to medium-size grocery bags

Table 1. Common animal unit conversion factors

	AU
Cow (1,000 lb) with calf	1.00
Mature bull	1.25
Yearling (under 17 mo.)	.70
Ewe (and lamb less than 2 mo.)	.20
Horse	1.25
Elk	.65
Mule deer	.25

A hoop can be made simply from 1/4-inch coated cable available from most farm and ranch supply outlets. Purchase 93 inches of cable and fasten the ends together with a 1/4-inch cable ferrule. The cable can be clamped in the ferrule with a chisel or heavy screwdriver and hammer. A 500-gram scale can be purchased from forestry, animal health or surveying companies for about $38.

Selecting Sites to Clip

Select a site to clip where soils, slope and grasses are representative of the pasture that is to be surveyed. In areas where topography and soils are variable, it may be wise to survey a number of sites and average the results so that more reliable data can be obtained.

When should clipping be done?

For the most accurate results, vegetation should be at maturity, and no grazing should have occurred. The grass must be mature to provide total forage production. Sample in late-grazed pastures or find areas in pastures that have not been grazed. It may also be necessary to fence out a small section of a pasture. For most Montana rangelands, clipping after July 1 will yield the most accurate results. Table 2 (back page) gives the percent dry matter of forages at various stages of maturity.

Growing conditions in a given year will affect forage production. If stocking rate estimates are done during a year of weather extremes, it may be necessary to re-estimate in subsequent years under more normal conditions to get more accurate results.

Steps for measuring forage production

Step 1: Pre-weigh empty bags

Weigh an empty paper bag in grams and write the weight on the bag. This weight will be important for calculations later.

Step 2: Toss hoop and clip forage.

Randomly toss the hoop and let it land flat on the ground. Clip plants within the hoop to ground

level, making sure to sort out all litter, roots or soil. Also discard all weeds or other plants that are not forage species.

Note; Clip at least four hoops to insure reliable forage production estimates. The more hoops that are clipped, the more reliable the forage production estimate will be.

Step 3: Weigh clippings.

Place forage clippings in bags and weigh with gram scale. Weights should be marked on each bag.

Step 4: Complete worksheet calculations.

Complete the following worksheet using the weights recorded on the paper sacks and a calculator.

Table 2. Percentage of dry matter of forage/grasses

	Before heading—Initial growth to boot stage	**Headed out**—Boot stage to flowering	**Seed ripe**–Leaf tips drying	**Leaves dry**—Stems partly dry	**Apparent dormancy**
Cool Season					
Wheatgrasses, perennial bromes, bluegrasses, prairie junegrass, fescues	35%	45%	60%	85%	95%
Warm season					
Tall grasses: bluestems, Indiangrass, switchgrass	30%	45%	60%	85%	95%
Mid grasses: side-oats grama	40%	55%	65%	90%	95%
Short grasses: blue grama, buffalograss, short 3-awns	45%	60%	80%	90%	95%
Source: National Range Handbook					

Stocking Rate Worksheet

Pasture/Unit: _____ Date: _____

Step 1: Calculate pounds of forage per acre.

Site 1

	1	2	3	4	Total	
A.	_____	_____	_____	_____	_____	A. Total weight of all sample in grams
B.	_____	_____	_____	_____	_____	B. Total weight of empty bags in grams.
C. Total weight of all samples (A-B = C)					_____	
D. Average weight per sample (Divide C by 4)					_____	
E. Pounds of forage per acre (Multiply D by 20)					_____	

Site 2

	1	2	3	4	Total	
A.	_____	_____	_____	_____	_____	A. Total weight of all sample in grams
B.	_____	_____	_____	_____	_____	B. Total weight of empty bags in grams.
C. Total weight of all samples (A-B = C)					_____	
D. Average weight per sample (Divide C by 4)					_____	
E. Pounds of forage per acre (Multiply D by 20)					_____	

Site 3

	1	2	3	4	Total	
A.	_____	_____	_____	_____	_____	A. Total weight of all sample in grams
B.	_____	_____	_____	_____	_____	B. Total weight of empty bags in grams.
C. Total weight of all samples (A-B = C)					_____	
D. Average weight per sample (Divide C by 4)					_____	
E. Pounds of forage per acre (Multiply D by 20)					_____	

Site 4

	1	2	3	4	Total	
A.	_____	_____	_____	_____	_____	A. Total weight of all sample in grams
B.	_____	_____	_____	_____	_____	B. Total weight of empty bags in grams.
C. Total weight of all samples (A-B = C)					_____	
D. Average weight per sample (Divide C by 4)					_____	
E. Pounds of forage per acre (Multiply D by 20)					_____	

Step 2. Calculate the average dry weight of usable forage

Site 1	Site 2	Site 3	Site 4	Total	
_____	_____	_____	_____	_____	Pounds of forage (E) per acre from each site

1. Divide total by number of sites		
2. Select percent dry matter of forage from Table 2	x _____	
3. Multiply line 1 time line 2	= _____	Pounds of dry forage per acre)
4. Multiply by your utilization percentage	x _____	(e.g. 50%, take half, leave half)
5. Amount of usable dry forage per acre	= _____	
6. Number of acres in pasture	x _____	
7. Multiply line 5 by line 6	= _____	Total usable forage in pasture
8. Total forage required by cow/calf for 1 month	/ _____	
9. Divide line 7 by line 8	= _____	Total number of animal units that can be fed for a month
10. Number of months pasture is grazed each year	/ _____	
11. Divide line 9 by line 10	= _____	stocking rate or the number of animal units the pasture can support.

MONTANA STATE UNIVERSITY EXTENSION SERVICE

The programs of the MSU Extension Service are available to all people regardless of race, creed, color, sex, disability or national origin. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, David A. Bryant, Vice Provost and Director, Extension Service, Montana State University, Bozeman, MT 59717.

File under: Range
A-3 (Range Management)
Reprinted Jan. 2003
(500103 ST)