

RANGE TECHNICAL NOTE

Montana Grazing Animal Unit Month (AUM) Estimator

Background

Rangeland and dryland pasture Animal Unit Month (AUM) estimations are needed for a variety of conservation planning and data applications.

Anticipated Uses of the AUM Estimator

- Montana Department of Revenue - Application for Agricultural Classification of Lands, AUM calculations (must use the Below Normal AUM/Acre values for qualifying agricultural land).
- Any other uses where having a reasonable estimate of grazing potential facilitate soil and water conservation activities, especially when weather doesn't permit on-site vegetation sampling.

Definition of AUM/Acre Parameters

Below Normal AUM/Acre values – lower precipitation and possibly cooler temperatures at a critical time that leads to lower production for the historic climax or near climax plant community. These AUM/Acre values should be used for AUM estimation where the plant community is at less than the historic climax or near climax condition or similarity index.

Normal AUM/Acre values – precipitation and temperature that allows for normal plant production for the historic climax or near climax plant community.

Above Normal AUM/Acre values – higher than normal precipitation as well as adequate temperatures that allows higher plant production for the historic climax or near climax plant community.

Deriving Animal Requirements

An Animal Unit (AU) is generally one mature cow of approximately 1,000 pounds and a calf as old as six months, or their equivalent. An Animal Unit Month (AUM) is the amount of forage required by one animal unit for one month. The Natural Resources Conservation Service (NRCS) uses 30 pounds of air-dry forage per day as the standard forage demand for a 1,000-pound cow and her calf (one animal unit). This consumption requirement is equal to 3.0 percent of body weight. Research has validated animal intake rates for beef cows as low as 1.5 percent of body weight to a high of 3.5 percent. No single rate is always correct. Forage consumption and animal feed requirements change based on many factors. Some factors include:

- forage quality (crude protein and digestibility)
- standing crop

- age of animal
- physiological stage of animal (dry; pregnant; lactating)
- mature animal body weight
- animal breed type
- supplementation
- topography
- weather factors
- watering facilities.

Calculated on an air-dry basis, 30 pounds of forage per day (3.0 percent of body weight) equates to a monthly requirement of 915 pounds of dry forage for each animal unit: One AUM = (30 pounds per day) x (30.5 days per month) = 915 pounds.

Native Rangeland AUMs

For the purposes of this AUM Estimator, individual range AUM values are determined using the following:

- Native rangeland weighted averages of annual plant production from NRCS soils data bases within a given soil map unit for the historic climax or near climax plant communities.
- A 25% grazing efficiency factor which is based on allocated forage to account for loss of edible forage due to trampling, insect use/damage, wildlife use, etc., AND a “take half – leave half” philosophy for grazing utilization levels during the growing season.

Native rangeland production values in the certified soils database are reported in terms of Historic Climax Plant Community (HCPC) production potentials. In many cases, the existing rangeland plant community does not reflect the HCPC. As the plant species composition shifts away from the HCPC, annual production potentials typically decrease. The planner is advised to select a choice within one of the columns (below normal, normal or above normal) based on the plant communities that occupy the acreage that is being evaluated.

Recommended animal stocking rates for native rangeland can also be found in the USDA NRCS Ecological Site Descriptions. These descriptions should be referenced in the conservation planning process, and are found in Section II of the NRCS Field Office Technical Guide (FOTG). They can also be accessed through the Montana NRCS electronic Field Office Technical Guide (click eFOTG; click Section II; click Ecological Site Descriptions). <http://www.mt.nrcs.usda.gov/>.

SAMPLE CALCULATION OF NATIVE RANGELAND AUMS AS DONE BY THE AUM ESTIMATOR:

Given: Annual forage production = 900 pounds per acre. One AUM = 915 pounds.

AUM per acre = (900 pounds per acre) x (25 percent grazing efficiency)
 = (225 pounds available forage per acre) / (915 pounds per AUM)
 = 0.25 AUM per acre.

Tame Dryland Pasture AUMs (Used only for Department of Revenue AUM estimation only)

Areas that have been cultivated and planted to either native or introduced forage species can be estimated by multiplying native rangeland AUM/Acre by a factor of 1.5.

SAMPLE CALCULATION OF DRYLAND PASTURE AUMS:

First calculate the native rangeland AUM/Acre (see example above). Multiply native rangeland AUM/Acre by 1.5.

AUM per acre = (0.25 AUM per acre) x 1.5 = 0.38 AUM per acre.

How to Use the AUM Estimator

Note: Output will be in Animal Unit Months (AUMs) for the entire parcel being estimated.

Question: Is a soil survey available for the parcel to be calculated?

If **YES**, follow steps listed below.

If **NO**, and the estimate is to be used for Montana Department of Revenue purposes, contact your county agricultural extension agent for an AUM estimate. If **NO**, and the estimate is to be used for conservation planning, the local NRCS office will provide the estimate using ecological site descriptions.

Step 1. Using existing soil survey information, determine the soil map units that occur in the parcel. For sources of soil survey information, refer to the published soil survey, or follow the links in the web version of this Estimator at:

<http://www.mt.nrcs.usda.gov/technical/ecs/range/technotes/howto.html>.

Step 2. Estimate the acres of each soil map unit; then enter the Map Unit Symbol into Column A and the Acres of this Map Unit in the Parcel into Column B of the AUM Estimator Worksheet (see Example Attachment A on Page 5). Estimator work sheets are available on the web at: <http://www.mt.nrcs.usda.gov/technical/ecs/range/technotes/howto.html>. The value in Column B could be based on GIS calculations (ArcGIS calculations), dot counting with an acreage grid, or simply visually estimating the proportion of the different map units that occur in the parcel being estimated.

Step 3. Using the figures under the Range AUM (shortened for AUM/Acre) Column (use the below normal column for Montana Department of Revenue calculations or the appropriate column based on the predominant plant community for other uses) based on the Soil Survey Area Estimated AUM (shortened for AUM/Acre) Table for the survey area(s), populate Column C of the AUM Estimator Worksheet. Calculate Column D (Map Unit AUMs in this Parcel) using the directions as noted (see the Example Worksheet after Step 4. below). The Soil Survey Area Estimated AUM Table can be accessed via the web at:

<http://www.mt.nrcs.usda.gov/technical/ecs/range/aum>.

Directions for Columns in the AUM Estimator Worksheet:

- A.** List map unit symbol(s) for parcel from soil survey map.
- B.** Enter acres of listed map unit in parcel (from published soil survey map or ArcView calculation).
- C.** Enter the AUM/Acre from the appropriate Column in the Soil Survey Area Estimated AUM Table for the soil survey area(s). These values will be either range AUM/Acre as listed in the Estimated AUM/Acre Table or dry pasture AUM/Acre as a 1.5 factor of the range AUM/Acre, depending upon current land use.
- D.** Multiply Columns B and C, and enter the results in Column D.

Step 4. Add the values in Column D to obtain the Total Estimated Parcel AUMs. Use the Total Estimated Parcel AUMs in your specific application. In the case of the example below, the number would be 13.22 AUMs for the entire 32.7 acre parcel.

Example Worksheet: (Calculations based on native rangeland production)			
A. Map Unit Symbol	B. Acres of this Map Unit in this Parcel	C. AUMs per Acre for the Map Unit in Column A	D. Map Unit AUMs in this Parcel
12A	20.3	.34	6.90
5B	12.4	.51	6.32
Total Estimated Parcels AUMs			13.22

AUM Estimator Worksheet

(See Example Attachment A on Page 5; or view/download Worksheet at <http://www.mt.nrcs.usda.gov/technical/ecs/range/technotes/howto.html>)

References for Using the AUM Estimator

Animal Nutritional Requirements

- *Nutrient Requirements of Beef Cattle*, 1996. National Research Council. National Academy Press. Washington, D.C. Seventh Revised Edition.
- *National Range and Pasture Handbook*, 1997. USDA Natural Resources Conservation Service, Chapter 6. Washington D.C.
<http://www.glti.nrcs.usda.gov/technical/publications/nrph.html>

Forage and Rangeland Plant Communities

- *Montana Interagency Plant Materials Handbook*, 1990. Montana State University, Extension Bulletin 69. Bozeman, Montana.
- Ecological Site Descriptions. USDA Natural Resources Conservation Service, Montana. Located in Section II, Field Office Technical Guide and on the web (click eFOTG, Section II, Ecological Site Descriptions). <http://www.mt.nrcs.usda.gov/>

Soil Maps

- Hard Copy Soil Survey Maps, available at conservation district offices where the survey has been published or mapping has been completed, but currently un-published.
- NRIS Interactive Mapper can be accessed if you have internet access. You can display soil maps for most all soil survey information that has been digitized. Knowing the legal description greatly facilitates locating your parcel(s).
<http://maps2.nris.mt.gov/mapper/index.html>

Table of AUM Estimates by Mapunit

- Soil Survey Estimated AUM Tables (viewable, printable or GIS usable download). Go to this Range Technical Note on the web at <http://www.mt.nrcs.usda.gov/technical/ecs/range/aum/> to generate the Soil Survey Estimated AUM Tables for your use.

