



# Does Size Matter? Animal Units and Animal Unit Months

By the Society for Range Management Rangeland Assessment and Monitoring Committee

## On The Ground

- The concepts of animal units, animal unit months, and animal unit equivalents have long been used as standards for range management planning, estimating stocking rates, reporting actual use, assessing grazing fees, ranch appraisal, and other purposes.
- Increasing size of cattle on rangelands has led some to suggest that the definition of animal units and animal unit months requires revision.
- Range managers need to understand these concepts and arbitrarily changing them would lead to confusion.
- The Rangeland Assessment and Monitoring Committee reviewed this issue and concluded that the existing definitions are adequate to accommodate increasing size of cattle.

**Keywords:** animal unit, animal unit month, animal unit equivalent, stocking rates, forage requirement, cow weights.

*Rangelands* 39(1):17-19

doi 10.1016/j.rala.2016.12.002

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The concepts of animal unit (AU) and animal unit month (AUM) have been in general use in the range management profession for over a century, and definitions approved by Society for Range Management (SRM) in the glossary since 1974. In recent years, questions have been raised as to whether the definitions need to be revised. The purpose of this article is to examine the question of revisions.

## Background

The concepts of AUs and AUMs were first developed in the period of 1907 to 1911 by James Jardine and Mark Anderson<sup>1</sup> as part of the Ocular Reconnaissance Range Survey method (see Scarnecchia<sup>2</sup> for history of the concept).

Over the years, various authors (see Sampson<sup>3</sup>; Pickford<sup>4</sup>; Stoddart and Smith<sup>5,6</sup>) used numerous terms relating to AU and AU equivalents but did not always offer precise definitions of these terms. In 1974, the SRM Glossary<sup>7</sup> defined an AU as a 1,000-pound cow or equivalent with a forage consumption of approximately 26 pounds of dry matter per day. This definition was consistent with common usage over the previous half century.

The current SRM Glossary<sup>7</sup> definitions are

**Animal Unit:** Considered to be one mature cow of about 1,000 pounds (450 kg), either dry or with calf up to 6 months of age, or their equivalent, consuming about 26 pounds (12 kg) of forage per day on an oven-dry basis. *Abbreviation: AU. Cf. animal-unit-equivalent.*

**Animal Unit Month:** The amount of oven-dry forage (forage demand) required by one animal unit for a standardized period of 30 animal-unit-days. Not synonymous with animal month. *Abbreviation: AUM.*

**Animal Unit Equivalent:** A number relating the forage dry matter intake (oven dry basis) of a particular kind or class of animal relative to 1 AU. If intake is not known, it can be estimated from the ratio of the metabolic weight of the animal in question to the metabolic weight of 1 AU (450 kg to the 0.75 power). *Abbreviation: AUE.*

These definitions are generally consistent with those used by various state and federal agencies and other range professionals, mainly for the following uses:

- 1 estimating stocking rates and grazing management planning
- 2 reporting actual use
- 3 legal documents such as grazing permits, management plans, and grazing fees

Some agencies may use somewhat different definitions of AUs for either billing or actual use reporting. For example, the Code of Federal Regulations<sup>8</sup> defines an AUM as the amount of forage used by one cow or its equivalent for 1 month.

Recently, some have questioned whether the definitions of AU and AUM need to be changed (e.g., Carter<sup>9</sup> and Uresk<sup>10</sup>). The following assertions are made:

- 1 Average size of range cows has increased; most weigh more than 1,000 pounds.
- 2 Larger animals consume more forage than the commonly accepted value for an AUM, and failure to account for increased size has resulted in overstocking of some ranges.
- 3 Grazing fees based on AUMs are undervaluing the amount of forage harvested per AUM, therefore grazing fees per AUM need to be increased.

## Discussion

We seek to define the terms and emphasize the proper use of the terms. The AU is a standard unit, not an average or specific weight for a given allotment. The AU standard, and the AUM calculated from it, are administrative necessities for communication, billing, and management of rangelands in the United States and Canada. We will examine each of the claims made above.

- 1 **Average size of range cows.** It is probably true that the average size of range cows, at least in some areas, has increased over the past few years. In that case, the forage consumption per cow would exceed that of a standard 1,000-pound cow (AU). At any rate, an increase in animal size does not require a change in the definition of an AU, rather the use of AUEs are then warranted. AUEs based on body weight (often expressed in terms of metabolic body weight =  $\text{body weight}^{0.75}$ ) have long been used to convert animals to AUs. For example, bulls are usually considered to be 1.5 AU, yearlings to be about 0.6 AUs, sheep to be about 0.2 AUs, and so on. Many authors use 0.1 AUE = 100 pounds of body weight (see Pratt and Rasmussen<sup>11</sup>), although there are other ways of calculating AUEs (e.g., Manske<sup>12</sup>). Thus, any animal weight and class can be accounted for without requiring a revision of the definition of an AU.
- 2 **Higher forage consumption.** When actual stocking and resource assessment data are lacking or unreliable, initial stocking rates are set based upon forage supply and animal demand, both of which are typically determined by “best available data.” Adjustments in stocking rates on rangelands are made on a “stock and monitor” basis, or “adaptive management process” as it is called now by federal land management agencies. The need to reduce or increase livestock numbers is based on monitoring and assessments, which take into account not only forage utilization but also livestock distribution, weather conditions, trends in range condition, multiple use objectives, current vegetative community, and other factors. Thus, stocking rate adjustments are made based on resource effects and management objectives, not on the pounds of forage consumed per

animal. Overall, there has been a trend toward reducing livestock on much of the federal range over the past 50 years. Determining forage intake on rangeland, although possible, is difficult to do. Recently, a comprehensive review on this subject was published (Coleman et al.<sup>13</sup>), and the authors of this review reported that forage intake by grazing cows was poorly predicted by a simple comparison to cow weight. Other relationships seemed to be more important, such as digestibility of the forage, physiologic state, and milk production. Although it cannot be argued that there is a relationship to increased forage intake with larger body weights, the relationship is imperfect.

- 3 **Grazing fee values.** Grazing fees on federal ranges are set by Congress. The term AUM should be used as defined and AUEs should be applied where appropriate. This will avoid conflicts about the value of grazing fees related to AUMs.

It should be emphasized that AUs, AUMs, and AUEs are starting points and should be informed by management. Much like forage production estimates from Ecological Site Descriptions, AUMs are a broad estimation of conditions based on best available science. Every operation, permit, and allotment is different, and it is simply not possible to provide a general mathematical formula for a “one size fits all” plan. Use of the AU, AUM, and AUE definitions in range management outlined in the Background section take into account the different sizes and species of animals. Grazing permit revisions, grazing fees determinations, management planning, actual use records, ranch appraisals, and economic analyses can all be done using AUEs. In the case of proposed range improvements, a comparative estimate of AUMs of grazing under different alternative proposed actions may be useful based on assumptions about animal intake, distribution, and other factors.

## Conclusions

We, the Society for Range Management Rangeland Assessment and Monitoring Committee, believe the definitions of AU and AUM used by the SRM should remain unchanged. Animal sizes and species can be estimated using AUEs and standard AUs for both stocking rate decisions and grazing fees. The determination of AUEs should be determined based on local data from individual operators or auctions. Finally, the “adaptive management” process by which permits are changed should be a local, collaborative process, based on local conditions and best available science, not a change in the definitions of AU, AUE, and AUM.

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