

An Improved AUM For Range Cattle

JOHN F. VALLENTINE

Extension Range Management Specialist, University of Nebraska, North Platte

Highlight

The AUM is a useful tool to range managers if properly defined and applied. A proposal is made that an animal unit be defined as a 1,000 lb dry cow in maintenance or gestation, or its equivalent. It is also proposed that 540 therms of digestible energy (equivalent to 270 lb of TDN) be used for converting dry roughages, silages, and grains to AUM's.

Variability and lack of precision in defining an animal unit month (AUM) makes ranch appraisal difficult, handicaps reporting and interpretation of range research, and confuses the range manager. This problem becomes magnified when harvested roughages are fed to provide additional carrying capacity in seasons when range forage is in short supply.

Review of Literature

A common definition of an AUM has been the amount of forage or feed sufficient to support a mature cow or its equivalent for a period of 30 days (Sampson, 1952). However, Stoddart and Smith (1955) considered an animal unit (AU) as 1,000 lb of live weight.

An animal unit was considered by the ASRM Range Term Glossary Committee (1964) to be one mature cow with calf or their equivalent. Shultis and Strong (1955) based the AUM on the amount of feed needed by one mature head of cattle two years old or older, or its equivalent, for good growth and production during one month. They further indicated that a beef cow with calf by side could be considered an AU but suggested greater precision by making an extra allowance for the calf.

Neely (1963) proposed alternative bases for an AU depending upon the stage of production. For classes of beef cattle where body maintenance is the goal, he suggested a mature pregnant cow weighing 1,000 lb. Where gain in body weight is an important factor he suggested an 800-lb steer gaining 1.5 lb/day be used as the basis of the animal unit.

Lactation has been shown to increase forage consumption over pregnancy or maintenance under free choice grazing. In a recent study on Utah summer range, Cook et al. (1961) found that lactating ewes weighing an average of 120 lb consumed 26% more dry matter than dry ewes, not considering forage eaten by the lambs.

In studies with identical twins stall fed on fresh pasture herbage cut daily, Hutton (1963) found that lactating cows during a 9-month lactation consumed 47% more gross energy than non-lactating cows. Lactating cows increased consumption 50% from calving to a peak at 150 days.

In a Nevada study reported by Fleming et al. (1960), green forage was cut and fed free choice to various classes of sheep. Ewes with single lambs, ewes with twin lambs, early weaned lambs, and yearling ewes consumed 200, 260, 91, and 98% as much forage respectively on a dry weight basis as dry ewes.

The feeding tables of the National Research Council (1963) are based on a daily consumption of 18 lb dry matter by cows in gestation and 28 lb by lactating cows. This is a 55% increase in consumption. Although dry matter consumption by range cattle needs intensive study, a 25% increase in dry matter consumption resulting from appetite stimulation associated with lactation appears to be a conservative estimate where ample supplies of forage are available.

Boykin et al. (1962) reported a cow and calf require about 40% more forage than a mature cow and slightly more forage than two yearlings. Suckling beef calves at an average age of 4 to 7 months of age were found in Virginia by Hammes et al. (1959) to consume about 7 lb of forage (air dry) per day. This is approximately $\frac{1}{3}$ of the average dry matter consumption attributed to a dry, mature cow.

The TDN equivalence of an AUM as used by technicians has been variable. Sampson (1952) suggested an AUM be further defined as 300 lb of TDN or the equivalent of 0.3 ton of hay. However, Shultis and Strong (1955) considered that 400 lb of TDN or about 800 lb of hay was equivalent to one AUM. Harris (1962) concluded an animal unit day

should be considered 32,000 kcal. of apparently digestible energy, equivalent to 16 lb of TDN per day.

These differences in TDN conversion to AUM's relate primarily to variable definitions of an AU. Shultis and Strong (1955) after Morrison (1949) based their conversion on an average requirement of 13.2 lb of TDN daily for cows nursing part of the year. Harris (1962) based his proposed conversion on the requirement of one cow in thrifty condition weighing 1,000 lb and producing 25 lb of milk testing 4% fat. Others have used the energy requirements of a mature beef cow in gestation (Sampson, 1952).

Proposed AU Basis for Range Cattle

A suggested modification of AU equivalents for various classes of beef cattle under range conditions is given in Table 1. It is proposed that an AU be defined as a mature, 1,000 lb dry cow in maintenance or gestation, or its equivalent. An AUM would then be the forage or feed necessary to support this AU for 30 days. A cow-calf pair through a production year based on Table 1 would be equivalent to about 1.2 AU's.

These definitions recognize that feeding standards do not differentiate between the requirements of dry and pregnant beef cows (Morrison, 1949; National Research Council, 1963). Hutton (1963) reported the effect of pregnancy on herbage intake was small. Since both lactation and age of calf materially affect consumption of forage by the cow-calf pair, a mature cow with calf

Table 1. Proposed animal unit equivalents for various classes of beef cattle.

Class of cattle	Animal units
Mature cow, maintenance or gestation ¹	1.00
Mature cow with calf, birth to 3 mo.	1.25
Mature cow with calf, 4 mo. to weaning	1.40
Weaner calves, to 12 mo.	.50
Yearlings, 13-17 mo.	.65
Yearlings, 18-24 mo.	.80
Two-year-old steers	.90
Bulls	1.25

¹Replacement heifers age 24 months and over are considered mature cows.

appears too variable for use as the basis of the animal unit. Also, an AUM based on live weight does not distinguish between gestation and lactation.

Research has indicated that basal metabolism is related to the 0.75 power of body weight $W^{.75}$ in ruminants. Closely related to maintenance requirement is free choice dry matter consumption. Since older cattle and more fleshy individuals consume less feed per cwt. of body weight than do younger animals carrying less condition (National Research Council, 1963), it appears that a standard age and phase of live-stock production must be the basis for defining an AUM. Under practical ranch operations this appears to best fit the dry, mature cow. In areas where mature cow weights average considerably over or under 1,000 lb, it may be desirable to make some adjustments in animal unit equivalence.

Animal unit equivalents given for growing cattle in Table 1 were based largely on an allowance of 0.11 AU/cwt. of body weight for growing cattle weighing 350 to 800 lb. This approach has been suggested by Shultis and Strong (1955).

Under free choice consumption of forage by grazing animals, no direct control of herbage intake is exerted by the grazer. Carrying capacity on the range appears more closely related to free choice consumption on a dry matter basis than energy requirements. However, since feed in the form of hay, fodder, or silage is usually fed under conditions in which feed intake can be limited to required amounts, an energy value measure such as TDN or digestible energy (DE) appears to be the most practical basis of converting such feeds to carrying capacity in AUM's.

Table 2 shows conversion figures for changing tonnage of feeds to their equivalents in AUM's. These conversion factors are based on average energy values (National Research Council, 1963) and on 540 therms of DE (or 270 lb of TDN) being equivalent to an AUM. The monthly allowance of 540 therms of DE (18 therms x 30 days) appears ample for a mature cow. The National Research Council (1963) indicates that even 15 therms daily, which is associated with a slight weight loss, is adequate for a mature

Table 2. AUM equivalents for dry roughage, silage, and grain.¹

Kind of feed	Lb. feed per AUM	AUM's/ton
<i>Dry roughages</i>		
Corn fodder	491	4.1
Sorghum fodder	500	4.0
Alfalfa hay, early bloom	529	3.8
Bromegrass hay	574	3.5
Corn stover, mature	563	3.6
Prairie hay, mid-bloom	600	3.3
<i>Silages</i>		
Alfalfa silage, wilted	1350	1.5
Corn dent silage, dough stage	1421	1.4
Beet top silage	1800	1.1
Sweet sorghum silage	1588	1.3
Alfalfa silage, unwilted	1500	1.3
<i>Grains</i>		
Corn yellow dent	338	5.9
Milo	321	6.2
Barley	346	5.8
Oats	415	4.8

¹Based on 540 therms of digestible energy (or 270 lbs. TDN) equivalent to one AUM. DE values from N. R. C. (1963)

pregnant cow in fair to good condition.

Unfortunately there are other factors besides age, weight, and lactation that affect the intake of grazing animals on the range. Factors that tend to lower consumption are scarcity of forage imposed by natural conditions or management, low succulence or palatability of herbage, unfavorable climatic conditions, and inadequate water or protein intake. Roberts (1959) has pointed up the difficulty of comparing AUM's provided under different grazing conditions unless the quality and quantity of forage consumed each day is constant. Yet, an AUM concept that fully considers all factors affecting consumption and quality of forage has not been found.

An AUM based on free choice consumption is only a quantitative measure of forage. Even an AUM of feed based on digestible energy still gives no consideration to miner-

als, proteins, or vitamins. Although AUM's from different forages and even feeds have a similar gross carrying capacity, they often differ markedly in quality and in ability to promote animal gains. Young pasture normally provides a balanced ration for lactating cows and promotes rapid gains in young cattle, but an AUM of cured range grass will normally have to be supplemented with various nutrients to meet the requirements of the dry cow.

Application of the AUM

The AUM can be used as a common measure of range and pasture forage, hay and other roughages, and even energy concentrates. All ages and kinds of grazing livestock can be converted to AU's. The AUM is very useful in ranch planning for comparing the yearlong and seasonal carrying capacity needs on a ranch with the carrying capacity the ranch can provide.

Many ranchers now lease deeded land on an AUM rather than on a per acre basis. Grazing fees on public ranges are normally set on an AUM basis. The appraised value of ranches and their loan value depend primarily upon the number of AU's they will support. However, the full utility of the AUM is dependent upon a practical but sound basis and application.

No fees are currently charged for calves and lambs entering the national forests if they accompany their dams and are under 6 months of age at the time of entry. On the other hand all weaned calves entering the forest are considered as one animal unit. Although simple to use, this oversimplification does not precisely record actual grazing pressures. It also discriminates against ranchers running young, weaned stock or dry stock on the forests and favors the ranchers who enter the forests with lactating cows with early winter or even late fall calves by side.

A count of the number of breeding females is sometimes used to approximate the number of animal units on a ranch. However, a rancher must also consider other classes of cattle on his ranch such as replacement heifers, bulls, and yearlings. Greater precision will result from classifying a herd into ages and

classes first and then using appropriate conversion factors.

An example of a 100-head breeding herd can be used to demonstrate this. On a typical cow-calf operation using 1 bull per 30 cows, breeding heifers to calve first at 24 months, selling weaner calves at an average of 8 months, and allowing one saddle horse per 100 cows, carrying capacity must be provided for 130 to 140 AU's rather than 100 AU's. In a cow-yearling operation this range would be 165 to 175 AU's per 100 breeding cows. If 50 head of weaner calves are purchased in the fall and carried through the next summer as yearlings, carrying capacity must be provided for an additional 30 to 35 AU's.

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