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Forage Consumption Estimated Animal Unit Conversion

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A common unit of measurement has been devised to estimate both the amount of forage demanded by livestock (stocking rate) and the amount of forage available (grazing capacity) in a pasture. This measurement defines a "standard animal" to adjust for differences in forage demand between kinds and classes of livestock, size of animal, and age of offspring.

The animal unit (AU) defines forage intake on the basis of a standard animal. The most practical "standard animal" is the cow-calf pair. We define the animal unit as a 1000-pound cow of average milking ability with a calf less than four months old. The animal unit month (AUM) is the amount of forage needed by an "animal unit" (AU) grazing for one month. Since daily forage requirements (on dry weight basis) of cattle average about two percent of their weight, a 1000-pound lactating cow will consume 22 pounds of forage (dry weight) per day.

Traditional British breeds of cattle were common a generation ago. Cows weighed about 900 pounds and weaned a 350 pound calf. Crossbreeding programs have increased cow size to an average of 1100 to 1300 pounds. Larger cows require more energy for maintenance and for greater milk production. In addition, modern calves are bigger and require more forage. Therefore, the old approach of regarding all cows, with or without calf as an AU is no longer recommended.

Animal size should be considered when matching livestock needs with available forage. The most widely recommended procedure uses the metabolic requirement ratio $(W)^{0.75}/(1000\ Pounds)^{0.75}$, where W is the weight (in pounds) of the animal, and a 1000-pound cow is defined as the basic AU. A rule of thumb is to adjust for changes in size on an animal unit equivalent by adding 0.1 AU for every 100 pound increase in live weight above the standard AU (Table 1). Figure 1 shows how the number of cows grazing a pasture should be adjusted to size.

Table 1. Calculating AUM Requirements of a Beef Cow with Calf under Four Months of Age

Weight of Cow	Daily Forage Dry Matter Intake (lbs)	Waste (25%)	Total Daily Requirement	Total Monthly Requirement
1000	22.0	5.5	27.5	839
1100	24.2	6.1	30.3	924
1200	26.4	6.6	33.0	1007
1300	28.6	7.1	35.7	1089
1400	30.8	7.6	38.4	1171

Consumption, combined with a factor for trampling and waste of 25 percent results in an estimate of 839 pounds of forage to supply one AUM. The estimate of wastage varies with range and pasture condition and with level of grazing management. Efficiency of forage harvest increases and wastage decreases with higher levels of grazing management.

Animals consuming more or less forage than the standard animal due to differences in size, type, production level, etc. are assigned AU values based on their intake relative to the standard animal. For example, daily forage requirement of sheep (on a dry weight basis) average three percent of their body weight. Thus, five ewes (average weight 150 pounds) are one animal unit (Table 2). Larger ewes require more forage. Lambs also require forage from two months of age (average weight 15 pounds) through weaning (average weight 80 pounds). By considering each lamb at the age of two months to consume about one-third as much as a ewe, each lamb averages 0.3 x 0.2 AU, or 0.06 AU. Thus, 100 ewes with 100 lambs that are more than two months of age would represent: (100 ewes x 0.2 AU) + (100 lambs x 0.06 AU) = 26 AU. In contrast, if the ewes had a 170% lamb crop, the same flock would represent: (100 ewes x 0.2 AU) + (170 lambs x 0.06 AU) = 30 AU.

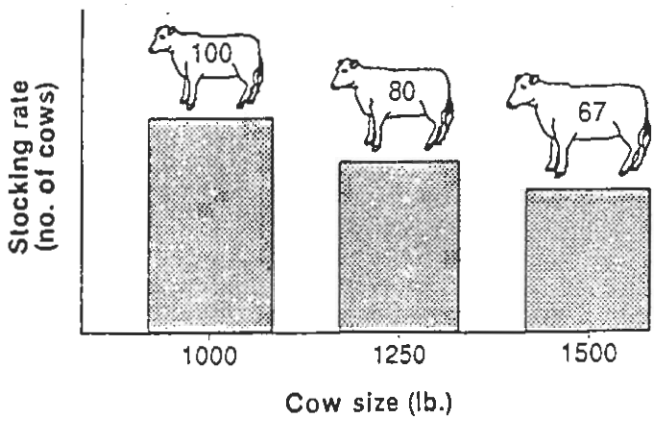

Figure 1. The number of animal units (1000-pound cow with calf less than four months of age) that can graze a field with a carrying capacity of 100 AUMs for one month declines as cow size increases. (Taken from Range Notes, No. 8, Prepared by Alberta Public Lands Range Management Program, Dec. 1989).

Table 2. Calculating AUM Requirements of a Ewe with Lamb under Two Months of Age.

Weight of Ewe (lbs)	Daily Forage Dry Matter Intake (lbs)	Waste (25%)	Total Daily Requirement	Total Monthly Requirement	AU Equivalent
150	4.5	1.1	5.6	171	0.20
175	5.3	1.3	6.6	201	0.24
200	6.0	1.5	7.5	229	0.27

AUM values for other kinds and classes of livestock are listed in Table 3. For example, yearling cattle (12-17 months) vary in weight from 600 to 900 pounds during the grazing season. As a rule of thumb, they are assigned 0.75 AU; thus, they consume 503 pound or [(30.5 days per month) x (22 pounds x 0.75)] of forage per month. The .75 rating should be adjusted accordingly for "light" and "heavy" yearlings. Mature bulls require more feed than a cow-calf pair and are considered to be 1.5 AU. As calves approach four months of age, forage intake increases and eventually becomes more important nutritionally than milk. Thus, from four months until weaning, calves require an average of 0.3 AU of forage monthly. For example, a 1200 pound cow with a 450 pound calf in October would be regarded as 1.5 AU or [(1200 pound cow = 1.2 AU + (calf = 0.3 AU)]. Each calf is assumed to be about 0.5 AU from weaning until they reach 12 months of age.

Table 3. Animal unit values (AU) for different kinds and classes of livestock and wildlife. The standard for this guide is based on forage intake of a spring calving cow (1000 pound average milking ability) and her calf (less than four months in age).

Kind/Class of Animal	AU	# of Animals Equal to 1 AU
Cow (1000 lb) and calf (spring calving, above average milking ability, first 3-4 months postpartum)	1.00	1.0
Cow (1000 lb) non-lactating	0.90	1.1
Calf (spring calving, 3-4 months postpartum to weaning)	0.30	3.3
Replacement heifers (18-24 months)	1.00	1.0
Yearling cattle (Long; 12-17 months)	0.75	1.4
Yearling cattle (Short; 7-12 months)	0.50	2.0
Young bulls (12-24 months)	1.20	0.8
Bulls (24-60 months)	1.50	0.6
Yearling horses	0.75	1.3
Two-year-old horses	1.00	1.0
Mature horses	1.25	0.8
Mature lactating ewe (150 lb) and lamb (less than 2 months in age)	0.20	5.0
Mature non-lactating ewe (150 lb)	0.18	5.5
Lamb (2 months to weaning)	0.06	16.7
Lamb (weaned to yearling)	0.12	8.3
Lamb (yearling)	0.15	6.6
Ram	0.25	4.0
Goat (mature)	0.15	6.6
Kid (yearling)	0.10	10.0
White-tailed deer	0.15	6.6
Mule deer	0.20	5.0
Antelope	0.20	5.0
Bison (cow)	0.90	1.1
Bison (bull)	1.50	0.66
Elk	0.60	1.7
Moose	1.00	1.0
Bighorn	0.20	5.0
Mountain goat	0.15	6.6
Blacktailed jackrabbit	0.016	62
Whitetailed jackrabbit	0.02	48
Columbian ground squirrel	0.003	385
Prairie dogs	0.004	256

Game and non-game animals also consume forage. Accurate determinations are complicated by incomplete knowledge of quantitative forage requirements, their dietary habits compared with domestic stock, the efficiency of animals in making use of feeds and the extent to which they utilize the same areas as domestic stock. Therefore, the estimated comparative feed requirements of game and domestic stock should be used with caution (Table 3).

The big game numbers in Table 3 apply to mature animals. Just as offspring of livestock are considered to exert additional demand for forage when they reach two to four months of age, offspring of wildlife should also be considered. Failure to do so will underestimate grazing use, and could lead to range deterioration.

Balancing livestock numbers with available forage is a basic goal and principle of range management. Forage productivity benefits when livestock are evenly distributed, spring grazing is delayed, and plants are provided periods of rest between grazing periods. Information about stocking rates, range condition, rainfall, and grazing patterns should be collected and evaluated. Grazing management programs should be adjusted when the need arises.