

## BALANCING LIVESTOCK NUMBERS, FEED AND FORAGE ON RANCHING UNITS

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Many stockmen who are interested in adjusting their livestock numbers, lack a precise means of determining the stocking capabilities of their ranching units. The many factors involved in such a balance are apt to be confusing until they are catalogued and set forth in a manner that is easily understood. Even then, mathematical computations are necessary to bring the various components into balance. These components are the animal units on the one hand, and feed and forage resources on the other. In this discussion, feed and forage are distinguished: feed, referring only to harvested roughage that is fed as hay or ensilage; forage, including all types of grazing available for livestock.

For many years a system of balancing livestock numbers, feed and forage, has been used by range conservationists of the Soil Conservation Service in the Northern Plains States. The system used has been satisfactory. The author, in the hope of developing a simpler system that would still embody the advantages and accuracy of the original procedure, devised the method outlined in this discussion. It has been used with ranchers in central Wyoming since 1955 and is easily understood by them. In addition, it summarizes certain types of information in a manner

that permits simpler calculation of adjustment in size of breeding herd to meet changing conditions.

The author is indebted to Dr. E. J. Dyksterhuis for the use of basic methods of calculating available feed and forage resources on ranching units. Computation of these items is identical in the present and proposed systems.

The method outlined herein consists of two charts of information that must be accurately and completely compiled. They are designated, "A Summary of Livestock Operations," (Figure 1) and a "Ranch Organization Summary," (Figure 2). For ease of explanation, the two forms will be explained separately.

The *Summary of Livestock Operations*, inventory form, is completed first. Using information available to the rancher, certain management practices are assumed to be stable. These include such items as:

1. The type ranching enterprise, such as cow and calf, yearling steers, etc.
2. Numbers of breeding females per bull, ram or stud, if applicable.
3. Number of days that roughage feeding is commonly practiced, based upon climatic conditions and calving dates.
4. Approximate date livestock is marketed.
5. Percent of young expected.
6. Numbers, classes and ages of livestock found on the ranch during the period of one calendar year.
7. Other factors which affect numbers and classes of livestock in a typical one-year period.

Using the information listed

above, enter all classes of livestock found on the ranch during the year, in the left-hand column of the form. Next list numbers of each class involved. A careful analysis of the operation is often necessary to determine this information accurately. Assign to each age and class of livestock shown on the inventory, the current acceptable, animal unit equivalent in use in the locality. (e.g. one breeding cow equals 1 AUM).

On the basis of the information thus obtained, the 12 monthly columns are completed. Include all livestock on the ranch, and make all calculations carefully. Finally, delineate either by colored pencil, underlining or other means, the periods on the summary sheet during which roughage is being fed. Total the columns by months and class of livestock, providing a cross check for accuracy of addition. The resultant figures indicate the total AUM's feed being provided for animals on the ranch at the present time. Total AUM's can be divided into AUM's feed, and AUM's forage, and these totals entered on the appropriate position on the form.

The calculations now are made that provide the basic data for balancing the operation. The AUM's forage, required for a one-year operation, is divided by the total number of breeding animals, (or major livestock class on the unit). This figure is entered in the line marked "a". Total AUM's feed required during the one-year period is divided by the total number of breeding animals and the quotient placed on space marked "b". The two figures thus obtained are totaled, and this result is entered on line "c".

Operator..... Address..... Acres.....

Table 1. Summary of present operations

Kinds and Classes of Livestock	Number	AU Factor	AUM's Feed or Forage Required Each Month												AUM Totals
			Jan†	Feb†	Mar†	Apr†	May	June	July	Aug	Sept	Oct	Nov	Dec	
Cows (2 yrs and older)	95	1.0	79†	79†	79†	79†	95	95	95	95	95	95	79	40† 40	1045
Heifers (17-24 mos.)	16	0.8	13†	13†	13†	13†							13	7† 7	79
Steers and Heifers (12-17 months)	76	0.75					57	57	57	57	57	57			342
Steers and Heifers (7-12 months)	76	0.6	46†	46†	46†	46†							46	23† 23	276
Bulls	4	1.3	5.2†	5.2†	5.2†	5.2†	5.2	5.2	5.2	5.2	5.2	5.2	5.2	2.6† 2.6	62
TOTALS	XX	XX	143	143	143	143	157	157	157	157	157	157	143	73 73	1804

REMARKS: (Include essential items required to complete calendar year operations)

a—80% calf crop

b—6 yr life for breeding cow

c—1 bull = 25 females

d—marketing date approx. Nov. 1st.

e—roughage fed 15 Dec-1 May each year

(NOTE—79 breeding cows on feed during winter months instead of 95 since 16 are sold November 1st and replacement heifers are under 2 yrs. old)

† Denote periods on feed

COMPUTATIONS:

Total AUM's Forage Required, 1153

Total AUM's Feed Required, 651

a—Divide total AUM's forage required by the number of breeding animals (or major livestock enterprise)

Answer:  $1153 \div 95 = 12.15$

b—Divide total AUM's feed required by the same number of breeding animals

Answer:  $651 \div 95 = 6.85$

c—Total "a" plus "b" — Ans: 19.0

FIGURE 1. Summary of livestock operations.

The reason for making the calculations outlined in the paragraph above is explained as follows: For each animal to be kept on the ranch, the operator must provide a certain quantity of feed and forage. Since costs and expenses are commonly computed as "so much per cow unit," feed and forage requirements are prorated against the breeding cow. In the example shown, it will be noted that 19 AUM's of feed and forage are necessary to maintain each animal in the breeding herd, instead of 12 which would be the requirements for the cow alone.

Since it is often difficult for the stockman to visualize an inventory of stock for which he must furnish feed during the year, use of this form will simplify the operation. cursory examination will also indicate feed and

forage requirements by month, year and class of livestock.

Figure 2 illustrates use of the form for *Ranch Organization Summary*, balancing the operation. It is divided into four separate tables. When the tables are completed in the sequence shown, the factors and merits of balancing a ranching operation will unfold in a natural way.

Table 1 of Figure 2 lists all types of grazing available to the rancher. There is room to list grazing areas in acres, and a second column for conversion to AUM's. Grazing privileges on federal lands are often adjudicated on the basis of AUM's only, and in these cases there is no reason to specify acres of such permits. It will be necessary for the planning technician to make

an inventory of range sites, and to determine range condition class by pastures. From this information the available AUM's of grazing from native rangeland will be computed. Prospective grazing from crop aftermath, and temporary tame pastures are best determined from guides prepared locally, and adjusted to the fields and tame pastures of a specific ranch.

Totalling the AUM column of Table 1 indicates the total forage resources on the ranch.

The right hand side of Table 1 lists the same information for inventory of harvested roughages. By determining acres of various crop and approximate yields, the total yield of such crops is determined. Apply the rule of thumb—tons hay times 3 and tons silage times 1.5, to convert yield figures

**Table 1. Anticipated grazing and - - - planned harvested roughage**

Kind of Grazing	Pres. Acres	Plnd. Acres	Animal Unit Mos.	Roughage	Plnd. Acres	Yield in Tons	A.U.M. Equivalent
Permits, Federal	xxxx	xxxx	233	Native Hay			
State Leases	1280	1280	421	Tame Hay (I)	145	2.5	1089
Native Pasture	1400	1340	385	Tame Hay (D)			
Perm. Tame Past (I)				Grain Straw	45	1.0	45
Perm. Tame Past (D)		60	120	Silage			
Temp. Tame Pasture							
Crop Aftermath	45	45	45				
Meadow Grazing	185	140	140				
Odd Areas							
Total			1344	Total			1134

\* Tons hay x 3 and tons silage x 1.5 will permit accumulation of some emergency feed. Subtract unusually great amount put to reserves, or usual amount sold before entering as AUM's in Table II.

**Table 2. Distribution of total AUM's and indicated numbers of breeding animals**

AUM's available for Grazing	1344
AUM's available as roughage	1134
Total	2478

Divide the total AUM's by the figure under "c", Table I. This indicates the total safe size of the breeding herd.

$$2478 \text{ AUM's} \div 19 = 131$$

**Table 3. Balancing the operation based on planned land use and stocking numbers**

Divide the AUM's available for grazing by the figure from "a"—Table I. Your answer indicates the number of breeding animals that should be planned for available pasture.

$$1344 \div 12.15 = 110$$

Divide the total AUM's available as roughage by the figure from "b", Table I. The answer indicates the number of breeding animals the available roughage would support.

$$1135 \div 6.85 = 165$$

**Table 4. Summary of planned operation**

Kinds and Classes of Livestock	Number	AU Factor	† Jan	† Feb	† Mar	† Apr	May	June	July	Aug	Sept	Oct	Nov	† Dec	AUM Totals
Cows	110	1.0	92	92	92	92	110	110	110	110	110	110	92	46/46	1212
Heifers	18	0.8	14	14	14	14							14	7/7	86
Heifers & Steers	88	0.75					66	66	66	66	66	66			396
Steers & Heifers	88	0.6	53	53	53	53							53	27/27	319
Bulls	5	1.3	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3/3	78
TOTAL AUM'S			166	166	166	166	183	183	183	183	183	183	166	84/84	2092
AUM's Grazing Required			1344			AUM's Roughage Required			747						
AUM's Grazing Available			1344			AUM's Roughage Available			1134						
Difference			00			Difference			387						

(If differences are significant compute changes necessary on fresh forms using Tables on this page only)

Surplus of 129 Tons of Hay

**FIGURE 2. Ranch organization summary.**

to AUM equivalents. The three factors; livestock numbers, feed, and forage are all expressed in a common unit of measure and balancing operations can now be conducted.

Table 2 is divided into two parts. On the left hand side add the total grazing available, and the total harvested roughages to get the total of feed and forage on the unit for one calendar year. This figure represents the productive capacity of the ranching unit. On the right hand side the total AUM's of feed and forage is divided by the figure appearing on line "c", on the first page, the *Livestock Operations Summary*. The resultant quotient indicates the maximum size breeding herd that could be maintained. However, the availability of this feed and forage by months or seasons requires further consideration. Assuming that every acre of forage or feed can be utilized in the production of livestock, this figure indicates a safe size for the breeding herd.

Table 3 is the plan for livestock numbers and their sustenance. Here, available forage is divided by AUM's forage prorated per breeding animal over a one-year period. The divisor is obtained from line "a" on the livestock summary sheet. Likewise the AUM's feed is divided by the figure on line "b" on the first page (Table 1, Figure 1). The two individual answers show maximum size of breeding herd based on the available forage, and maximum size breeding herd based upon roughage production, respectively. Chances are the computations will point out that the forage will support a larger operation than will the roughage resources, or *vice versa*. Only in rare cases will the grass and roughage production on a ranch be in balance at this point.

The planning technician and the rancher now have at their disposal the necessary informa-

tion on which to plan a balanced unit. Depending upon the situation certain decisions will be necessary to effect the balance. When the figures show that pasture available will support a larger operation than the available feed, the operator may consider the following possibilities.

1. He may consider a reduction of total days on feed.
2. He may convert some lands from forage to the production of harvested roughage, if suitable land is available.
3. He may consider buying hay during feeding periods.
4. He may consider leasing some rangeland to other operators.
5. He may plan to "summer" additional steers or heifers, buying in the spring and selling in the fall.
6. He may plan for more intensive cultivation of his present crop and hayland, if practical.
7. He may consider a revision of his management system.
8. He may plan to use a combination of these factors, or decide on still other means to provide a balanced year-round operation.

When there is a shortage of range and other grazing and an excess of roughage, the operator may wish to consider the following in bringing his unit into balance.

1. Converting hayland to tame pasture.
2. "Wintering" additional animals for the spring market.
3. Leasing or otherwise obtaining additional rangeland.
4. Selling surplus hay.
5. Any other alternative which will bring feed, forage and livestock numbers into harmony.

The final table is a summary of these decisions, to guide the

rancher in the years ahead. If adjustments are needed, they are quickly computed as follows: Determine the ratio between present numbers of breeding animals (or major livestock enterprise) and the planned numbers. Apply this factor to all figures representing numbers of various ages and classes of livestock on the first page, *Livestock Operations Summary*. Enter the number thus derived in the appropriate place on Table 4 (adjusted Table 1). Complete the columns representing months of a one-year operation, and total by months and class of stock. Check the final answer by comparing feed and forage available from Table 1 with requirements as determined from Table 4 (adjusted Table 1). If computations have been accurately performed, the resultant comparison will of mathematical necessity be nearly equal.

### Summary

The balance between livestock numbers and available feed and forage is important if the benefits of range management studies are to be realized.

The system outlined offers a simple and understandable method for developing the information necessary to complete an effective balance.

Recognizing that one class of livestock is normally the predominant enterprise on a ranching unit (usually breeding animals), the consumption of all sustenance is accordingly charged against this class.

When using the balancing procedure outlined, a lack of balance between the components (1) number of animals, (2) feed, and (3) forage can quickly and easily be identified. The mechanics of the procedure used to develop the information, suggest many alternatives to the operator, upon which he may base decisions for needed adjustments.