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TEXAS AGRICULTURAL EXPERIMENT STATION

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COLLEGE STATION, BRAZOS COUNTY, TEXAS

BULLETIN NO. 586 JUNE 1940

DIVISION OF CHEMISTRY

and

DIVISION OF BOTANY

# Composition and Utilization of Range Vegetation of Sutton and Edwards Counties

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

T. O. WALTON, President

Chemical analyses were made of 349 samples of range vegetation, and a study of the various kinds of vegetation eaten by cattle, sheep and goats was made in Sutton and Edwards Counties. Cattle fed on the smallest numbers of different kinds of plants, sheep came next, while the diet of the goats was quite diversified.

The work indicated that the forage supplied sufficient quantities of lime (calcium) to the cattle, sheep and goats. The protein was probably insufficient in the rations of the cattle in February, March, April, and November of the years studied. The protein was probably insufficient in the rations of the sheep and goats only in one month (November) of the period studied. The phosphoric acid was probably insufficient in the ration of the cattle from September through February, that of the sheep in December 1930, January 1931 and September to December 1931, and that of the goats was probably deficient from October 1930 through February 1931 and October, November, and December 1931.

In order to facilitate comparisons, the percentages of protein, lime and phosphoric acid are expressed in grades for the various forages, with Grade No. 1 containing those with the highest percentage and Grade No. 5 containing those with the lowest.

CONTENTS

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# Composition and Utilization of Range Vegetation of Sutton and Edwards Counties

G. S. Fraps, Chief, Division of Chemistry, and V. L. Cory, Acting Chief, Division of Botany

It is well recognized that during some seasons of the year, range animals do well, while during other seasons, they are not so thrifty. Also ranges differ from one another. The same kinds of plants differ in nutritive value during the various seasons of the year. Investigation is needed to ascertain the extent of these differences and how to correct them.

In order to secure information as to the nutritive values of range vegetation at different seasons of the year in typical localities, an extensive series of samples of range vegetation was collected in Sutton County and Edwards County and subjected to analysis. Some of the samples were collected at different times during the season, while only a few samples of the others were collected. Some of the plants collected are eaten only to a small extent, by the range animals, and others not at all, but analyses seemed to be desirable.

The work was conducted from October 1930 to December 1931, inclusive, on the Ranch Experiment Station, (Texas Substation No. 14) which is located in Sutton and Edwards Counties, in the Edwards Plateau, where the pastures are fenced and in which grazing is continuous. Some of the samples were collected from a wider area. The native vegetation, according to Carter (Bulletin 431) is a thin cover of short grasses, largely buffalo and mesquite grasses, with scattered growth, in many places, of small trees, chiefly live oak and shin oak, with many shrubs. The elevation is 2000 to 4000 feet above sea level. The average annual rainfall is 20 to 25 inches. The soils are derived from limestone. Analyses reported by Fraps and Fudge in Bulletin 549 indicate that the soils have a fair to good content of total, acid-soluble, and active potash, acid-

**Rainfall recorded at Substation No. 14, Sonora, Texas**

| | Rainfall, inches | |
|---|---|---|
| | 1930 | 1931 |
| January | | 4.26 |
| February | | 5.78 |
| March | | 3.15 |
| April | | 1.21 |
| May | | 3.22 |
| June | | 1.60 |
| July | | 4.41 |
| August | | 4.36 |
| September | | 2.85 |
| October | 6.31 | 3.48 |
| November | 4.69 | 5.04 |
| December | 5.94 | 9.08 |
| Total | | 48.44 |

soluble lime and magnesia and basicity and are neutral to slightly alkaline in reaction. The content of total phosphoric and of active phosphoric acid are fair to low, while the nitrogen content ranges from fair to high.

As the climatic conditions affect the growth of the vegetation, the rainfall at Sonora, Sutton County, for the period of the study, is given below. The rainfall for October, November, and December 1930 was high, and for 1931 was considerably higher than the average.

During the period of collection of the samples, representative animals were followed on the range, and the time spent by them in grazing on different kinds of plants was recorded. This record was taken as a rough measure of the quantity of the various forages being eaten.

Cory, in a previous bulletin (367) gives a description of the activities of cattle, sheep, and goats on the range, and a summary of the time spent in travel, in feeding, drinking water, and resting, together with descriptions of the more important plants that were eaten.

The term *forbs* is applied to herbaceous plants, not grasses, which are eaten by cattle, sheep and goats and are sometimes called weeds.

## Composition of the Vegetation

The usual feeding analyses of the various kinds of plants collected and dried (numbering 349) are given in Table 1 together with the date of collection. They are arranged in alphabetical order, according to the botanical name. The ordinary name is also given, when available.

Table 2 contains a list of the ordinary names used in this locality, together with the corresponding botanical names. The ordinary name may be different in different localities for the same kind of plant, as shown by the botanical name, and the same ordinary name may be used for different kinds of plants, so that the ordinary name is not always definite.

These analyses show not only the composition of the plants eaten by the cattle, sheep and goats, but also the composition of some of the other vegetation. With the forages eaten more frequently by the animals, several analyses were made at different periods of growth. The younger plants are usually higher in protein, and lower in crude fiber, than the older plants. Some of the old plants are very low in protein. The mineral content of potash ($K_2O$), lime (CaO), magnesia (MgO), phosphoric acid ($P_2O_5$), and the grades in protein, lime and phosphoric acid are given in Table 4.

## Grades of Protein, Lime, and Phosphoric Acid in the Vegetation

In order to facilitate comparison of the composition of the samples, they are grouped into 5 classes or grades, according to their content of protein, phosphoric acid and lime. A similar system of grading the percentages of constitutents has been used with soils (Bul. 449) and the same system with forage grasses of the East Texas Timber Country (Bul. 582). The grades are to a certain extent empirical, but the grouping of the analyses has been made so as to carry as much meaning as possible. The grades selected, with their provisional interpretation, are given in

**Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis**

| Stage of growth or character of sample | Date collected | Protein | Ether extract | Crude fiber | Nitrogen free extract | Water | Ash |
|---|---|---|---|---|---|---|---|
| | 1930–31 | | | | | | |
| Abutilon incanum, Indian mallow | | | | | | | |
| fruiting | 6/13/31 | 17.55 | 1.32 | 22.44 | 41.58 | 7.39 | 9.72 |
| preflowering | 8/24/31 | 18.70 | 1.95 | 19.31 | 44.43 | 6.93 | 8.68 |
| Acacia angustissima, prairie guajillo | | | | | | | |
| foliage | 5/ 1/31 | 27.37 | 2.43 | 14.68 | 44.33 | 7.02 | 4.17 |
| tops of flowering | 7/15/31 | 22.03 | 4.61 | 16.83 | 44.94 | 6.71 | 4.88 |
| Acacia Roemeriana, catsclaw | | | | | | | |
| foliage | 6/ 1/31 | 19.58 | 2.34 | 18.71 | 48.27 | 6.93 | 4.17 |
| foliage | 7/14/31 | 18.60 | 4.31 | 18.98 | 46.30 | 6.37 | 5.62 |
| Acalypha gracilens, slender three-seeded mercury | | | | | | | |
| fruiting | 8/28/31 | 14.77 | 3.25 | 16.43 | 49.94 | 7.89 | 7.72 |
| Acleisanthes longiflora, angel trumpets | | | | | | | |
| preflowering | 7/14/31 | 22.75 | 1.94 | 23.07 | 35.42 | 6.36 | 10.46 |
| Actinea odorata, poison bitterweed | | | | | | | |
| stems and leaves preflowering | 1/23/31 | 31.21 | 3.05 | 8.12 | 38.92 | 8.07 | 10.63 |
| stems and leaves preflowering | 2/24/31 | 29.68 | 3.01 | 11.89 | 33.64 | 9.82 | 11.96 |
| stems and leaves flowering | 4/ 1/31 | 11.04 | 3.26 | 19.29 | 52.39 | 8.24 | 5.78 |
| Actinea scaposa linearis | | | | | | | |
| fruiting | 6/ 2/31 | 11.52 | 6.70 | 23.45 | 41.95 | 7.90 | 8.48 |
| Agave lecheguilla, lechuguilla | | | | | | | |
| foliage minus points and bases | 2/27/31 | 6.50 | 2.23 | 25.96 | 52.15 | 4.91 | 8.25 |
| Allium Drummondii, white onion | | | | | | | |
| green parts | 4/30/31 | 11.46 | 1.75 | 20.69 | 50.21 | 8.64 | 7.25 |
| Alternanthera repens | | | | | | | |
| fruiting | 8/24/31 | 19.64 | 1.50 | 13.79 | 38.18 | 7.00 | 19.89 |
| Amaranthus Berlandieri | | | | | | | |
| fruiting | 8/24/31 | 24.46 | 1.59 | 10.47 | 37.61 | 6.45 | 19.42 |
| Amaranthus blitoides | | | | | | | |
| green parts | 6/ 1/31 | 25.29 | 1.33 | 10.99 | 36.30 | 6.20 | 19.89 |
| fruiting | 8/24/31 | 17.25 | 1.18 | 12.21 | 38.17 | 6.58 | 24.61 |
| Amaranthus Palmeri | | | | | | | |
| flowering spikes | 8/24/31 | 15.82 | 1.94 | 20.00 | 44.20 | 7.20 | 10.84 |
| Amaranthus retroflexus | | | | | | | |
| green parts | 6/ 1/31 | 23.91 | 1.38 | 9.98 | 40.09 | 7.11 | 17.53 |
| Ambrosia psilostachya, ragweed | | | | | | | |
| green parts | 6/ 3/31 | 21.82 | 4.95 | 10.98 | 39.25 | 8.65 | 14.35 |
| Andropogon cirratus | | | | | | | |
| plants in head | 9/28/31 | 3.35 | 1.67 | 33.62 | 49.06 | 7.95 | 4.35 |
| Andropogon saccharoides, silver beardgrass | | | | | | | |
| stems and foliage | 6/14/31 | 7.50 | 1.60 | 32.00 | 42.24 | 7.22 | 9.44 |
| green growth; preheading | 7/13/31 | 10.35 | 2.08 | 30.14 | 42.79 | 6.62 | 8.02 |
| past maturity, stems out | 11/11/31 | 3.73 | 1.72 | 31.36 | 47.92 | 6.64 | 8.63 |

**Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.**

| Stage of growth or character of sample | Date collected | Protein | Ether extract | Crude fiber | Nitrogen free extract | Water | Ash |
|---|---|---|---|---|---|---|---|
| | 1930–31 | | | | | | |
| Aphanostephus humilis | | | | | | | |
| green parts | 4/30/31 | 12.33 | 2.28 | 17.17 | 52.08 | 7.96 | 8.18 |
| flowering | 5/23/31 | 7.96 | 2.57 | 26.57 | 48.62 | 7.81 | 6.47 |
| flowering and fruiting | 7/14/31 | 14.15 | 3.38 | 24.47 | 43.25 | 7.09 | 7.66 |
| Aristida purpurea, purple three-awn grass | | | | | | | |
| past maturity | 9/26/31 | 5.47 | 1.57 | 31.21 | 45.92 | 7.86 | 7.97 |
| past maturity; some green basal growth | 10/19/31 | 5.60 | 1.49 | 29.64 | 44.60 | 7.93 | 10.74 |
| past maturity; some green basal growth | 11/13/31 | 6.07 | 1.28 | 32.56 | 43.81 | 6.85 | 9.42 |
| mixed cured and green | 12/14/31 | 6.08 | 1.47 | 35.01 | 45.67 | 6.38 | 5.39 |
| Aristida Wrightii, Wright three-awn grass | | | | | | | |
| mostly mature | 11/20/30 | 6.45 | 1.56 | 30.88 | 44.09 | 6.58 | 10.44 |
| mostly mature | 12/19/30 | 8.90 | 1.58 | 25.84 | 42.98 | 7.51 | 13.19 |
| cured growth | 2/ 3/31 | 6.62 | 1.42 | 28.22 | 45.40 | 7.33 | 11.01 |
| mixed green and cured | 2/25/31 | 8.70 | 1.69 | 25.23 | 43.36 | 8.85 | 12.17 |
| green foliage and stems | 6/ 4/31 | 7.21 | 1.26 | 35.06 | 41.23 | 7.23 | 8.01 |
| foliage, mostly green | 8/24/31 | 7.36 | 1.89 | 31.74 | 43.36 | 6.11 | 9.54 |
| matured | 9/26/31 | 5.56 | 1.48 | 33.60 | 42.49 | 7.59 | 9.28 |
| Artemisia vulgaris gnaphalodes, woolly wormwood | | | | | | | |
| tops of preflowering plants | 7/13/31 | 10.56 | 5.55 | 31.20 | 39.76 | 7.01 | 5.92 |
| Aster ericoides | | | | | | | |
| budding and flowering | 9/28/31 | 6.92 | 4.53 | 19.17 | 54.55 | 9.01 | 5.82 |
| Astragalus Nuttallianus, Nuttall milkvetch | | | | | | | |
| young green | 3/24/31 | 20.80 | 2.72 | 13.48 | 46.27 | 7.98 | 8.75 |
| Astragalus macilentus, thin milkvetch | | | | | | | |
| young green | 3/23/31 | 21.67 | 2.23 | 15.73 | 45.02 | 8.09 | 7.26 |
| Avena sativa, oats | | | | | | | |
| luxuriant green growth | 12/18/30 | 25.63 | 5.00 | 16.59 | 30.15 | 8.96 | 13.67 |
| Berberis trifoliata, agrito | | | | | | | |
| mature foliage | 11/19/31 | 10.32 | 2.38 | 30.59 | 47.61 | 6.13 | 2.97 |
| Bouteloua curtipendula, side-oats grama | | | | | | | |
| mostly mature | 12/19/30 | 6.41 | 2.04 | 25.71 | 46.29 | 7.60 | 12.22 |
| mostly plants in head | 7/13/31 | 7.56 | 1.66 | 33.70 | 43.59 | 6.50 | 6.99 |
| Bouteloua hirsuta, hairy grama | | | | | | | |
| fruiting | 8/31/31 | 7.71 | 1.66 | 31.89 | 44.61 | 6.49 | 7.64 |
| Bouteloua trifida, red grama | | | | | | | |
| past maturity | 9/26/31 | 6.99 | 2.08 | 30.34 | 44.49 | 8.15 | 7.95 |
| Boerhaavia tenuifolia | | | | | | | |
| flowering | 8/28/31 | 10.61 | 2.00 | 22.57 | 48.80 | 7.20 | 8.82 |
| Bromus catharticus, rescue grass | | | | | | | |
| foliage, preheading | 3/23/31 | 11.08 | 2.43 | 24.99 | 46.30 | 7.20 | 8.00 |
| plants in head | 5/ 1/31 | 11.65 | 1.19 | 24.60 | 49.53 | 7.76 | 5.27 |
| foliage, preheading | 2/24/31 | 21.99 | 3.22 | 20.16 | 36.42 | 8.81 | 9.40 |
| Buchloe dactyloides, buffalo grass | | | | | | | |
| luxuriant green growth; second clipping | 5/28/30 | 11.55 | 1.79 | 23.85 | 48.31 | 7.02 | 7.48 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| luxuriant maturing growth | 10/20/30 | 7.71 | 1.61 | 23.67 | 45.56 | 7.41 | 14.04 |
| mostly mature | 11/19/30 | 7.41 | 1.69 | 23.06 | 46.66 | 7.31 | 13.87 |
| mostly mature | 12/19/30 | 6.58 | 1.35 | 25.18 | 46.89 | 7.96 | 12.04 |
| mostly green | 4/30/31 | 12.01 | 2.30 | 25.00 | 46.21 | 7.27 | 7.21 |
| luxuriant green | 6/ 1/31 | 11.85 | 1.57 | 26.64 | 42.47 | 7.49 | 9.98 |
| green growth after mowing | 7/ 9/31 | 11.92 | 1.86 | 25.81 | 42.66 | 7.55 | 10.20 |
| partly cured foliage | 8/31/31 | 8.75 | 1.74 | 22.74 | 45.26 | 6.48 | 15.03 |
| Bumelia texana | | | | | | | |
| mature foliage | 11/18/30 | 12.29 | 9.69 | 23.90 | 42.23 | 5.65 | 6.24 |
| Callirrhoe pedata, annual poppy mallow | | | | | | | |
| green parts | 6/ 2/31 | 9.55 | 2.46 | 27.94 | 43.98 | 7.50 | 8.57 |
| Carex planostachys, thicket sedge | | | | | | | |
| green | 11/20/30 | 12.16 | 1.56 | 23.61 | 46.80 | 6.69 | 9.18 |
| green | 2/25/31 | 10.75 | 1.78 | 24.53 | 43.83 | 9.71 | 9.40 |
| mostly green foliage | 11/12/31 | 5.80 | 1.56 | 26.08 | 51.02 | 6.96 | 8.58 |
| green foliage | 12/14/31 | 7.52 | 2.00 | 26.48 | 47.22 | 6.92 | 9.86 |
| Cassia Roemeriana, Roemer senna | | | | | | | |
| leaves of mature plants | 7/ 9/31 | 16.74 | 2.33 | 10.50 | 51.87 | 7.92 | 10.64 |
| tops with flowers and fruits | 8/28/31 | 17.88 | 2.12 | 15.66 | 47.91 | 7.33 | 9.10 |
| Celtis reticulata, hackberry | | | | | | | |
| foliage | 6/ 3/31 | 14.35 | 1.55 | 16.88 | 44.01 | 8.81 | 14.40 |
| Centaurium calycosum, centaury | | | | | | | |
| flowering plants | 6/ 2/31 | 8.55 | 3.40 | 17.21 | 60.87 | 6.64 | 3.33 |
| Chamaesaracha sordida | | | | | | | |
| flowering and fruiting plants | 9/ 5/31 | 21.66 | 2.72 | 14.54 | 39.56 | 7.49 | 14.03 |
| Chenopodium albescens | | | | | | | |
| green parts | 5/ 1/31 | 25.13 | 1.63 | 10.46 | 30.38 | 6.57 | 25.83 |
| Chloris virgata, feather fingergrass | | | | | | | |
| fruiting plants | 8/31/31 | 10.01 | 1.91 | 31.10 | 42.70 | 6.37 | 7.91 |
| Chloris sp. | | | | | | | |
| cultivated-preheading plants | 8/24/31 | 13.83 | 2.35 | 28.29 | 39.55 | 6.42 | 9.56 |
| Cirsium austrinlum, Southern pasture thistle | | | | | | | |
| green parts | 5/ 1/31 | 22.79 | 2.51 | 13.18 | 39.62 | 8.31 | 13.59 |
| Clematis Drummcndii, Texas virgin bower | | | | | | | |
| flowering plants | 8/31/31 | 14.71 | 1.89 | 25.71 | 45.92 | 6.76 | 5.01 |
| Colubrina texensis | | | | | | | |
| foliage from young growth | 11/19/31 | 19.80 | 2.87 | 12.10 | 49.82 | 8.32 | 7.09 |
| foliage from new growth | 11/12/31 | 16.03 | 5.44 | 9.53 | 52.55 | 7.56 | 8.89 |
| Condalia obtusifolia, lote bush | | | | | | | |
| foliage | 6/ 4/31 | 21.30 | 1.88 | 8.38 | 54.75 | 7.67 | 6.02 |
| foliage | 7/15/31 | 20.41 | 2.47 | 10.33 | 51.94 | 6.63 | 8.22 |
| Corydalis aurea occidentalis, fanutcry | | | | | | | |
| stems and leaves | 12/18/31 | 35.75 | 3.06 | 8.60 | 31.31 | 7.91 | 13.37 |
| Croton corymbulosus | | | | | | | |
| green parts | 6/ 5/31 | 17.02 | 2.81 | 16.90 | 50.15 | 7.29 | 5.83 |
| Croton monanthogynus, annual croton | | | | | | | |
| green parts | 6/ 2/31 | 20.52 | 3.14 | 16.37 | 44.17 | 7.10 | 8.70 |
| fruiting plants | 8/31/31 | 15.45 | 3.88 | 23.80 | 42.84 | 6.55 | 7.48 |
| tops of fruiting plants | 9/28/31 | 9.64 | 5.69 | 23.93 | 47.65 | 7.21 | 5.88 |
| fruiting tops | 10/20/31 | 11.49 | 4.87 | 24.90 | 44.43 | 7.28 | 7.03 |

**Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.**

| Stage of growth or character of sample | Date collected | Protein | Ether extract | Crude fiber | Nitrogen free extract | Water | Ash |
|---|---|---|---|---|---|---|---|
| | 1930–31 | | | | | | |
| Croton neomexicanus, New Mexico croton | | | | | | | |
| fruiting plants | 10/ 3/31 | 15.14 | 3.88 | 22.00 | 45.29 | 7.47 | 6.22 |
| Cucurbita foetidissima, prairie gourd | | | | | | | |
| foliage of fruiting plants | 7/15/31 | 23.44 | 3.73 | 9.43 | 35.93 | 7.58 | 19.89 |
| Cuscuta exaltata, liveoak dodder | | | | | | | |
| succulent stems | 7/13/31 | 7.12 | 1.56 | 22.85 | 59.38 | 6.37 | 2.72 |
| Cynodon dactylon, Bermuda grass | | | | | | | |
| luxuriant maturing growth | 10/21/30 | 12.37 | 1.99 | 21.78 | 45.71 | 7.25 | 10.90 |
| mature growth | 11/20/30 | 9.84 | 1.55 | 23.21 | 47.59 | 7.19 | 10.62 |
| mature growth | 12/19/30 | 8.37 | 1.35 | 31.64 | 51.90 | 7.76 | 8.98 |
| luxuriant green growth | 6/ 3/31 | 17.85 | 1.64 | 24.07 | 37.77 | 6.93 | 11.74 |
| plants heading | 7/ 9/31 | 11.10 | 1.77 | 23.43 | 47.11 | 7.04 | 9.55 |
| partly cured foliage | 8/31/31 | 8.34 | 1.48 | 21.64 | 53.32 | 6.47 | 8.75 |
| luxuriant green growth | 10/20/31 | 14.91 | 2.49 | 21.52 | 45.08 | 7.12 | 8.88 |
| luxuriant green growth | 11/11/31 | 12.45 | 2.30 | 24.94 | 44.96 | 7.04 | 8.31 |
| luxuriant partly cured growth | 12/12/31 | 10.16 | 1.50 | 25.59 | 46.94 | 7.29 | 8.52 |
| Dasylirion texanum, sotol | | | | | | | |
| distal portions of foliage | 2/27/31 | 6.61 | 1.97 | 36.20 | 45.12 | 7.29 | 2.81 |
| Daucus pusillus, wild carrot | | | | | | | |
| green parts | 5/ 1/31 | 10/85 | 2.86 | 14.39 | 55.39 | 8.09 | 8.49 |
| fruiting umbels | 6/17/31 | 10.44 | 8.58 | 19.95 | 42.81 | 9.68 | 8.54 |
| Descurainia pennata, tansy mustard | | | | | | | |
| green parts of flowering plants | 2/25/31 | 34.20 | 1.99 | 14.67 | 28.20 | 8.59 | 12.35 |
| Desmanthus fallax | | | | | | | |
| flowering | 6/ 2/31 | 17.09 | 2.34 | 18.91 | 48.78 | 7.77 | 5.11 |
| Digitaria sanguinalis, crab grass | | | | | | | |
| plants heading | 7/ 9/31 | 12.33 | 2.82 | 26.40 | 38.23 | 6.93 | 13.29 |
| Digitaria sp. | | | | | | | |
| cultivated, fruiting plants | 8/24/31 | 12.56 | 3.13 | 30.33 | 38.11 | 6.51 | 9.36 |
| Diospyros texana, Mexican persimmon | | | | | | | |
| mature foliage | 10/16/30 | 11.52 | 9.64 | 18.98 | 45.19 | 6.01 | 8.66 |
| younger foliage | 6/ 1/31 | 15.21 | 3.99 | 20.39 | 46.03 | 6.93 | 7.45 |
| foliage; mostly diseased | 10/20/31 | 9.87 | 7.13 | 19.38 | 43.80 | 6.65 | 13.17 |
| Draba cuneifolia, Whitlow wart | | | | | | | |
| green parts of flowering plants | 2/21/31 | 14.40 | 1.92 | 16.06 | 43.28 | 8.55 | 13.79 |
| Echinochloa colonum, jungle rice | | | | | | | |
| fruiting plants | 8/24/31 | 16.30 | 2.24 | 27.77 | 34.66 | 6.23 | 12.80 |
| Elymus brachystachys, wild rye | | | | | | | |
| plants in head | 6/ 2/31 | 11.93 | 1.48 | 32.93 | 37.95 | 6.77 | 8.94 |
| Engelmannia pinnatifida | | | | | | | |
| foliage, rosette stage | 2/25/31 | 21.59 | 1.10 | 9.24 | 44.94 | 6.94 | 16.19 |
| foliage and stems | 4/29/31 | 13.87 | 1.81 | 23.95 | 41.90 | 8.52 | 9.95 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ephedra antisyphilitica, jointfir | | | | | | | |
| green stems of budding plants | 3/ 1/31 | 6.55 | 1.43 | 31.86 | 48.66 | 5.50 | 6.00 |
| Eragrostis cilianensis, stinkgrass | | | | | | | |
| maturing plants | 8/24/31 | 11.37 | 1.46 | 25.88 | 44.38 | 6.73 | 10.18 |
| Erigeron canadensis, Canada fleabone | | | | | | | |
| tops of flowering plants | 8/ 6/31 | 14.90 | 1.81 | 26.12 | 46.43 | 2.54 | 8.20 |
| Eriochloa gracilis | | | | | | | |
| fruiting plants | 9/ 5/31 | 12.07 | 2.19 | 26.90 | 40.11 | 8.93 | 9.80 |
| Erodium cicutarium, filaree | | | | | | | |
| green parts—flowering stage | 2/27/31 | 24.44 | 1.80 | 11.95 | 37.38 | 9.88 | 14.55 |
| Erodium texanum, large-flowered stork's bill | | | | | | | |
| foliage from Sonora | 2/24/31 | 23.19 | 2.26 | 7.73 | 47 26 | 7.97 | 11.59 |
| foliage from Sanderson | 2/27/31 | 21.38 | 2.08 | 7.10 | 51.15 | 9.45 | 8.84 |
| Euphorbia cictyesperma | | | | | | | |
| young plants | 3/30/31 | 11.81 | 3.30 | 10.33 | 60.84 | 7.64 | 6.08 |
| Euphorbia prostrata | | | | | | | |
| fruiting plants | 8/24/31 | 14.76 | 4.28 | 13.82 | 45.58 | 7.26 | 14.30 |
| Evax multicaulis, evax | | | | | | | |
| young plants | 3/30/31 | 13.03 | 2.00 | 18.73 | 38.91 | 6.78 | 20.55 |
| mature plants | 5/15/31 | 10.47 | 2.20 | 30.22 | 38.54 | 6.76 | 11.81 |
| Evax prolifera, evax | | | | | | | |
| mature plants | 6/ 2/31 | 7.01 | 2.52 | 33.13 | 27.42 | 6.62 | 23.30 |
| Festuca octoflora, annual fescue grass | | | | | | | |
| young plants—preheading | 3/23/31 | 18.29 | 3.01 | 21.86 | 41.32 | 7.04 | 8.48 |
| green plants in head | 4/26/31 | 9.36 | 2.05 | 27.34 | 47.33 | 7.21 | 6.71 |
| Forbs, mixed | | | | | | | |
| stems and foliage | 10/18/30 | 20.32 | 3.64 | 13.21 | 41.09 | 7.36 | 14.38 |
| stems and foliage | 12/18/30 | 34.71 | 2.15 | 9.17 | 32.85 | 8.46 | 12.66 |
| young plants | 2/ 3/31 | 22.42 | ..... | 8.90 | ..... | ..... | 20.82 |
| Forestiera neomexicana | | | | | | | |
| young foliage | 3/30/31 | 18.39 | 2.69 | 8.83 | 57.65 | 6.41 | 6.03 |
| foliage | 6/ 4/31 | 11.78 | 1.77 | 15.04 | 56.84 | 7.31 | 7.26 |
| foliage | 7/15/31 | 8.81 | 1.85 | 11.99 | 64.22 | 6.04 | 7.09 |
| Gaillardia pulchella, Indian blanket | | | | | | | |
| fruiting plants | 6/ 4/31 | 11.97 | 4.26 | 26.37 | 39.44 | 7.58 | 10.38 |
| Gaura coccinea | | | | | | | |
| fruiting plants | 6/17/31 | 10.95 | 2.20 | 23.80 | 48.39 | 7.77 | 6.89 |
| budding plants | 8/31/31 | 13.35 | 3.86 | 16.94 | 52.07 | 7.23 | 6.55 |
| Gaura parviflora | | | | | | | |
| fruiting plants | 5/ 1/31 | 23.39 | 1.78 | 14.47 | 40.76 | 7.85 | 11.75 |
| Geranium carolinianum, geranium | | | | | | | |
| green parts | 4/30/31 | 12.24 | 1.84 | 15.33 | 50.57 | 7.98 | 12.04 |
| Grasses, mixed (Carex, Stipa, Elymus, etc.) | | | | | | | |
| green | 1/24/31 | 12.03 | 2.09 | 23.83 | 44.25 | 7.35 | 10.45 |
| green growth | 12/18/31 | 12.54 | 2.16 | 22.44 | 42.13 | 8.04 | 12.69 |
| Gutierrezia microcephala, (perennial) snakeweed | | | | | | | |
| flowering plants | 10/ 3/31 | 9.55 | 14.65 | 20.85 | 43.45 | 7.55 | 3.94 |
| Gutierrezia texana, (annual) snakeweed | | | | | | | |
| green parts | 6/ 1/31 | 13.72 | 6.68 | 17.74 | 49.30 | 6.91 | 5.65 |
| Hedeoma Drummondii | | | | | | | |
| fruiting plants | 6/ 2/31 | 9.93 | 3.50 | 27.48 | 43.09 | 8.65 | 7.35 |

**Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.**

| Stage of growth or character of sample | Date collected | Protein | Ether extract | Crude fiber | Nitrogen free extract | Water | Ash |
|---|---|---|---|---|---|---|---|
| | 1930–31 | | | | | | |
| Helenium microcephalum, small-headed sneezeweed | | | | | | | |
| preflowering plants | 4/22/31 | 17.11 | 4.38 | 10.02 | 48.59 | 8.67 | 11.23 |
| Helianthus annuus, sunflower | | | | | | | |
| foliage of flowering plants | 7/14/31 | 18.91 | 6.41 | 9.86 | 41.31 | 7.91 | 15.60 |
| Helianthus ciliaris, blueweed | | | | | | | |
| tops of flowering plants | 7/15/31 | 14.63 | 4.99 | 14.85 | 45.00 | 8.14 | 12.39 |
| Hilaria Belangeri, curly mesquite grass | | | | | | | |
| fresh green growth | 10/20/30 | 16.04 | 2.29 | 23.75 | 36.19 | 7.12 | 14.61 |
| mostly mature growth | 10/21/30 | 9.44 | 2.28 | 24.73 | 41.07 | 8.14 | 14.34 |
| with flowering stalks | 11/19/30 | 9.79 | 2.41 | 24.40 | 42.43 | 6.74 | 14.23 |
| mostly mature growth | 12/19/30 | 6.11 | 2.06 | 23.46 | 44.07 | 6.63 | 17.67 |
| cured growth | 1/23/31 | 6.01 | 2.02 | 25.98 | 44.09 | 7.92 | 13.98 |
| cured growth | 2/25/31 | 5.32 | 2.16 | 25.80 | 43.36 | 7.92 | 15.44 |
| large green growth | 6/ 2/31 | 9.04 | 2.55 | 27.80 | 43.81 | 6.89 | 9.91 |
| plants in head | 7/ 9/31 | 10.13 | 2.19 | 26.95 | 40.52 | 7.13 | 13.08 |
| green plants | 8/31/31 | 10.13 | 2.19 | 28.15 | 38.51 | 5.99 | 15.03 |
| partly cured foliage | 9/22/31 | 7.15 | 2.38 | 26.78 | 44.26 | 8.16 | 11.27 |
| cured foliage | 10/19/31 | 6.24 | 2.42 | 24.74 | 46.32 | 8.03 | 12.25 |
| cured foliage | 11/13/31 | 5.15 | 1.91 | 26.51 | 44.23 | 7.08 | 15.12 |
| cured foliage | 12/14/31 | 7.05 | 2.56 | 28.13 | 44.87 | 6.65 | 10.74 |
| Hordeum pusillum, little barley | | | | | | | |
| green plants in head | 4/30/31 | 9.58 | 1.64 | 27.59 | 47.37 | 6.25 | 7.57 |
| Hoffmanseggia brachycarpa | | | | | | | |
| fruiting plants | 8/28/31 | 13.60 | 2.32 | 15.77 | 53.41 | 7.59 | 7.31 |
| Houstonia angustifolia | | | | | | | |
| fruiting tops | 10/20/31 | 7.35 | 7.04 | 24.05 | 50.06 | 7.99 | 3.51 |
| Juniperus Pinchoti, Pinchot juniper | | | | | | | |
| fruits—mature | 12/18/30 | 5.94 | 11.12 | 29.35 | 35.98 | 14.77 | 2.84 |
| foliage | 3/24/31 | 7.93 | 9.48 | 18.45 | 52.05 | 7.66 | 4.43 |
| Kallstroemia intermedia, caltrop | | | | | | | |
| fruiting plants | 6/17/31 | 16.95 | 1.91 | 18.29 | 42.88 | 7.18 | 12.79 |
| Krameria secundiflora | | | | | | | |
| fruiting plants | 6/ 4/31 | 13.31 | 1.52 | 16.77 | 55.97 | 7.35 | 5.08 |
| Lepidium lasiocarpum Wrightii, Wright peppergrass | | | | | | | |
| young stems and leaves | 1/24/31 | 34.83 | 1.56 | 9.60 | 31.72 | 8.12 | 14.17 |
| preflowering mostly | 2/24/31 | 37.40 | 1.87 | 12.51 | 31.26 | 6.19 | 10.77 |
| flowering mostly | 3/23/31 | 24.72 | 1.58 | 17.12 | 40.46 | 7.73 | 8.39 |
| flowering and fruiting mostly | 4/29/31 | 20.38 | 2.13 | 24.08 | 38.10 | 7.78 | 7.53 |
| Leptochloa dubia, sprangletop | | | | | | | |
| plants in head | 8/31/31 | 10.91 | 1.97 | 30.37 | 41.68 | 6.25 | 8.82 |
| Leptolema cognatum, fall witchgrass | | | | | | | |
| plants in head | 6/ 2/31 | 11.36 | 1.85 | 33.95 | 36.23 | 6.96 | 9.15 |
| matured plants | 9/22/31 | 6.49 | 2.38 | 34.53 | 42.75 | 8.00 | 5.85 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lesquerella Gordoni, Gordon bladderpod | | | | | | | |
| green parts—budding stage | 2/24/31 | 24.60 | 1.48 | 14.03 | 37.59 | 8.75 | 13.55 |
| green flowering and fruiting stage | 3/24/31 | 19.59 | 2.04 | 15.90 | 44.28 | 8.53 | 9.66 |
| Leucaena retusa | | | | | | | |
| foliage of flowering trees | 7/14/31 | 16.24 | 3.60 | 22.37 | 43.85 | 8.08 | 5.86 |
| Leucophyllum minus | | | | | | | |
| flowering plants | 8/18/31 | 6.64 | 5.36 | 24.23 | 54.12 | 6.23 | 3.52 |
| Liatris punctata, dotted button snakeroot | | | | | | | |
| flowering plants | 10/ 3/30 | 6.94 | 8.13 | 27.08 | 40.88 | 7.82 | 9.15 |
| Limnodea arkansana | | | | | | | |
| mature green growth | 4/30/31 | 10.60 | 2.18 | 27.03 | 46.67 | 7.41 | 6.11 |
| Lonicera albiflora, white-flowered honeysuckle | | | | | | | |
| foliage | 6/ 4/31 | 9.85 | 2.29 | 8.40 | 61.94 | 8.66 | 8.86 |
| Lupinis texensis, bluebonnet | | | | | | | |
| foliage | 5/ 1/31 | 13.57 | 1.78 | 18.69 | 49.12 | 8.03 | 8.81 |
| flowers | 5/ 1/31 | 16.07 | 2.31 | 22.61 | 44.78 | 8.15 | 8.08 |
| Martynia lousisiarica, unicorn plant | | | | | | | |
| foliage of fruiting plants | 7/11/31 | 17.04 | 8.86 | 5.78 | 37.99 | 6.26 | 24.07 |
| Melampodium leucantum | | | | | | | |
| flowering plants | 8/28/31 | 12.49 | 9.32 | 14.79 | 47.13 | 7.17 | 9.15 |
| Mimosa fragrans, fragrant catsclaw | | | | | | | |
| foliage | 8/29/31 | 19.20 | 3.25 | 19.74 | 44.47 | 6.69 | 6.65 |
| Morus microphylla, mulberry | | | | | | | |
| foliage | 7/15/31 | 14.65 | 5.16 | 11.08 | 46.43 | 7.95 | 14.73 |
| Nama hispidum | | | | | | | |
| fruiting plants | 6/ 3/31 | 10.50 | 2.09 | 21.24 | 46.89 | 9.01 | 10.27 |
| Nama jamaicense | | | | | | | |
| fruiting plants | 5/ 1/31 | 15.36 | 2.20 | 14.02 | 37.80 | 7.21 | 23.41 |
| Nolina texana (Sacahuiste) | | | | | | | |
| including succulent bases | 11/20/30 | 6.81 | 3.00 | 36.40 | 39.21 | 7.61 | 6.97 |
| tips of foliage | 12/18/30 | 7.05 | 3.76 | 37.95 | 44.10 | 4.72 | 2.42 |
| new growth of foliage after burning | 12/18/30 | 7.90 | 1.70 | 42.53 | 39.01 | 6.56 | 2.30 |
| whole lengths of foliage | 12/18/30 | 5.06 | 3.52 | 38.33 | 42.27 | 5.38 | 5.44 |
| distal ends of foliage | 1/28/31 | 5.57 | 3.06 | 40.31 | 42.96 | 5.95 | 2.13 |
| whole lengths of foliage | 1/28/31 | 5.67 | 3.08 | 39.70 | 43.23 | 3.26 | 5.06 |
| foliage | 2/25/31 | 5.18 | 2.91 | 35.93 | 42.54 | 7.71 | 5.73 |
| foliage | 10/21/31 | 5.27 | 3.08 | 43.26 | 39.62 | 6.17 | 2.60 |
| foliage with dead tips removed | 11/13/31 | 5.54 | 2.49 | 44.71 | 38.55 | 5.72 | 2.99 |
| foliage with dead tips removed | 12/12/31 | 5.33 | 2.19 | 42.05 | 42.73 | 5.11 | 2.59 |
| budding shoots | 2/25/31 | 23.66 | 2.53 | 14.95 | 44.45 | 8.89 | 5.52 |
| budding shoots | 3/23/31 | 20.46 | 2.79 | 17.56 | 45.11 | 8.13 | 5.95 |
| Oenothera serrulata Drummondii flava, Evening primrose | | | | | | | |
| green parts | 5/ 1/31 | 8.40 | 2.79 | 14.41 | 61.92 | 7.74 | 4.74 |
| Oenothera Greggii lampsana, evening primrose | | | | | | | |
| flowering plants | 5/ 1/31 | 10.85 | 2.07 | 17.57 | 54.12 | 8.79 | 6.60 |
| Oenothera speciosa, showy evening primrose | | | | | | | |
| green parts | 5/ 1/31 | 19.09 | 2.07 | 19.98 | 42.39 | 7.85 | 8.62 |
| green growth after mowing | 7/15/31 | 14.54 | 3.91 | 21.41 | 42.43 | 8.47 | 9.24 |
| Opuntia Ellisiana, spineless cactus | | | | | | | |
| joints as fed to livestock | 12/18/30 | 2.08 | .69 | 17.14 | 40.46 | 17.42 | 22.21 |
| joints, growth of previous year (green) | 1/24/31 | .63 | .27 | 2.21 | 12.02 | 80.27 | 4.60 |

**Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.**

| Stage of growth or character of sample | Date collected | Protein | Ether extract | Crude fiber | Nitrogen free extract | Water | Ash |
|---|---|---|---|---|---|---|---|
| | 1930–31 | | | | | | |
| Opuntia leptocaulis, tasajillo | | | | | | | |
| fruits and branchlets | 12/18/30 | 8.15 | 2.70 | 12.37 | 51.47 | 3.34 | 21.97 |
| fruits and branchlets (green) | 1/24/31 | 3.69 | .89 | 3.08 | 18.11 | 67.49 | 6.74 |
| Opuntia atrospina, prickly pear | | | | | | | |
| joints, areolae with spines removed | 12/18/30 | 7.00 | 1.17 | 10.95 | 55.39 | 5.06 | 20.43 |
| joints with areolae removed | 1/23/31 | 8.56 | 1.44 | 8.17 | 57.90 | 6.06 | 17.87 |
| mature fruits | 9/ 8/31 | 4.58 | 5.48 | 32.37 | 48.69 | 2.80 | 6.08 |
| buds and young fruit | 6/ 2/31 | 11.69 | 2.07 | 12.98 | 53.13 | 6.48 | 13.65 |
| Panicum fasciculatum reticulatum | | | | | | | |
| fruiting plants | 6/23/31 | 17.66 | 2.05 | 26.19 | 34.17 | 7.17 | 12.76 |
| fruiting plants | 8/24/31 | 16.37 | 2.46 | 25.32 | 36.93 | 6.32 | 12.60 |
| Panicum Hallii, Hall panic grass | | | | | | | |
| fruiting plants | 8/31/31 | 10.26 | 1.89 | 27.45 | 44.90 | 6.39 | 9.11 |
| Panicum hirticaule | | | | | | | |
| maturing plants | 7/15/31 | 11.14 | 1.71 | 38.01 | 42.00 | 6.89 | 10.25 |
| Panicum obtusum, vine mesquite grass | | | | | | | |
| green growth | 2/ 3/31 | 14.89 | 2.33 | 20.61 | 41.02 | 7.12 | 14.03 |
| green growth | 6/ 2/31 | 16.35 | 2.77 | 30.81 | 33.66 | 6.27 | 10.14 |
| fruiting plants | 8/24/31 | 14.09 | 2.53 | 29.59 | 37.61 | 6.41 | 9.77 |
| Parosela frutescens | | | | | | | |
| foliage of flowering shrubs | 7/14/31 | 17.60 | 6.02 | 13.42 | 49.36 | 7.40 | 6.20 |
| Parthenium Hysterophorus | | | | | | | |
| preflowering green growth | 6/13/31 | 24.84 | 4.31 | 11.82 | 38.03 | 8.36 | 12.64 |
| fruiting tops | 9/ 5/31 | 17.56 | 6.27 | 21.22 | 37.94 | 9.30 | 7.71 |
| Parthenium incanum, mariola | | | | | | | |
| budding plants | 8/18/31 | 15.76 | 8.19 | 20.22 | 39.65 | 7.43 | 8.75 |
| Paspalum distichum | | | | | | | |
| fruiting plants | 9/ 8/31 | 9.77 | 2.55 | 29.02 | 40.96 | 8.78 | 8.92 |
| Petalostemum multiflorum | | | | | | | |
| green parts, budding stage | 6/17/31 | 12.96 | 2.67 | 23.11 | 47.92 | 8.01 | 5.33 |
| Pennisetum clandestinum | | | | | | | |
| cultivated, green growth | 8/24/31 | 16.55 | 2.17 | 23.50 | 40.46 | 6.95 | 10.37 |
| Phacelia Popei | | | | | | | |
| foliage-rosette stage | 2/27/31 | 24.94 | 1.54 | 7.30 | 43.44 | 7.76 | 15.02 |
| Phalaris angusta | | | | | | | |
| green growth | 5/ 1/31 | 18.65 | 2.82 | 23.68 | 38.94 | 7.33 | 8.58 |
| Phlox Rosmeriana | | | | | | | |
| flowering plants | 5/ 1/31 | 11.50 | 2.25 | 23.16 | 46.01 | 7.67 | 9.41 |
| Physalis lobata, violet-flowered groundcherry | | | | | | | |
| flowering and fruiting plants | 7/14/31 | 29.17 | 3.82 | 13.46 | 29.93 | 7.17 | 16.45 |
| Pinaropappus roseus | | | | | | | |
| flowering plants | 6/ 2/31 | 11.33 | 6.14 | 22.77 | 47.01 | 7.33 | 5.42 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Plantago Helleri, Heller plantain | | | | | | | |
| fruiting plants | 4/30/31 | 10.21 | 1.99 | 22.14 | 53.06 | 7.69 | 4.91 |
| Plantago rhodosperma, redseeded plantain | | | | | | | |
| green parts | 2/24/31 | 17.53 | .98 | 8.25 | 53.56 | 11.70 | 7.98 |
| green parts | 3/30/31 | 12.95 | 1.89 | 7.63 | 54.84 | 8.31 | 14.38 |
| fruiting plants | 5/ 1/31 | 8.75 | 1.19 | 19.90 | 49.20 | 8.23 | 12.73 |
| Plantago spinulosa, bracted plantain | | | | | | | |
| flowering plants | 3/23/31 | 10.96 | 2.72 | 14.95 | 58.67 | 7.98 | 4.72 |
| Portulaca retusa, purslane | | | | | | | |
| flowering | 8/29/31 | 9.31 | 4.71 | 16.80 | 39.20 | 6.34 | 23.64 |
| Prosopis chilensis (Mesquite tree foliage) | | | | | | | |
| mature foliage | 10/17/30 | 17.62 | 3.91 | 25.49 | 38.71 | 6.64 | 7.63 |
| young foliage | 6/ 1/31 | 21.67 | 2.71 | 22.83 | 40.82 | 7.65 | 4.32 |
| foliage | 7/14/31 | 20.42 | 2.81 | 26.94 | 38.79 | 6.20 | 4.84 |
| foliage | 8/29/31 | 19.26 | 3.22 | 26.61 | 39.67 | 5.92 | 5.32 |
| Prosopis chilensis (pods) | | | | | | | |
| mature pods | 10/20/31 | 15.02 | 1.54 | 23.93 | 48.94 | 7.24 | 3.33 |
| pods | 9/25/31 | 12.15 | 2.01 | 30.92 | 48.78 | 2.64 | 3.50 |
| Prunus minutiflora, small flowered plum | | | | | | | |
| foliage mostly from young growth | 10/17/30 | 24.72 | 4.15 | 9.91 | 48.29 | 6.46 | 6.47 |
| foliage mostly from young growth | 11/18/30 | 22.71 | 4.13 | 9.44 | 48.86 | 7.36 | 7.00 |
| foliage | 6/ 1/31 | 17.84 | 3.35 | 10.83 | 54.84 | 7.15 | 5.99 |
| Pyrrhopappus carolinianus, false dandelion | | | | | | | |
| flowering plants | 6/ 4/31 | 11.27 | 5.47 | 25.17 | 41.62 | 7.84 | 8.63 |
| Quercus breviloba (shin oak) | | | | | | | |
| mostly mature foliage | 10/18/30 | 9.05 | 2.64 | 20.67 | 54.16 | 8.46 | 5.02 |
| mostly mature foliage | 11/19/30 | 7.98 | 2.80 | 22.64 | 54.18 | 7.15 | 5.25 |
| foliage | 6/ 3/31 | 11.41 | 1.60 | 23.95 | 51.82 | 7.80 | 3.42 |
| foliage | 7/13/31 | 8.92 | 2.08 | 26.53 | 51.35 | 6.86 | 4.26 |
| foliage | 8/29/31 | 9.44 | 1.84 | 19.33 | 54.87 | 7.65 | 6.87 |
| foliage of sucker plants | 9/28/31 | 9.30 | 2.13 | 24.07 | 53.64 | 7.30 | 3.56 |
| foliage from sucker plants | 10/20/31 | 8.90 | 2.25 | 23.26 | 53.05 | 7.45 | 5.09 |
| foliage from trees | 11/11/31 | 8.25 | 2.98 | 23.96 | 53.15 | 6.90 | 4.76 |
| foliage from trees | 12/14/31 | 7.16 | 2.81 | 26.07 | 50.96 | 6.70 | 6.30 |
| Quercus virginiana (foliage) (live oak) | | | | | | | |
| mostly mature foliage | 10/18/30 | 8.88 | 2.37 | 27.02 | 47.43 | 7.94 | 6.36 |
| foliage mostly from young growth | 11/19/30 | 8.92 | 2.30 | 26.59 | 50.18 | 7.13 | 4.88 |
| foliage mostly from young growth | 12/18/30 | 8.95 | 3.17 | 24.51 | 51.89 | 7.04 | 4.44 |
| foliage | 1/24/31 | 9.61 | 2.63 | 26.55 | 47.96 | 7.52 | 5.73 |
| mature foliage | 2/24/31 | 9.40 | 2.99 | 26.47 | 48.76 | 7.42 | 4.96 |
| old foliage | 3/30/31 | 8.39 | 2.51 | 28.00 | 47.63 | 6.28 | 7.19 |
| new foliage | 4/28/31 | 17.69 | 1.10 | 22.31 | 46.40 | 7.90 | 4.60 |
| foliage | 6/ 3/31 | 11.61 | 1.36 | 29.05 | 44.73 | 9.38 | 3.87 |
| foliage | 7/13/31 | 9.13 | 1.91 | 30.82 | 47.32 | 6.96 | 3.86 |
| foliage | 8/29/31 | 9.49 | 1.70 | 25.67 | 51.81 | 6.88 | 4.45 |
| foliage | 9/26/31 | 8.93 | 1.71 | 24.95 | 50.16 | 7.75 | 6.50 |
| foliage | 10/19/31 | 9.12 | 1.89 | 26.81 | 49.19 | 7.60 | 5.39 |
| foliage from trees | 11/11/31 | 8.30 | 2.49 | 26.27 | 51.28 | 6.13 | 5.53 |
| foliage | 12/12/31 | 10.21 | 2.60 | 26.87 | 48.22 | 6.77 | 5.33 |

**Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued**

| Stage of growth or character of sample | Date collected | Protein | Ether extract | Crude fiber | Nitrogen free extract | Water | Ash |
|---|---|---|---|---|---|---|---|
| | 1930–31 | | | | | | |
| Quercus virginiana (acorns) | | | | | | | |
| acorns picked up from ground | 10/16/31 | 4.42 | 1.83 | 10.09 | 47.67 | 33.24 | 2.75 |
| acorns fallen from tree | 11/19/31 | 5.58 | 3.65 | 10.59 | 64.76 | 11.94 | 3.48 |
| fallen acorns | 9/26/31 | 5.60 | 1.54 | 18.33 | 62.94 | 9.71 | 1.88 |
| mature acorns picked from trees | 10/19/31 | 4.65 | 6.52 | 9.67 | 66.96 | 10.61 | 1.59 |
| mature acorns picked from trees | 11/11/31 | 3.44 | 6.37 | 10.21 | 73.04 | 5.68 | 1.26 |
| acorns picked from trees | 12/14/31 | 5.65 | 6.39 | 12.73 | 68.02 | 5.48 | 1.73 |
| Ratibida columnifera, prairie coneflower | | | | | | | |
| foliage—winter rosette stage | 2/24/31 | 17.96 | 2.02 | 11.55 | 42.01 | 8.98 | 17.48 |
| green parts | 4/30/31 | 15.74 | 4.19 | 16.18 | 43.90 | 8.10 | 11.89 |
| green parts | 6/ 1/31 | 20.65 | 5.24 | 10.82 | 40.58 | 7.75 | 14.96 |
| mature heads | 11/12/31 | 12.47 | 5.55 | 34.28 | 33.26 | 7.85 | 6.59 |
| Rhus microphylla, small-leaf sumac | | | | | | | |
| foliage from young growth | 11/19/30 | 13.30 | 6.20 | 11.50 | 53.99 | 6.53 | 8.48 |
| foliage | 6/ 1/31 | 15.59 | 2.09 | 10.11 | 61.52 | 6.22 | 4.47 |
| foliage | 7/13/31 | 15.17 | 2.84 | 10.78 | 59.72 | 6.53 | 4.96 |
| foliage | 8/29/31 | 13.68 | 4.02 | 10.83 | 57.30 | 5.98 | 8.19 |
| foliage | 10/21/31 | 14.40 | 5.40 | 9.93 | 54.69 | 6.78 | 8.76 |
| foliage and buds | 11/12/31 | 11.54 | 6.02 | 10.92 | 57.46 | 6.21 | 7.85 |
| Rhus trilobata, ill-scented sumac | | | | | | | |
| foliage mostly from young growth | 10/18/30 | 7.33 | 6.06 | 9.14 | 63.16 | 8.01 | 6.30 |
| foliage from old and from young growth | 11/18/30 | 6.49 | 6.50 | 9.80 | 64.39 | 7.32 | 5.50 |
| foliage | 6/ 3/31 | 9.94 | 1.55 | 7.45 | 69.87 | 7.45 | 3.74 |
| foliage | 7/14/31 | 7.45 | 2.44 | 8.95 | 69.23 | 7.80 | 4.13 |
| foliage | 8/29/31 | 7.19 | 3.61 | 7.87 | 69.70 | 6.78 | 4.85 |
| foliage | 9/26/31 | 6.50 | 4.01 | 8.08 | 68.62 | 7.69 | 5.10 |
| foliage | 10/21/31 | 8.14 | 4.84 | 7.81 | 65.54 | 8.63 | 5.04 |
| foliage and buds | 11/12/31 | 8.19 | 5.51 | 8.10 | 64.94 | 6.97 | 6.29 |
| Rhus virens, evergreen sumac | | | | | | | |
| mature foliage | 11/18/30 | 10.36 | 6.81 | 17.58 | 55.22 | 5.98 | 4.05 |
| foliage | 11/12/31 | 8.25 | 5.02 | 17.55 | 58.33 | 5.98 | 4.87 |
| Rhynchosia texana | | | | | | | |
| flowering plants | 7/14/31 | 16.48 | 2.91 | 25.07 | 41.55 | 7.47 | 6.52 |
| mostly flowering plants | 8/24/31 | 18.45 | 3.16 | 21.24 | 44.39 | 6.66 | 6.10 |
| Salsola pestifer, Russian thistle | | | | | | | |
| tops of fruiting plants | 8/ 6/31 | 17.64 | 1.08 | 18.61 | 39.04 | 7.79 | 15.84 |
| Salvia reflexa, annual sage | | | | | | | |
| tops of pre-flowering plants | 8/24/31 | 22.75 | 3.59 | 11.37 | 42.63 | 6.54 | 13.12 |
| Schrankia angustata, shamevine | | | | | | | |
| green | 6/ 2/31 | 25.97 | 2.03 | 21.78 | 37.13 | 7.96 | 5.13 |
| Scutellaria Drummondii, Skullcap | | | | | | | |
| flowering | 6/ 2/31 | 8.95 | 2.65 | 28.58 | 44.82 | 7.82 | 7.18 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Setaria macrostachys, plains bristlegrass | | | | | | | |
| in head | 7/15/31 | 18.05 | 2.21 | 25.62 | 34.86 | 7.06 | 12.20 |
| Sedum Nuttallianum, stonecrop | | | | | | | |
| Preflowering | 4/ 1/31 | 7.98 | 5.69 | 11.00 | 49.86 | 5.97 | 19.50 |
| Sida procumbens | | | | | | | |
| flowering | 6/ 2/31 | 17.42 | 1.57 | 16.02 | 47.16 | 8.82 | 9.01 |
| Simsia calva | | | | | | | |
| fruiting plants | 6/ 1/31 | 15.03 | 1.30 | 19.76 | 43.24 | 8.37 | 12.30 |
| budding plants | 8/28/31 | 18.68 | 1.17 | 17.29 | 40.14 | 8.37 | 14.35 |
| Siphonoglossa pilosella | | | | | | | |
| flowering | 8/31/31 | 20.00 | 3.51 | 19.68 | 33.56 | 6.93 | 16.32 |
| Sitanion Hystrix, squirreltail grass | | | | | | | |
| in head | 4/30/31 | 11.54 | 1.74 | 33.82 | 39.95 | 7.17 | 5.78 |
| Solanum Torreyi, Torrey horsenettle | | | | | | | |
| tops of flowering and fruiting plants | 7/11/31 | 15.64 | 2.46 | 18.47 | 48.03 | 6.94 | 8.46 |
| Solanum elaeagnifolium, trompillo | | | | | | | |
| tops of flowering plants | 6/ 5/31 | 19.32 | 1.62 | 22.76 | 39.49 | 7.69 | 9.12 |
| tops of flowering plants | 7/14/31 | 25.28 | 1.75 | 23.77 | 35.25 | 7.26 | 6.69 |
| tops of preflowering plants | 8/24/31 | 21.78 | 1.68 | 21.23 | 37.06 | 5.99 | 12.26 |
| tops with mature fruit | 11/12/31 | 14.94 | 7.08 | 27.94 | 39.50 | 5.24 | 5.30 |
| Solanum triquetrum | | | | | | | |
| flowering and fruiting | 8/31/31 | 20.98 | 3.97 | 22.40 | 37.39 | 6.26 | 9.00 |
| Sophorasecundiflora, mescalbean | | | | | | | |
| foliage | 12/18/30 | 18.43 | 2.73 | 29.33 | 38.91 | 6.20 | 4.40 |
| foliage | 1/28/31 | 18.74 | 2.74 | 27.71 | 39.56 | 6.48 | 4.78 |
| foliage | 6/ 5/31 | 16.47 | 1.79 | 30.51 | 39.54 | 6.26 | 5.34 |
| pods | 6/ 5/31 | 16.94 | .62 | 14.05 | 58.10 | 7.27 | 3.02 |
| Sorghum halepensis, Johnson grass | | | | | | | |
| green second growth of stunted plants | 7/14/31 | 18.55 | 3.48 | 22.98 | 38.62 | 7.12 | 9.25 |
| Sphaeralcea angustifolia cuspidata, globemallow | | | | | | | |
| tops of flowering and fruiting plants | 8/29/31 | 18.97 | 2.19 | 21.63 | 39.30 | 6.98 | 10.93 |
| Sporobolus cryptandrus, sand dropseed grass | | | | | | | |
| plants in head | 8/24/31 | 14.08 | 1.62 | 33.18 | 34.99 | 6.48 | 9.65 |
| Stipa leucotricha, Texas needlegrass | | | | | | | |
| green growth of mature plants | 6/ 2/31 | 7.24 | 1.45 | 32.82 | 44.58 | 7.11 | 6.80 |
| luxuriant green growth | 12/12/31 | 14.44 | 3.11 | 25.86 | 41.60 | 6.82 | 8.17 |
| Stillingia Treculeana | | | | | | | |
| green growth of flowering plants | 5/27/31 | 20.02 | 2.89 | 12.81 | 42.45 | 8.02 | 10.81 |
| Talinum aurantiacum | | | | | | | |
| tops of flowering plants | 8/24/31 | 21.55 | 2.82 | 12.60 | 39.36 | 7.28 | 16.39 |
| Thelesperma simplicifolium | | | | | | | |
| green growth of flowering plants | 6/ 2/31 | 9.33 | 1.53 | 31.25 | 46.04 | 7.07 | 4.78 |
| Tidestromia suffruticosa | | | | | | | |
| flowering plants | 9/11/31 | 14.77 | 1.25 | 20.51 | 44.56 | 8.77 | 10.14 |
| Tragia ramosa | | | | | | | |
| green growth of flowering plants | 6/ 2/31 | 14.60 | 2.22 | 18.99 | 49.65 | 7.96 | 6.58 |
| fruiting plants | 8/28/31 | 15.30 | 3.61 | 17.29 | 49.09 | 7.42 | 7.29 |
| Tribulus terrestris, puncture plant | | | | | | | |
| green growth of fruiting plants | 6/23/31 | 17.60 | 2.54 | 23.93 | 38.04 | 6.94 | 10.95 |

**Table 1. Percentage Composition of Forage Plants of Sutton County, as Dried for Analysis—Continued.**

| Stage of growth or character of sample | Date collected | Protein | Ether extract | Crude fiber | Nitrogen free extract | Water | Ash |
|---|---|---|---|---|---|---|---|
| | 1930–31 | | | | | | |
| Triodia albescens | | | | | | | |
| fruiting, approaching maturity | 9/ 8/31 | 6.90 | 1.86 | 30.77 | 45.37 | 7.99 | 7.11 |
| Trisetum interruptum | | | | | | | |
| green growth of maturing plants | 4/26/31 | 8.85 | 1.55 | 28.65 | 41.29 | 6.90 | 12.76 |
| Ungnadia speciosa, Mexican buckeye | | | | | | | |
| foliage | 7/15/31 | 12.03 | 2.20 | 21.94 | 51.19 | 6.62 | 6.02 |
| Verbena bipinnatifida, large flowered verbena | | | | | | | |
| green growth of fruiting plants | 4/22/31 | 10.60 | 1.67 | 16.74 | 55.41 | 7.86 | 7.72 |
| Verbena plicata, small flowered verbena | | | | | | | |
| green growth of flowering plants | 6/ 2/31 | 10.85 | 3.14 | 5.99 | 63.24 | 7.70 | 9.08 |
| fruiting plants | 8/31/31 | 10.30 | 3.38 | 20.46 | 47.74 | 7.79 | 10.33 |
| Vicia Leavenworthii (Leavenworthii), Stall vetch | | | | | | | |
| green growth of flowering plants | 3/24/31 | 24.69 | 2.62 | 19.01 | 37.98 | 7.53 | 8.17 |
| Xanthoxylum c.-h. fruticosum, prickly ash | | | | | | | |
| foliage | 6/ 1/31 | 20.17 | 1.68 | 11.72 | 48.38 | 8.97 | 9.08 |
| Yucca Reverchoni, yucca (buds) | | | | | | | |
| budding shoots | 5/ 1/31 | 14.50 | 1.41 | 22.99 | 45.04 | 8.66 | 6.50 |
| Yucca Reverchoni (flowers) | | | | | | | |
| flowers | 6/ 2/31 | 19.06 | 3.51 | 12.57 | 46.84 | 10.18 | 7.84 |
| Yucca Treguleana | | | | | | | |
| distal portion of leaves | 2/28/31 | 11.01 | 1.74 | 33.09 | 36.17 | 8.44 | 9.55 |
| Yucca Treguleana (buds) | | | | | | | |
| buds | 3/24/31 | 22.66 | 1.22 | 13.18 | 46.47 | 8.35 | 8.12 |
| Yucca Thompsoniana | | | | | | | |
| leaves without basal portion | 3/ 2/31 | 7.60 | 1.69 | 42.29 | 37.60 | 7.17 | 3.65 |
| Zexmania hispida | | | | | | | |
| green growth of flowering plants | 6/ 4/31 | 11.10 | 1.19 | 23.48 | 40.42 | 8.67 | 15.14 |
| budding plants | 8/28/31 | 16.10 | 2.87 | 19.55 | 39.11 | 8.14 | 14.23 |

**Table 2. Common and Botanical Names**

| Common name | Botanical name |
|---|---|
| Agrito | Berberis trifoliata |
| Angel trumpets | Acleisanthes longiflora |
| Ash, prickly | Xanthoxylum c.-h. fruticosum |
| Barley, little | Hordeum pusillum |
| Beardgrass, silver | Andropogon saccharoides |
| Bermuda grass | Cynodon dactylon |
| Bitterweed, poison | Actinea odorata |
| Bladderpod, Gordon | Lesquerella Gordoni |
| Bluebonnet | Lupinis texensis |
| Blueweed | Helianthus ciliaris |
| Bower, Texas virgin | Clematis Drummondii |
| Bristlegrass, plains | Setaria macrostachys |
| Buckeye, Mexican | Ungnadia speciosa |
| Buffalo grass | Buchloe dactyloides |
| Cactus, spineless | Opuntia Ellisiana |
| Caltrop | Kallstroemia intermedia |
| Canada fleabone | Erigeron canadensis |
| Carrot, wild | Daucus pusillus |
| Catsclaw | Acacia Roemeriana |
| Catsclaw, fragrant | Mimosa fragrans |
| Centaury | Centaurium calycosum |
| Coneflower, prairie | Ratibida columnifera |
| Crab grass | Digitaria sanguinalis |
| Croton, annual | Croton monanthogynus |
| Croton, New Mexico | Croton neomexicanus |
| Curly mesquite grass | Hilaria belangeri |
| Dandelion, false | Pyrrhopappus carolinianus |
| Dropseed grass, sand | Sporobolus cryptandrus |
| Evax | Evax multicaulis |
| Evax | Evax prolifera |
| False dandelion | Pyrrhopappus carolinianus |
| Fanutory | Corydalis aurea occidentalis |
| Fescue grass, annual | Festuca octoflora |
| Feather fingergrass | Chloris virgata |
| Filaree | Erodium cicutarium |
| Fingergrass, feather | Chloris virgata |
| Fleabone, Canada | Erigeron canadensis |
| Geranium | Geranium carolinianum |
| Globemallow | Sphaeralcea angustifolia cuspidata |
| Gordon bladderpod | Lesquerella Gordoni |
| Gourd, prairie | Cucurbita foetidissima |
| Grama, hairy | Bouteloua hirsuta |
| Grama, red | Bouteloua trifida |
| Grama, side oats | Bouteloua curtipendula |
| Groundcherry, violet flowered | Physalis lobata |
| Guajillo, prairie | Acacia angustissima |
| Hackberry | Celtis reticulata |
| Honeysuckle, white-flowered | Lonicera albiflora |
| Heller plantain | Plantago Helleri |
| Horsenettle, Torrey | Solanum Torreyi |
| Ill-scented sumac | Rhus trilobata |
| Indian blanket | Gaillardia pulchella |
| Indian mallow | Abutilon incanum |
| Johnson grass | Sorghum halepensis |
| Joint-fir | Ephedra antisyphilitica |
| Juniper, Pinchot | Juniperus Pinchoti |
| Jungle rice | Echinochloa colonum |
| Lechuguilla | Agave lecheguilla |
| Live oak | Quercus virginiana |
| Live oak dodder | Cuscuta exaltata |
| Lote bush | Condalia obtusifolia |
| Mallow, Indian | Abutilon incanum |
| Mallow, annual poppy | Callirrhoe pedata |
| Mariola | Parthenium incanum |
| Mercury, slender three-seeded | Acalypha gracilens |
| Mescalbean | Sophora secundiflora |
| Mesquite tree | Prosopis chilensis |
| Mesquite grass, curly | Hilaria belangeri |
| Mesquite grass, vine | Panicum obtusum |
| Mexican buckeye | Ungnadia speciosa |
| Mexican persimmon | Diospyros texana |
| Milkvetch, Nuttall | Astragalus Nuttallianus |
| Milkvetch, thin | Astragalus macilentus |
| Mulberry | Morus microphylla |
| Mustard, tansy | Descurainia pinnata |

**Table 2. Common and Botanical Names—Continued**

| Common name | Botanical name |
|---|---|
| Needlegrass, Texas | Stipa leucotricha |
| Nuttall milkvetch | Astragalus Nuttallianus |
| Oak, live | Quercus virginiana |
| Oak dodder, live | Cuscuta exaltata |
| Oak, shin | Quercus breviloba |
| Onion, white | Allium Drummondii |
| Panic grass, Hall | Panicum Hallii |
| Peppergrass, Wright | Lepidium lasiocarpum Wrightii |
| Persimmon, Mexican | Diospyros texana |
| Plains bristlegrass | Setaria macrostachys |
| Plantain, bracted | Plantago spinulosa |
| Plantain, Heller | Plantago Helleri |
| Plantain, redseeded | Plantago, rhodosperma |
| Plum, small flowered | Prunus minutiflora |
| Poison bitterweed | Actinea odorata |
| Prairie coneflower | Ratibida columnifera |
| Prairie gourd | Cucurbita foetidissima |
| Prairie guajillo | Acacia angustissima |
| Prickly ash | Xanthoxylum c.-h. fruticosum |
| Prickly pear | Opuntia atrospina |
| Primrose, evening | Oenothera Greggii lampsana |
| Primrose, evening | Oenothera serrulata Drummondii flava |
| Primrose, showy evening | Oenothera speciosa |
| Puncture plant | Tribulus terrestris |
| Purslane | Portulaca retusa |
| Ragweed | Ambrosia psilostachya |
| Rescue grass | Bromus catharticus |
| Rice, jungle | Echinochloa colonum |
| Russian thistle | Salsola pestifer |
| Rye, wild | Elymus brachystachys |
| Sacahuiste | Nolina texana |
| Sage, annual | Salvia reflexa |
| Sand dropseed grass | Sporobolus cryptandrus |
| Sedge, thicket | Carex planostachys |
| Senna, Roemer | Cassia Roemeriana |
| Shamevine | Schrankia angustata |
| Shin oak | Quercus breviloba |
| Silver beardgrass | Andropogon saccharoides |
| Skullcap | Scutellaria Drummondii |
| Slender three-seeded mercury | Acalypha gracilens |
| Snakeroot, dotted button | Liatris punctata |
| Snakeweed (perennial) | Gutierrezia microcephala |
| Snakeweed (annual) | Gutierrezia texana |
| Sneezeweed, small headed | Helenium microcephalum |
| Sotol | Dasylirion texanum |
| Sprangletop | Leptochloa dubia |
| Squirreltail grass | Sitanion Hystrix |
| Stall vetch | Vicia Leavenworthii |
| Stinkgrass | Eragrostis cilianensis |
| Stonecrop | Sedum Nuttallianum |
| Stork's bill, large-flowered | Erodium texanum |
| Sumac, evergreen | Rhus virens |
| Sumac, ill-scented | Rhus, trilobata |
| Sumac, small leaf | Rhus microphylla |
| Sunflower | Helianthus annuus |
| Tansy mustard | Descurainia pinnata |
| Tasajillo | Opuntia leptocaulis |
| Texas needlegrass | Stipa leucotricha |
| Thicket sedge | Carex planostachys |
| Thistle, Russian | Salsola pestifer |
| Thistle, southern pasture | Cirsium austrinlum |
| Three-awn grass, purple | Aristida purpurea |
| Three-awn grass, Wright | Aristida Wrightii |
| Trompillo | Solanum elaeagnifolium |
| Unicorn plant | Martynia louisianica |
| Verbena, large flowered | Verbena bipinnatifida |
| Verbena, small flowered | Verbena plicata |
| Vetch, stall | Vicia Leavenworthii |
| Vine mesquite grass | Panicum obtusum |
| Violet flowered groundcherry | Physalis lobata |
| Whitlow wart | Draba cuniefolia |
| Witchgrass, fall | Leptolema cognatum |
| Wormwood, woolly | Artemisia vulgaris gnaphalodes |
| Yucca | Yucca Reverchoni |

**Table 3. Grades for Calcium, Phosphorus, and Protein in Forage for Range Animals**
(All figures as per cent on air dry basis)

Protein

| Grade | Interpretation | Crude protein |
|---|---|---|
| 1 | High | 15.00+ |
| 2 | Good | 10.50 to 14.99 |
| 3 | Fair | 6.00 to 10.49 |
| 4 | Deficient | 3.00 to 5.99 |
| 5 | Very deficient | 0 to 2.99 |

Phosphorus (P) or phosphoric acid ($P_2O_5$)

| | | P | $P_2O_5$ |
|---|---|---|---|
| 1 | High | .45+ | 1.01+ |
| 2 | Good | .30 to .44 | .67 to 1.00 |
| 3 | Fair | .15 to .29 | .33 to .66 |
| 4 | Deficient | .08 to .14 | .17 to .32 |
| 5 | Very deficient | 0 to .07 | 0 to .16 |

Calcium (Ca) or lime (CaO)

| | | Ca | CaO |
|---|---|---|---|
| 1 | High | .61+ | .83+ |
| 2 | Good | .31 to .60 | .43 to .82 |
| 3 | Fair | .16 to .30 | .22 to .42 |
| 4 | Deficient | .08 to .15 | .11 to .21 |
| 5 | Very deficient | 0 to .07 | 0 to .10 |

Table 2 and are the same as those previously used in Bulletin 582. The grades of the constituents of the samples analyzed are given in Table 3, and enable comparisons between the different kinds of vegetation to be easily made. Since some workers report their analyses in terms of phosphorus (P) instead of phosphoric acid ($P_2O_5$) and in terms of calcium (Ca) instead of lime (CaO), these are also given in Table 2.

## Vegetation Consumed by Range Animals

The approximate percentages of the different kinds of vegetation consumed by cattle is given in Tables 5 and 6, by sheep in Table 7 and 8, and by goats in Table 9 and 10.

The tables show that the cattle consume the smallest number of different kinds of plants, the sheep next, while the goats consume a much larger number of different kinds of plants. This diversity of choice would no doubt give the goats an advantage in times of scarcity of feed, or when there is danger of over grazing. The cattle would be more likely to suffer first.

The relation of the kinds of plants eaten to the season is also shown in Tables 5, 6, 7, 8, 9 and 10. Curly mesquite makes a large part of the rations of the cattle except in December, January, March and April. Live oak leaves were consumed in appreciable quantities in November, December, and January, with a maximum in January. Sacahuiste was consumed in large quantities in December, and in appreciable quantities in January, February and March. Texas needle grass *(Stipa leucotricha)* made up approximately 32% of the feed in January, but almost none was consumed in the other months. Appreciable amounts of buffalo grass *(Buchloe dactyloides)* were available and were consumed in May (45%) and some in June (17%) but none in the other months. Plants such as *Astragralus Nuttallianus, A. macilentus, Plantago rhodosperma* and *P. Helleri* made up 52% of the ration in March and 58% in April, but in other months of the year the grasses were of more importance than the forbs as feed for cattle. Although curly mesquite grass was the main ingredient of the ration, at some seasons of the year the cattle ate considerable quantities of other vegetation, probably partly from necessity and partly from choice.

Buffalo grass grows near Sonora only in lake beds and along draws where moisture conditions are favorable enough to permit it to grow and in these favorable habitats it crowds out the curly mesquite grass. In two of the months the livestock had opportunity to feed upon buffalo grass while such was not the case in the other months. It is known, however, that buffalo grass is more palatable than curly mesquite and that all livestock having the opportunity of choice will feed upon buffalo grass rather than curly mesquite. Buffalo grass has green growth for a longer season than does curly mesquite. Our figures therefore do not accurately set up the value of buffalo grass as forage during the various months of the year.

The sheep, like the cattle, consumed quantities of curly mesquite, sacahuiste, and live oak leaves, but at some seasons the bulk of the ration was composed of other kinds of vegetation. They also consumed vegetation different from that of the cattle, so that the sheep had more choice in their feeding.

The goats consumed vegetation not eaten by cattle or sheep, in addition to plants eaten by both. A long list of plants, eaten in larger or smaller amounts, is given in Table 6 for goats.

The various forbs (herbaceous plants eaten by animals) that are forage plants are somewhat similar in forage value and otherwise are important as forage in the late winter and early spring months. When growing intimately in grass land and in abundance in the months of March and April they supply a major portion of the grazing for cattle. However, if these forbs do not grow in an intimate mixture with green and succulent grass, cattle do not feed upon them to any appreciable extent. On the other hand both sheep and goats feed quite heavily upon the forbs.

**Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants**

| Name | Date Collected | Per cent | | | | Grades | | |
|---|---|---|---|---|---|---|---|---|
| | | Potash | Lime | Magnesia | Phosphoric acid | Protein | Lime | Phosphoric acid |
| Abutilon incanum | 6/13 | 3.30 | 2.58 | .87 | .55 | 1 | 1 | 3 |
| Abutilon incanum | 8/24 | 2.74 | 3.02 | .89 | .60 | 1 | 1 | 3 |
| Acacia angustissima | 5/ 1 | 1.50 | .87 | .25 | .73 | 1 | 1 | 2 |
| Acacia angustissima | 7/15 | 1.36 | 1.66 | .38 | .50 | 1 | 1 | 3 |
| Acacia Roemeriana | 6/ 1 | 1.14 | 1.45 | .40 | .46 | 1 | 1 | 3 |
| Acacia Roemeriana | 7/14 | 1.22 | 2.50 | .45 | .37 | 1 | 1 | 3 |
| Acalypha gracilens | 8/28 | 2.10 | 2.95 | .57 | .40 | 2 | 1 | 3 |
| Acleisanthes longiflora | 7/14 | 3.81 | 3.47 | .88 | .32 | 1 | 1 | 4 |
| Actinea odorata, poison bitterweed | 1/23 | ..... | 2.40 | ..... | .84 | 1 | 1 | 2 |
| Actinea odorata, poison bitterweed | 2/24 | 4.99 | 2.28 | .54 | 1.07 | 1 | 1 | 1 |
| Actinea odorata, poison bitterweed | 4/ 1 | 2.85 | 1.34 | .32 | .42 | 2 | 1 | 3 |
| Actinea scaposa linearis | 6/ 2 | 2.82 | 2.71 | .38 | .39 | 2 | 1 | 3 |
| Agave lecheguilla | 2/27 | .85 | 5.74 | .46 | .23 | 3 | 1 | 4 |
| Allium Drummondii | 4/30 | 1.94 | 2.30 | .25 | .44 | 2 | 1 | 3 |
| Alternanthera repens | 8/24 | 4.20 | 3.98 | .96 | .63 | 1 | 1 | 3 |
| Amaranthus Berlandieri | 8/24 | 4.67 | 5.37 | 1.28 | .84 | 1 | 1 | 2 |
| Amaranthus blitoides | 6/ 1 | 5.88 | 5.50 | 1.41 | 1.05 | 1 | 1 | 1 |
| Amaranthus blitoides | 8/24 | 5.13 | 4.19 | .95 | .39 | 1 | 1 | 3 |
| Amaranthus Palmeri | 8/24 | 4.71 | 2.96 | .81 | .85 | 1 | 1 | 2 |
| Amaranthus retroflexus, Pig weed | 6/ 1 | 5.77 | 5.13 | 1.60 | 1.09 | 1 | 1 | 1 |
| Ambrosia psilostachya, ragweed | 6/ 3 | 4.39 | 4.26 | .75 | .69 | 1 | 1 | 2 |
| Andropogon cirratus | 9/28 | .58 | .37 | .18 | .14 | 4 | 3 | 5 |
| Andropogon saccharoides, Silver beardgrass | 6/ 4 | 1.12 | .86 | .26 | .34 | 3 | 1 | 3 |
| Andropogon saccharoides, Silver beardgrass | 7/13 | 1.99 | .58 | .25 | .49 | 3 | 2 | 3 |
| Andropogon saccharoides, Silver beardgrass | 11/11 | .55 | .64 | ..... | .13 | 4 | 2 | 5 |
| Aphanostephus humilis | 4/30 | 3.07 | 1.79 | .32 | .50 | 2 | 1 | 3 |
| Aphanostephus humilis | 5/23 | 2.82 | 1.35 | .30 | .42 | 3 | 1 | 3 |
| Aphanostephus humilis | 7/14 | 3.27 | 1.94 | .32 | .62 | 2 | 1 | 3 |
| Aristida purpurea, Purple three-awn grass | 9/26 | .75 | .59 | .16 | .25 | 4 | 2 | 4 |
| Aristida purpurea, Purple three-awn grass | 10/19 | .74 | .78 | .22 | .28 | 4 | 2 | 4 |
| Aristida purpurea, Purple three-awn grass | 11/13 | .43 | .61 | .19 | .16 | 3 | 2 | 5 |
| Aristida purpurea, Purple three-awn grass | 12/14 | .36 | .45 | .15 | .18 | 3 | 2 | 4 |
| Aristida sp., Three-awn grass | 11/20 | .30 | .48 | .15 | .22 | 3 | 2 | 4 |
| Aristida sp., Three-awn grass | 12/19 | .42 | 1.04 | .24 | .27 | 3 | 1 | 4 |
| Aristida sp., Three-awn grass | 2/ 3 | .32 | .54 | .10 | .23 | 3 | 2 | 4 |
| Aristida sp., Three-awn grass | 2/25 | .55 | .86 | .12 | .26 | 3 | 1 | 4 |
| Aristida Wrightii, Wright three-awn grass | 6/ 4 | .61 | .38 | .14 | .21 | 3 | 3 | 4 |
| Aristida Wrightii, Wright three-awn grass | 8/24 | .70 | .61 | .19 | .35 | 3 | 2 | 3 |
| Aristida Wrightii, Wright three-awn grass | 9/26 | .72 | .44 | .14 | .23 | 4 | 2 | 4 |
| Artemisia vulgaris gnaphalodes | 7/13 | 2.46 | 1.12 | .41 | .41 | 2 | 1 | 3 |
| Aster ericoides | 9/28 | 1.03 | 3.15 | .43 | .21 | 3 | 1 | 4 |

**Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued**

| Name | Date collected | Per cent | | | | Grades | | |
|---|---|---|---|---|---|---|---|---|
| | | Potash | Lime | Magnesia | Phosphoric acid | Protein | Lime | Phosphoric acid |
| Astragalus Nuttallianus, Wild pea vine | 3/24 | 3.31 | 2.18 | .35 | .64 | 1 | 1 | 3 |
| Astragalus macilentus | 3/23 | 2.90 | 2.07 | .34 | .48 | 1 | 1 | 3 |
| Avena sativa, Oats (young) | 12/18 | 6.34 | 1.01 | .42 | .87 | 1 | 1 | 2 |
| Berberis trifoliata | 11/19 | .91 | .88 | .24 | .34 | 3 | 1 | 3 |
| Boerhaavia tenuifolia | 8/28 | 1.54 | 4.77 | .42 | .24 | 2 | 1 | 4 |
| Bouteloua curtipendula, Side oats grama | 12/19 | .39 | .71 | .19 | .18 | 3 | 2 | 4 |
| Bouteloua curtipendula, Side oats grama | 7/13 | 1.20 | .59 | .21 | .22 | 3 | 2 | 4 |
| Bouteloua trifida, Red grama | 9/26 | .67 | .79 | .22 | .21 | 3 | 2 | 4 |
| Bouteloua hirsuta, Hairy grama | 8/31 | .98 | .55 | .21 | .28 | 3 | 2 | 4 |
| Bromus catharticus, Rescue grass | 3/23 | 3.11 | .57 | .19 | .71 | 2 | 2 | 2 |
| Bromus catharticus, Rescue grass | 5/ 1 | 1.28 | .33 | .15 | .57 | 2 | 3 | 3 |
| Bromus catharticus, Rescue grass | 2/24 | 4.23 | .68 | .25 | .80 | 1 | 2 | 2 |
| Buchloe dactyloides, Buffalo grass | 5/28 | 1.07 | .73 | .27 | .40 | 2 | 2 | 3 |
| Buchloe dactyloides, Buffalo grass | 10/20 | .62 | .88 | .23 | .40 | 3 | 1 | 3 |
| Buchloe dactyloides, Buffalo grass | 11/19 | .50 | .60 | .18 | .36 | 3 | 2 | 3 |
| Buchloe dactyloides, Buffalo grass | 12/19 | .40 | .47 | .15 | .31 | 3 | 2 | 4 |
| Buchloe dactyloides, Buffalo grass | 4/30 | 1.16 | .65 | .22 | .52 | 2 | 2 | 3 |
| Buchloe dactyloides, Buffalo grass | 6/ 1 | .93 | .57 | .21 | .61 | 2 | 2 | 3 |
| Buchloe dactyloides, Buffalo grass | 7/ 9 | .94 | .82 | .29 | .63 | 2 | 2 | 3 |
| Buchloe dactyloides, Buffalo grass | 8/31 | .72 | .68 | .19 | .47 | 3 | 2 | 3 |
| Bumelia texana | 11/18 | .65 | 4.01 | .38 | .26 | 2 | 1 | 4 |
| Callirrhoe pedata | 6/ 2 | 2.49 | 3.18 | .39 | .95 | 3 | 1 | 2 |
| Carex planostachys, Sedge | 11/20 | 1.15 | 1.12 | .24 | .34 | 2 | 1 | 3 |
| Carex planostachys, Sedge | 2/25 | 1.14 | .98 | .20 | .31 | 2 | 1 | 4 |
| Carex planostachys, Sedge | 11/12 | .88 | .81 | ..... | .16 | 4 | 2 | 5 |
| Carex planostachys, Sedge | 12/14 | .72 | .89 | .21 | .17 | 3 | 1 | 4 |
| Carex stipa | 1/24 | 1.10 | 1.08 | .22 | .31 | 2 | 1 | 4 |
| Cassia Roemeriana | 7/ 9 | 1.38 | 6.64 | .46 | .37 | 1 | 1 | 3 |
| Cassia Roemeriana | 8/28 | 1.70 | 4.65 | .46 | .46 | 1 | 1 | 3 |
| Caura parviflora | 5/ 1 | 3.71 | 3.57 | 1.06 | 1.00 | 1 | 1 | 2 |
| Celtis reticulata | 6/ 3 | 1.52 | 6.27 | .70 | .38 | 2 | 1 | 3 |
| Centaurium calycosum | 6/ 2 | 1.51 | .36 | .29 | .36 | 3 | 3 | 3 |
| Chamaesaracha sordida | 9/ 5 | 4.64 | 3.14 | .96 | .59 | 1 | 1 | 3 |
| Chenopodium albescens | 5/ 1 | 9.81 | 4.36 | 1.21 | 1.09 | 1 | 1 | 1 |
| Chloris virgata, Feather finger grass | 8/31 | 3.29 | .97 | .38 | .34 | 3 | 1 | 3 |
| Chloris sp., Finger grass | 8/24 | 4.43 | .82 | .44 | .42 | 2 | 2 | 3 |
| Cirsium austrinlum | 5/ 1 | 3.51 | 5.47 | .63 | .45 | 1 | 1 | 3 |
| Clematis Drummondii | 8/31 | 1.74 | 1.92 | .29 | .45 | 2 | 1 | 3 |
| Colubrina texensis | 11/19 | 1.80 | 3.56 | .34 | .44 | 1 | 1 | 3 |
| Colubrina texensis | 11/12 | 1.04 | 4.93 | ..... | .27 | 1 | 1 | 4 |
| Condalia obtusifolia, lote bush | 6/ 4 | 2.31 | 1.50 | .39 | .54 | 1 | 1 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Condalia obtusifolia, lote bush | 7/15 | 3.03 | 2.40 | .55 | .38 | 1 | 1 | 3 |
| Corydalis aurea occidentalis | 12/18 | 4.72 | 3.22 | .56 | 1.52 | 1 | 1 | 1 |
| Croton corymbulosus | 6/ 5 | 1.57 | 2.01 | .45 | .35 | 1 | 1 | 3 |
| Croton monanthogynus | 6/ 2 | 2.84 | 3.08 | .70 | .46 | 1 | 1 | 3 |
| Croton monanthogynus | 8/31 | 1.76 | 3.12 | .62 | .46 | 1 | 1 | 3 |
| Croton monanthogynus | 9/28 | 1.47 | 2.28 | .42 | .22 | 3 | 1 | 4 |
| Croton monanthogynus | 10/20 | 1.21 | 3.23 | .72 | .32 | 2 | 1 | 4 |
| Croton neomexicanus | 10/ 3 | 1.31 | 2.82 | .64 | .30 | 1 | 1 | 4 |
| Cucurbita foetidissima | 7/15 | 2.82 | 10.04 | 1.68 | .55 | 1 | 1 | 3 |
| Cuscuta exaltata | 7/13 | 1.40 | .15 | .10 | .27 | 3 | 4 | 4 |
| Cynodon dactylon, Bermuda grass | 10/21 | 1.61 | 1.03 | .27 | .58 | 2 | 1 | 3 |
| Cynodon dactylon, Bermuda grass | 11/20 | 1.30 | 1.00 | .23 | .51 | 3 | 1 | 3 |
| Cynodon dactylon, Bermuda grass | 12/19 | .96 | .84 | .21 | .49 | 3 | 1 | 3 |
| Cynodon dactylon, Bermuda grass | 6/ 3 | 3.19 | .94 | .26 | .74 | 1 | 1 | 2 |
| Cynodon dactylon, Bermuda grass | 7/ 9 | 2.39 | .75 | .22 | .48 | 2 | 2 | 3 |
| Cynodon dactylon, Bermuda grass | 8/31 | 1.78 | .65 | .22 | .39 | 3 | 2 | 3 |
| Cynodon dactylon, Bermuda grass | 10/20 | 2.16 | 1.26 | .53 | .65 | 2 | 1 | 3 |
| Cynodon dactylon, Bermuda grass | 11/11 | 1.84 | 1.03 | .33 | .35 | 2 | 1 | 3 |
| Cynodon dactylon, Bermuda grass | 12/12 | .62 | .78 | .24 | .43 | 3 | 2 | 3 |
| Dasylirion texanum | 2/27 | .85 | .90 | .17 | .18 | 3 | 1 | 4 |
| Daucus pusillus | 5/ 1 | 3.66 | 2.42 | .43 | .60 | 2 | 1 | 3 |
| Daucus pusillus | 6/17 | 2.02 | 3.56 | .46 | .86 | 3 | 1 | 2 |
| Descurainia pinnata | 2/25 | 4.90 | 2.52 | .48 | 1.45 | 1 | 1 | 1 |
| Desmanthus fallax | 6/ 2 | 2.01 | 1.63 | .51 | .40 | 1 | 1 | 3 |
| Digitaria sanguinalis, Crab grass | 7/ 9 | 5.16 | 1.08 | .75 | .63 | 2 | 1 | 3 |
| Digitaria sp., Crab grass | 8/24 | 4.33 | .68 | .48 | .43 | 2 | 2 | 3 |
| Diospyros texana | 10/16 | .81 | 5.16 | .88 | .20 | 2 | 1 | 4 |
| Diospyros texana | 6/ 1 | 1.52 | 3.32 | .65 | .35 | 1 | 1 | 3 |
| Diospyros texana | 10/20 | 1.39 | 7.68 | .71 | .19 | 3 | 1 | 4 |
| Draba cuniefolia | 2/21 | 1.96 | 4.24 | .35 | .70 | 2 | 1 | 2 |
| Echinochloa colonum, Jungle rice | 8/24 | 4.15 | 1.09 | .81 | .51 | 1 | 1 | 3 |
| Elymus brachystachys | 6/ 2 | 2.18 | .47 | .20 | .44 | 2 | 2 | 3 |
| Engelmannia pinnatifida | 2/25 | 5.31 | 3.42 | .51 | .78 | 1 | 1 | 2 |
| Engelmannia pinnatifida | 4/29 | 4.62 | 2.15 | .42 | .58 | 2 | 1 | 3 |
| Ephedra antisyphilitica, Jointfir | 3/ 1 | .71 | 4.05 | .26 | .18 | 3 | 1 | 4 |
| Eragrostis cilianensis, Strong-scented love-grass | 8/24 | 1.81 | 1.24 | .40 | .51 | 2 | 1 | 3 |
| Erigeron canadensis, Horseweed | 8/ 6 | 3.14 | 1.42 | .34 | .65 | 2 | 1 | 3 |
| Eriochloa contracta | 9/ 5 | 3.34 | .87 | .55 | .46 | 2 | 1 | 3 |
| Erodium cicutarium, Alfileria | 2/27 | 4.77 | 4.56 | .49 | .99 | 1 | 1 | 2 |
| Erodium texanum | 2/24 | 2.61 | 2.69 | .34 | .56 | 1 | 1 | 3 |
| Erodium texanum | 2/27 | 2.40 | 2.31 | .35 | .49 | 1 | 1 | 3 |
| Euphorbia dictyosperma | 3/30 | 2.16 | 1.54 | .41 | .54 | 2 | 1 | 3 |
| Euphorbia stictospora | 8/24 | 2.04 | 2.96 | .49 | .51 | 2 | 1 | 3 |
| Evax multicaulis | 3/30 | 2.27 | 3.33 | .55 | .38 | 2 | 1 | 3 |
| Evax multicaulis | 5/15 | 2.68 | 1.33 | .62 | .46 | 3 | 1 | 3 |
| Evax prolifera | 6/ 2 | 1.19 | 2.64 | 1.93 | .46 | 3 | 1 | 3 |
| Festuca octoflora, Slender fescue | 3/23 | 2.63 | .59 | .32 | .79 | 1 | 2 | 2 |
| Festuca octoflora, Slender fescue | 4/26 | 1.22 | .62 | .22 | .43 | 3 | 2 | 3 |
| Forbs, mixed | 10/18 | 2.95 | 4.40 | .89 | .58 | 1 | 1 | 3 |
| Forbs, mixed | 12/18 | 4.09 | 3.47 | .71 | 1.31 | 1 | 1 | 1 |

**Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued**

| Name | Date collected | Per cent | | | | Grades | | |
|---|---|---|---|---|---|---|---|---|
| | | Potash | Lime | Magnesia | Phosphoric acid | Protein | Lime | Phosphoric acid |
| Forbs, mixed | 2/ 3 | 2.72 | ..... | ..... | .74 | 1 | ..... | 2 |
| Forestiera neomexicana | 3/30 | 2.59 | .97 | .31 | .75 | 1 | 1 | 2 |
| Forestiera neomexicana | 6/ 4 | 3.12 | 1.64 | .54 | .31 | 2 | 1 | 4 |
| Forestiera neomexicana | 7/15 | 2.80 | 1.74 | .44 | .25 | 3 | 1 | 4 |
| Gaillardia pulchella, Firewheel | 6/ 4 | 3.64 | 3.47 | .31 | .60 | 2 | 1 | 3 |
| Gaura coccinea | 6/17 | 2.12 | 2.56 | .45 | .33 | 2 | 1 | 3 |
| Gaura coccinea | 8/31 | 2.15 | 2.47 | .65 | .37 | 2 | 1 | 3 |
| Geranium carolinianum | 4/30 | 2.40 | 1.73 | .38 | 1.20 | 2 | 1 | 1 |
| Grasses, mixed | 12/18 | 1.27 | .93 | .22 | .33 | 2 | 1 | 3 |
| Gutierrezia microcephala | 10/ 3 | 1.51 | .96 | .24 | .29 | 3 | 1 | 4 |
| Gutierrezia texana, annual Snakeweed | 6/ 1 | 3.34 | .85 | .33 | .36 | 2 | 1 | 3 |
| Hedeoma Drummondii | 6/ 2 | 1.90 | 2.55 | .47 | .40 | 3 | 1 | 3 |
| Helenium microcephalum, sneezeweed | 4/22 | 4.35 | 3.12 | .28 | .56 | 1 | 1 | 3 |
| Helianthus annuus, Sunflower | 7/14 | 4.60 | 5.21 | .71 | .43 | 1 | 1 | 3 |
| Helianthus ciliaris, Blueweed | 7/15 | 4.95 | 2.74 | 1.04 | .47 | 2 | 1 | 3 |
| Hilaria Belangeri, curly mesquite | 10/20 | .89 | .88 | .48 | .56 | 1 | 1 | 3 |
| Hilaria Belangeri, curly mesquite | 10/21 | .47 | .65 | .22 | .34 | 3 | 2 | 3 |
| Hilaria Belangeri, curly mesquite | 11/19 | 1.02 | .69 | .19 | .44 | 3 | 2 | 3 |
| Hilaria Belangeri, curly mesquite | 12/19 | .37 | .78 | .59 | .26 | 3 | 2 | 4 |
| Hilaria Belangeri, curly mesquite | 1/23 | .23 | .58 | .10 | .20 | 3 | 2 | 4 |
| Hilaria Belangeri, curly mesquite | 2/25 | .19 | .48 | .11 | .18 | 4 | 2 | 4 |
| Hilaria Belangeri, curly mesquite | 6/ 2 | .94 | .76 | .21 | .37 | 3 | 2 | 3 |
| Hilaria Belangeri, curly mesquite | 7/ 9 | 1.40 | .77 | .26 | .45 | 3 | 2 | 3 |
| Hilaria Belangeri, curly mesquite | 8/31 | 1.25 | 1.10 | .25 | .36 | 3 | 1 | 3 |
| Hilaria Belangeri, curly mesquite | 9/22 | 1.13 | .88 | .21 | .24 | 3 | 1 | 4 |
| Hilaria Belangeri, curly mesquite | 10/19 | 1.06 | .76 | .22 | 25 | 3 | 2 | 4 |
| Hilaria Belangeri, curly mesquite | 11/13 | .47 | 1.35 | .16 | .27 | 4 | 1 | 4 |
| Hilaria Belangeri, curly mesquite | 12/14 | .28 | .52 | .12 | .16 | 3 | 2 | 5 |
| Hordeum pusillum, Little barley | 4/30 | 1.63 | .36 | .23 | .69 | 3 | 3 | 2 |
| Hoffmanseggia brachycarpa | 8/28 | 1.35 | 4.11 | .32 | .39 | 2 | 1 | 3 |
| Houstonia angustifolia | 10/20 | .76 | 1.38 | .24 | .18 | 3 | 1 | 4 |
| Juniperus Pinchoti | 12/18 | 1.21 | 1.22 | .19 | .28 | 4 | 1 | 4 |
| Juniperus Pinchoti | 3/24 | .59 | 2.36 | .26 | .28 | 3 | 1 | 4 |
| Kallstroemia intermedia | 6/17 | 3.43 | 5.74 | .46 | .50 | 1 | 1 | 3 |
| Krameria secundiflora, Ratany | 6/ 4 | 1.84 | 1.30 | .29 | .42 | 2 | 1 | 3 |
| Krigeron canadensis | 8/ 6 | 3.14 | 1.42 | .34 | .65 | 2 | 1 | 3 |
| Lepidium lasiocarpum Wrightii | 1/24 | 3.74 | 3.17 | 1.02 | 1.30 | 1 | 1 | 1 |
| Lepidium lasiocarpum Wrightii | 2/24 | 3.36 | 1.89 | .47 | 1.25 | 1 | 1 | 1 |
| Lepidium lasiocarpum Wrightii | 3/23 | 2.52 | 2.05 | .50 | .85 | 1 | 1 | 2 |
| Lepidium lasiocarpum Wrightii | 4/29 | 2.03 | 1.95 | .59 | .75 | 1 | 1 | 2 |
| Leprochloa dubia, Texas crowfoot | 8/31 | 2.09 | .53 | .26 | .50 | 2 | 2 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Leptoloma cognatum, Fall witch grass | 6/ 2 | 1.94 | .75 | .57 | .40 | 2 | 2 | 3 |
| Leptoloma cognatum, Fall witch grass | 9/22 | 3.57 | .64 | .45 | .21 | 3 | 2 | 4 |
| Lesquerella Gordoni | 2/24 | 2.27 | 6.42 | .50 | .73 | 1 | 1 | 2 |
| Lesquerella Gordoni | 3/24 | 1.85 | 5.94 | .43 | .52 | 1 | 1 | 3 |
| Leucaena retusa | 7/14 | 1.44 | 3.62 | .33 | .26 | 1 | 1 | 4 |
| Leucophyllum minus | 8/18 | .79 | 1.50 | .21 | .22 | 3 | 1 | 4 |
| Liatris Pyenostachya | 10/ 3 | 1.04 | 1.72 | .49 | .23 | 3 | 1 | 4 |
| Limnodea arkansana | 4/30 | 1.97 | .44 | .22 | .40 | 2 | 2 | 3 |
| Lonicera albiflora | 6/ 4 | 2.63 | 3.54 | .79 | .29 | 3 | 1 | 4 |
| Lupinis texensis | 5/ 1 | 1.90 | 5.08 | .47 | .36 | 2 | 1 | 3 |
| Lupinis texensis (flowers) | 5/ 1 | 1.88 | 1.53 | .39 | .63 | 1 | 1 | 3 |
| Martynia louisianica | 7/11 | 3.63 | 3.06 | .87 | .57 | 1 | 1 | 3 |
| Melampodium leucanthum | 8/28 | 3.24 | 2.25 | .60 | .39 | 2 | 1 | 3 |
| Mimosa fragrans, Catclaw | 8/29 | 1.28 | 3.11 | .50 | .36 | 1 | 1 | 3 |
| Morus microphylla | 7/15 | 2.20 | 5.98 | .81 | .35 | 2 | 1 | 3 |
| Nama hispidum | 6/ 3 | 2.23 | 5.42 | .58 | ..... | 2 | 1 | ..... |
| Nama jamaicense | 5/ 1 | 3.48 | 7.49 | .81 | .49 | 1 | 1 | 3 |
| Nolina texana (Sacahuiste) | 11/20 | .80 | 1.79 | .59 | .25 | 3 | 1 | 4 |
| Nolina texana (upper leaves) | 12/18 | .71 | .92 | .19 | .22 | 3 | 1 | 4 |
| Nolina texana (after burned) | 12/18 | .93 | .64 | .21 | .29 | 3 | 2 | 4 |
| Nolina texana (leaves and base) | 12/18 | .64 | 2.03 | .29 | .17 | 4 | 1 | 4 |
| Nolina texana (distal and foliage) | 1/28 | .61 | .88 | .14 | .18 | 4 | 1 | 4 |
| Nolina texana (whole leaves) | 1/28 | .59 | 1.57 | .23 | .17 | 4 | 1 | 4 |
| Nolina texana (foliage) | 2/25 | .72 | 1.90 | .24 | .20 | 4 | 1 | 4 |
| Nolina texana | 10/21 | .93 | .82 | .17 | .18 | 4 | 2 | 4 |
| Nolina texana | 11/13 | .98 | .95 | .22 | .18 | 4 | 1 | 4 |
| Nolina texana | 12/12 | 1.01 | .60 | .18 | .17 | 4 | 2 | 4 |
| Nolina texana (Sacahuiste) (buds) | 2/25 | 3.10 | .52 | ..... | 1.03 | 1 | 2 | 1 |
| Nolina texana (Sacahuiste) (buds) | 3/23 | 3.20 | .54 | .25 | .90 | 1 | 2 | 2 |
| Oenothera serrulata Drummondii | 5/ 1 | 1.41 | 1.56 | .42 | .39 | 3 | 1 | 3 |
| Oenothera Greggii lampsana | 5/ 1 | 1.54 | 2.99 | .49 | .35 | 2 | 1 | 3 |
| Oenothera speciosa | 5/ 1 | 3.90 | 2.28 | .56 | .78 | 1 | 1 | 2 |
| Oenothera speciosa | 7/15 | 2.61 | 2.68 | .59 | .62 | 2 | 1 | 3 |
| Opuntia Ellisiana, Spineless cactus | 12/18 | 1.67 | 16.20 | 1.51 | .12 | 5 | 1 | 5 |
| Opuntia Ellisiana, Spineless cactus | 1/24 | 2.31 | 15.13 | 1.95 | .14 | 5 | 1 | 5 |
| Opuntia leptocaulis | 12/18 | 2.55 | 14.49 | 1.15 | .26 | 3 | 1 | 4 |
| Opuntia leptocaulis | 1/24 | 3.11 | 11.37 | 1.46 | .31 | 4 | 1 | 4 |
| Opuntia sp. | 12/18 | 2.59 | 13.85 | 1.59 | .24 | 3 | 1 | 4 |
| Opuntia sp. | 1/23 | 3.48 | 9.43 | 1.74 | .41 | 3 | 1 | 3 |
| Opuntia sp. | 9/ 8 | 1.77 | 2.84 | .44 | .22 | 4 | 1 | 4 |
| Opuntia sp. (buds and young fruit) | 6/ 2 | 3.63 | 5.46 | 1.18 | .54 | 2 | 1 | 3 |
| Panicum fasciculatum reticulatum | 6/23 | 4.82 | .84 | .54 | .59 | 1 | 1 | 3 |
| Panicum fasciculatum reticulatum | 8/24 | 4.21 | .76 | .65 | .58 | 1 | 2 | 3 |
| Panicum Hallii | 8/31 | 1.71 | .68 | .50 | .37 | 2 | 2 | 3 |
| Panicum hirticaule | 7/15 | 1.90 | .63 | .47 | .39 | 2 | 2 | 3 |
| Panicum obtusum, Grapevine mesquite | 2/ 3 | 1.95 | .90 | .35 | .41 | 2 | 1 | 3 |
| Panicum obtusum, Grapevine mesquite | 6/ 2 | 3.54 | .82 | .34 | .67 | 1 | 2 | 2 |
| Panicum obtusum, Grapevine mesquite | 8/24 | 2.89 | 1.06 | .51 | .43 | 2 | 1 | 3 |
| Parosella frutescens | 7/14 | 1.35 | 2.94 | .37 | .30 | 1 | 1 | 4 |
| Parthenium Hysterophorus | 6/13 | 6.38 | 3.42 | .39 | .72 | 1 | 1 | 2 |

**Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued**

| Name | Date collected | Per cent | | | | Grades | | |
|---|---|---|---|---|---|---|---|---|
| | | Potash | Lime | Magnesia | Phosphoric acid | Protein | Lime | Phosphoric acid |
| Parthenium Hysterophorus | 9/ 5 | 1.61 | 2.39 | .32 | .64 | 1 | 1 | 3 |
| Parthenium incanum | 8/18 | 1.86 | 3.84 | .44 | .34 | 1 | 1 | 3 |
| Paspalum distichum, Joint grass | 9/ 8 | 2.63 | .56 | .27 | .51 | 3 | 2 | 3 |
| Pennisetum clandestinum | 8/24 | 5.15 | .78 | .43 | .61 | 1 | 2 | 3 |
| Petalostemum multiflorum | 6/17 | 1.56 | 2.25 | .35 | .32 | 2 | 1 | 4 |
| Phacelia Popei | 2/27 | 3.35 | 4.99 | .54 | .68 | 1 | 1 | 2 |
| Phalaris angusta | 5/ 1 | 3.02 | .66 | .41 | .54 | 1 | 2 | 3 |
| Phlox Rosmeriana | 5/ 1 | 3.53 | 1.87 | .28 | .66 | 2 | 1 | 3 |
| Physalis lobata | 7/14 | 6.74 | 2.80 | .87 | .77 | 1 | 1 | 2 |
| Pinaropappus rosens | 6/ 2 | 2.76 | 1.42 | .36 | .44 | 2 | 1 | 3 |
| Plantago Helleri | 4/30 | 1.43 | 1.20 | .29 | .38 | 3 | 1 | 3 |
| Plantago rhodosperma | 2/24 | 3.19 | 8.45 | .36 | .48 | 1 | 1 | 3 |
| Plantago rhodosperma | 3/30 | 3.53 | 6.52 | .35 | .30 | 2 | 1 | 4 |
| Plantago rhodosperma | 5/ 1 | 2.10 | 4.87 | .36 | .37 | 3 | 1 | 3 |
| Plantago Purshii, Indian wheat | 3/23 | 1.65 | 1.23 | .34 | .36 | 2 | 1 | 3 |
| Portulaca Retusa | 8/29 | 6.09 | 3.72 | 1.32 | .69 | 3 | 1 | 2 |
| Prosopis chilensis (Mesquite tree foliage) | 10/17 | 1.48 | 3.97 | .47 | .41 | 1 | 1 | 3 |
| Prosopis chilensis (Mesquite tree foliage) | 6/ 1 | 1.51 | 1.13 | .32 | .53 | 1 | 1 | 3 |
| Prosopis chilensis (Mesquite tree foliage) | 7/14 | 1.70 | 2.16 | .34 | .38 | 1 | 1 | 3 |
| Prosopis chilensis (Mesquite tree foliage) | 8/29 | 1.64 | 2.87 | .32 | .30 | 1 | 1 | 4 |
| Prosopis chilensis (pods) Mesquite tree | 10/20 | 1.58 | .80 | .14 | .48 | 1 | 2 | 3 |
| Prosopis chilensis (pods) Mesquite tree | 9/25 | 1.66 | .94 | .22 | .40 | 2 | 1 | 3 |
| Prunus minutiflora | 10/17 | 1.71 | 3.97 | .40 | .79 | 1 | 1 | 2 |
| Prunus minutiflora | 11/18 | 2.11 | 2.21 | .47 | .57 | 1 | 1 | 3 |
| Prunus minutiflora | 6/ 1 | 1.80 | 1.69 | .51 | .37 | 1 | 1 | 3 |
| Pyrrhopappus carolinianus | 6/ 4 | 4.02 | 1.87 | .38 | .65 | 2 | 1 | 3 |
| Quercus breviloba, Shin oak | 10/18 | .46 | 2.46 | .31 | .26 | 3 | 1 | 4 |
| Quercus breviloba, Shin oak | 11/19 | 1.56 | 2.98 | .39 | .21 | 3 | 1 | 4 |
| Quercus breviloba, Shin oak | 6/ 3 | .97 | 1.01 | .31 | .33 | 2 | 1 | 3 |
| Quercus breviloba, Shin oak | 7/13 | .71 | 1.84 | .28 | .20 | 3 | 1 | 4 |
| Quercus breviloba, Shin oak | 8/29 | .85 | 2.76 | .43 | .25 | 3 | 1 | 4 |
| Quercus breviloba, Shin oak | 9/28 | .67 | 1.42 | .23 | .19 | 3 | 1 | 4 |
| Quercus breviloba, Shin oak | 10/20 | .72 | 2.32 | .30 | .20 | 3 | 1 | 4 |
| Quercus breviloba, Shin oak | 11/11 | .52 | 2.07 | ..... | .17 | 3 | 1 | 4 |
| Quercus breviloba, Shin oak | 12/14 | .55 | 3.50 | .36 | .19 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 10/18 | .77 | 3.02 | .42 | .22 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 10/16 | 1.84 | .31 | .18 | .23 | 4 | 3 | 4 |
| Quercus virginiana (foliage) | 11/19 | 2.12 | .23 | .15 | .22 | 4 | 3 | 4 |
| Quercus virginiana (foliage) | 11/19 | .76 | 1.81 | .29 | .25 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 12/18 | .57 | 1.57 | .24 | .24 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 1/24 | .51 | 2.55 | .30 | .25 | 3 | 1 | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Quercus virginiana (foliage) | 2/24 | .66 | 1.57 | .23 | .28 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 3/30 | .96 | 2.95 | .25 | .19 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 4/28 | 1.33 | .88 | .30 | .59 | 1 | 1 | 3 |
| Quercus virginiana (foliage) | 6/ 3 | 1.28 | 1.01 | .28 | .36 | 2 | 1 | 3 |
| Quercus virginiana (foliage) | 7/13 | .91 | 1.37 | .27 | .24 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 8/29 | .72 | 1.27 | .47 | .21 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 9/26 | .84 | .33 | .13 | .20 | 4 | 3 | 4 |
| Quercus virginiana (foliage) | 9/26 | .98 | 1.76 | .35 | .20 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 10/19 | .58 | 1.37 | .34 | .23 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 11/11 | .75 | 2.21 | ..... | .18 | 3 | 1 | 4 |
| Quercus virginiana (foliage) | 12/12 | .80 | 2.46 | .39 | .21 | 3 | 1 | 4 |
| Quercus virginiana (acorns) | 10/19 | .83 | .14 | .10 | .17 | 4 | 4 | 4 |
| Quercus virginiana (acorns) | 11/11 | .56 | .20 | .10 | .14 | 4 | 4 | 5 |
| Quercus virginiana (acorns) | 12/14 | .75 | .24 | .12 | .19 | 4 | 3 | 4 |
| Ratibida columnifera | 2/24 | 5.92 | 4.39 | .79 | .73 | 1 | 1 | 2 |
| Ratibida columnifera | 4/30 | 4.66 | 3.43 | .48 | .42 | 1 | 1 | 3 |
| Ratibida columnifera | 6/ 1 | 4.41 | 4.79 | 1.00 | .50 | 1 | 1 | 3 |
| Ratibida columnifera | 11/12 | 1.44 | 2.36 | ..... | .65 | 2 | 1 | 3 |
| Rhus microphylla, Sumac | 11/19 | 2.41 | 3.56 | .65 | .30 | 2 | 1 | 4 |
| Rhus microphylla, Sumac | 6/ 1 | 1.60 | 1.49 | .28 | .40 | 1 | 1 | 3 |
| Rhus microphylla, Sumac | 7/13 | 1.51 | 1.85 | .47 | .32 | 1 | 1 | 4 |
| Rhus microphylla, Sumac | 8/29 | 2.71 | 2.87 | .61 | .29 | 2 | 1 | 4 |
| Rhus microphylla, Sumac | 10/21 | 2.36 | 2.98 | .62 | .50 | 2 | 1 | 3 |
| Rhus microphylla, Sumac | 11/12 | 1.34 | 3.18 | ..... | .23 | 2 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 10/18 | .76 | 3.67 | .57 | .28 | 3 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 11/18 | .91 | 3.04 | .52 | .18 | 3 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 6/ 3 | 1.37 | 1.21 | .30 | .32 | 3 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 7/14 | 1.00 | 1.71 | .47 | .21 | 3 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 8/29 | .86 | 2.65 | .56 | .19 | 3 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 9/26 | .91 | 2.51 | .58 | .17 | 3 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 10/21 | 1.53 | 1.97 | .47 | .20 | 3 | 1 | 4 |
| Rhus trilobata, Illscented sumac | 11/12 | .83 | 3.20 | ..... | .23 | 3 | 1 | 4 |
| Rhus virens | 11/18 | .79 | 1.97 | .36 | ..... | 3 | 1 | ..... |
| Rhus virens | 11/12 | .85 | 2.42 | ..... | .22 | 3 | 1 | 4 |
| Rhynchosia texana | 7/14 | 1.62 | 2.08 | .38 | .54 | 1 | 1 | 3 |
| Rhynchosia texana | 8/24 | 1.45 | 2.21 | .37 | .42 | 1 | 1 | 3 |
| Salsola pestifer, Russian thistle | 8/ 6 | 5.14 | 2.57 | .76 | .35 | 1 | 1 | 3 |
| Salvia reflexa | 8/24 | 5.22 | 2.11 | .80 | .83 | 1 | 1 | 2 |
| Schrankia angustata | 6/ 2 | 1.46 | 1.34 | .48 | .48 | 1 | 1 | 3 |
| Scutellaria Drummondii | 6/ 2 | 1.91 | 1.97 | .55 | .36 | 3 | 1 | 3 |
| Setaria macrostachys, Foxtail grass | 7/15 | 6.52 | .54 | .43 | .67 | 1 | 2 | 2 |
| Sedum Nuttallianum | 4/ 1 | 2.99 | 9.88 | .33 | .87 | 3 | 1 | 2 |
| Sida procumbens | 6/ 2 | 1.98 | 3.36 | .96 | .54 | 1 | 1 | 3 |
| Simsia calva | 6/ 1 | 3.39 | 4.80 | 1.40 | .45 | 1 | 1 | 3 |
| Simsia calva | 8/28 | 3.90 | 5.67 | .94 | .49 | 1 | 1 | 3 |
| Siphonoglossa pilosella | 8/31 | 4.39 | 7.21 | 1.08 | .43 | 1 | 1 | 3 |
| Sitanion Hystrix, Bottlebrush squirrel-tail | 4/30 | 2.17 | .48 | .21 | .42 | 2 | 2 | 3 |
| Solanum Torreyi | 7/11 | 3.07 | 2.56 | .66 | .35 | 1 | 1 | 3 |
| Solanum elaeagnifolium | 6/ 5 | 3.47 | 2.45 | .54 | .60 | 1 | 1 | 3 |
| Solanum elaeagnifolium | 7/14 | 3.52 | 1.61 | .42 | .77 | 1 | 1 | 2 |

**Table 4. Minerals and Grades of Protein, Lime and Phosphoric Acid in Forage Plants—Continued**

| Name | Date collected | Per cent | | | | Grades | | |
|---|---|---|---|---|---|---|---|---|
| | | Potash | Lime | Magnesia | Phosphoric acid | Protein | Lime | Phosphoric acid |
| Solanum elaeagnifolium | 8/24 | 2.89 | 2.36 | .47 | .64 | 1 | 1 | 3 |
| Solanum elaeagnifolium | 12/14 | 2.44 | 1.42 | ..... | .49 | 2 | 1 | 3 |
| Solanum triquetrum | 8/31 | 3.12 | 3.64 | .72 | .56 | 1 | 1 | 3 |
| Sophora secundiflora | 12/18 | .93 | 2.47 | .30 | .31 | 1 | 1 | 4 |
| Sophora secundiflora | 1/28 | .86 | 2.71 | .33 | .31 | 1 | 1 | 4 |
| Sophora secundiflora | 6/ 5 | 1.23 | 2.66 | .35 | .29 | 1 | 1 | 4 |
| Sophora secundiflora (pods) | 6/ 5 | 1.29 | .65 | .26 | .29 | 1 | 2 | 4 |
| Sorghum halepensis, Johnson grass | 7/14 | 3.49 | .81 | .39 | .58 | 1 | 2 | 3 |
| Sphaeralcea angustifolia cuspidata | 8/29 | 3.01 | 4.35 | .56 | .65 | 1 | 1 | 3 |
| Sporobolus cryptandrus, Dropseed grass | 8/24 | 1.72 | .56 | .37 | .54 | 2 | 2 | 3 |
| Stipa leucotricha, Spear grass | 6/ 2 | 1.33 | .34 | .14 | .27 | 3 | 3 | 4 |
| Stipa leucotricha, Spear grass | 12/12 | 1.70 | .75 | .30 | .39 | 2 | 2 | 3 |
| Stillingia Treculeana | 5/27 | 2.87 | 4.01 | .64 | .50 | 1 | 1 | 3 |
| Talinum aurantiacum | 8/24 | 5.95 | 3.90 | 2.08 | .47 | 1 | 1 | 3 |
| Thelesperma simplicifolium | 6/ 2 | 1.79 | 1.69 | .30 | .32 | 3 | 1 | 4 |
| Tidestromia suffruticosa | 9/11 | 3.64 | 3.07 | .82 | .28 | 2 | 1 | 4 |
| Tragia ramosa | 6/ 2 | 1.73 | 2.32 | .53 | .47 | 2 | 1 | 3 |
| Tragia ramosa | 8/28 | 1.70 | 2.84 | .57 | .47 | 1 | 1 | 3 |
| Tribulus terrestris | 6/23 | 3.19 | 4.36 | .49 | .52 | 1 | 1 | 3 |
| Triodia albescens | 9/ 8 | 1.79 | .45 | .17 | .50 | 3 | 2 | 3 |
| Trisetum interruptum | 4/26 | 1.57 | 1.20 | .23 | .47 | 3 | 1 | 3 |
| Ungnadia speciosa | 7/15 | 1.39 | 3.17 | .54 | .36 | 2 | 1 | 3 |
| Verbena bipinnatifida | 4/22 | 1.78 | 2.56 | .52 | .37 | 2 | 1 | 3 |
| Verbena plicata | 6/ 2 | 1.69 | 3.19 | .52 | .37 | 2 | 1 | 3 |
| Verbena plicata | 8/31 | 1.85 | 3.75 | .67 | .32 | 3 | 1 | 4 |
| Vicia Leavenworthii, Vetch | 3/24 | 3.51 | 2.10 | .40 | .56 | 1 | 1 | 3 |
| Xanthoxylum c.-h. fruticosum | 6/ 1 | 3.30 | 2.69 | .49 | .54 | 1 | 1 | 3 |
| Yucca Reverchoni (buds) | 5/ 1 | 2.53 | 1.49 | .33 | .80 | 2 | 1 | 2 |
| Yucca Reverchoni (flowers) | 6/ 2 | 3.28 | 1.44 | .48 | 1.04 | 1 | 1 | 1 |
| Yucca Treguleana | 2/28 | 1.96 | 4.90 | .54 | .36 | 2 | 1 | 3 |
| Yucca Treguleana (buds) | 3/24 | 3.04 | 1.95 | .42 | 1.35 | 1 | 1 | 1 |
| Yucca Thompsoniana | 3/ 2 | .79 | 1.69 | .27 | .18 | 3 | 1 | 4 |
| Zexmania hispida | 6/ 4 | 3.47 | 3.75 | .69 | .38 | 2 | 1 | 3 |
| Zexmania hispida | 8/28 | 2.75 | 4.52 | 1.00 | .42 | 1 | 1 | 3 |

**Table 5. Percentages of Forages Eaten by Range Cattle**

| | October, 1930 % | November, 1930 % | December, 1930 % | January, 1931 % | February, 1931 % | March, 1931 % | April, 1931 % |
|---|---|---|---|---|---|---|---|
| Curly mesquite, Hilaria Belangeri | 92 | 68 | 22 | 6 | 72 | 1 | 2 |
| Live oak, Quercus virginiana | ..... | 13 | 28 | 15 | 3 | ..... | 10 |
| Sacahuiste, Nolina texana | ..... | 7 | 46 | 38 | 21 | 24 | ..... |
| Needle grass, Aristida sp | ..... | 4 | ..... | 32 | ..... | 1 | ..... |
| Bromus catharticus | ..... | ..... | ..... | ..... | ..... | 17 | ..... |
| Astralagus Nuttallianus* | ..... | ..... | ..... | ..... | ..... | 52 | ..... |
| Plantago Helleri* | ..... | ..... | ..... | ..... | ..... | ..... | 58 |
| Trisetum interruptum | ..... | ..... | ..... | ..... | ..... | ..... | 20 |
| Limnodea arkansana | ..... | ..... | ..... | ..... | ..... | ..... | 10 |
| Ill-scented sumac, Rhus trilobata | 2 | ..... | ..... | ..... | ..... | ..... | ..... |
| Mixed forbs | 5 | ..... | ..... | ..... | ..... | ..... | ..... |
| Miscellaneous | 1 | ..... | 4 | 7 | ..... | ..... | ..... |
| Carex planostachys | ..... | 8 | ..... | ..... | 4 | 5 | ..... |
| Prickly pear, Opuntia sp | ..... | ..... | ..... | 2 | ..... | ..... | ..... |

*Taken as representative of the forage-plant forbs in general.

**Table 6. Percentages of Forages Eaten by Range Cattle**

| | May, 1931 % | June, 1931 % | July, 1931 % | August, 1931 % | September, 1931 % | October, 1931 % | November, 1931 % | December, 1931 % |
|---|---|---|---|---|---|---|---|---|
| Curly mesquite, Hilaria Belangeri | 45 | 65 | 94 | 80 | 98 | 67 | 78 | 22 |
| Live oak, Quercus virginiana | | 1 | 1 | 6 | | 5 | 15 | 29 |
| Sacahuiste | | | | | | 18 | 2 | 45 |
| Buchloe dactyloides | 45 | 17 | | 9 | | | | |
| Quercus breviloba | 1 | 9 | | 1 | | 2 | | |
| Rhus trilobata | | | 1 | | 1 | | 2 | |
| Carex planostachys | 2 | | | | | | 1 | 1 |
| Stipa leucotricha | 3 | | | | | | | 2 |
| Aristida Wrightii | 3 | 3 | | 1 | | | | |
| Tragia ramosa | 1 | | | | | | | |
| Aphanostephus humilis | | 2 | | | | | | |
| Thelesperma simplicifolium | | 1 | | | | | | |
| Miscellaneous | | 2 | | | | | | |
| Prosopis chilensis | | | 4 | 2 | | | | |
| Verbena plicata | | | | 1 | | | | |
| Chamaesaracha sordida | | | | | 1 | | | |
| Diospyros texana | | | | | | 7 | | |
| Houstonia angustifolia | | | | | | 1 | | |
| Colubrina texensis | | | | | | | 1 | |
| Aristida purpurea | | | | | | | 1 | 1 |

**Table 7. Percentages of Forages Eaten by Range Sheep**

| | October, 1930 % | November, 1930 % | December, 1930 % | January, 1931 % | February, 1931 % | March, 1931 % | April, 1931 % |
|---|---|---|---|---|---|---|---|
| Curly mesquite, Hilaria Belangeri | 90 | 58 | 58 | 25 | ..... | 2 | 10 |
| Mixed forbs | 5 | 23 | ..... | 20 | 20 | ..... | ..... |
| Live oak, Quercus virginiana | ..... | 7 | 26 | 25 | 1 | ..... | ..... |
| Sacahuiste, Nolina texana | ..... | ..... | 16 | 25 | ..... | ..... | ..... |
| Festuca octoflora | ..... | ..... | ..... | ..... | 79 | 59 | ..... |
| Astragalus macilentus | ..... | ..... | ..... | ..... | ..... | 19 | ..... |
| Trisetum interruptum | ..... | ..... | ..... | ..... | ..... | ..... | 40 |
| Aphanostephus humilis | ..... | ..... | ..... | ..... | ..... | ..... | 50 |
| Carex planostachys | ..... | 12 | ..... | ..... | ..... | ..... | ..... |
| Rhus trilobata, Ill-scented sumac | 2 | ..... | ..... | ..... | ..... | ..... | ..... |
| Live oak acorns | 1 | ..... | ..... | ..... | ..... | ..... | ..... |
| Mesquite pods | 1 | ..... | ..... | ..... | ..... | ..... | ..... |
| Prunus minutiflora | 1 | ..... | ..... | ..... | ..... | ..... | ..... |
| Grasses from thickets | ..... | ..... | ..... | 5 | ..... | ..... | ..... |
| Lesquerella Gordoni | ..... | ..... | ..... | ..... | ..... | 5 | ..... |
| Astragalus Nuttallianus | ..... | ..... | ..... | ..... | ..... | 5 | ..... |
| Euphorbia dictyosperma | ..... | ..... | ..... | ..... | ..... | 5 | ..... |
| Plantago rhodosperma | ..... | ..... | ..... | ..... | ..... | 5 | ..... |

**Table 8. Percentages of Forages Eaten by Range Sheep**

| | May, 1931 % | June, 1931 % | July, 1931 % | August, 1931 % | September, 1931 % | October, 1931 % | November, 1931 % | December, 1931 % |
|---|---|---|---|---|---|---|---|---|
| Curly mesquite, Hilaria Belangeri | 23 | 64 | 55 | 70 | 88 | 54 | 83 | 28 |
| Live oak acorns | | | | | | 6 | 5 | |
| Live oak, Quercus virginiana | 1 | 1 | | 1 | 5 | 1 | 3 | 22 |
| Sacahuiste, Nolina texana | | | | | | 28 | 2 | 25 |
| Aphanostephus humilis | 12 | 14 | 37 | | | | | |
| Carex planostachys | 9 | | | | | | 1 | 23 |
| Centaurium calycosum | 13 | 2 | | | | | | |
| Zexmania hispida | 10 | | | 3 | | | | |
| Rhus trilobata | 1 | 4 | 1 | 10 | 3 | 1 | 3 | |
| Aristida purpurea | | | | | | 9 | 1 | 1 |
| Sida procumbens | 3 | 3 | 2 | | | | 1 | 1 |
| Schrankia angustata | 3 | 1 | | | | | | |
| Celtis reticulata | 1 | | | | | | | |
| Acacia Roemeriana | 2 | | | | | | | |
| Solanum elaeagnifolium | | | 1 | | | | | |
| Cuscuta exaltata | | | 1 | | | | | |
| Rhynchosia texana | | | 2 | 3 | | | | |
| Oenothera speciosa | | | 1 | | | | | |
| Panicum Hallii | | | | 3 | | | | |
| Abutilon incanum | | | | 1 | | | | |
| Talinum aurantiacum | | | | 2 | | | | |
| Boerhaavia tenuifolia | | | | 3 | | | | |
| Portulaca retusa | | | | 1 | | | | |
| Croton monanthogynus | | 1 | | 1 | 1 | | | |
| Verbena plicata | | | | 1 | | | | |
| Siphonoglossa pilosella | | | | 1 | | | | |
| Chamaesaracha sordida | | | | | 2 | | | |
| Aster ericoides | | | | | 1 | | | |
| Houstonia angustifolia | | | | | | 1 | 1 | |
| Lepidium lasiocarpum Wrightii | 4 | | | | | | | |
| Amaranthus blitoides | 2 | 3 | | | | | | |
| Valerianella ameralla | 9 | | | | | | | |
| Sedum Nuttallianum | 7 | | | | | | | |
| Pinaropappus roseus | | 1 | | | | | | |
| Gutierrezia texana | | 1 | | | | | | |
| Panicum obtusum | | 2 | | | | | | |
| Desmanthus fallax | | 2 | | | | | | |
| Pyrrhopappus carolinianus | | 1 | | | | | | |

**Table 9. Percentages of Forage Eaten by Range Goats**

| | October, 1930 % | November, 1930 % | December, 1930 % | January, 1931 % | February, 1931 % | March, 1931 % | April, 1931 % |
|---|---|---|---|---|---|---|---|
| Curly mesquire, Hilaria Belangeri | 64 | 36 | 14 | 3 | ..... | 2 | 5 |
| Live oak acorns | 15 | 6 | ..... | ..... | ..... | ..... | ..... |
| Live oak, Quercus virginiana | 12 | 32 | 59 | 77 | 33 | 3 | 15 |
| Mixed plants | 1 | 12 | ..... | 1 | 7 | ..... | ..... |
| Other grasses | ..... | ..... | 16 | 4 | ..... | ..... | ..... |
| Festuca octoflora | ..... | ..... | ..... | ..... | 54 | 14 | ..... |
| Lesquerella Gordoni | ..... | ..... | ..... | ..... | ..... | 20 | ..... |
| Trisetum interruptum | ..... | ..... | ..... | ..... | ..... | ..... | 25 |
| Engelmannia pinnatifida | ..... | ..... | ..... | ..... | ..... | ..... | 50 |
| Shin oak, Quercus breviloba | 1 | 1 | ..... | ..... | ..... | ..... | 5 |
| Rhus trilobata, Ill-scented sumac | 6 | 5 | ..... | ..... | ..... | ..... | ..... |
| Carex planostachys | ..... | 2 | ..... | ..... | 4 | 4 | ..... |
| Prunus minutiflora | 1 | 2 | ..... | ..... | ..... | ..... | ..... |
| Bumelia texana | ..... | 2 | ..... | ..... | ..... | ..... | ..... |
| Berberis trifoliata | ..... | 2 | ..... | ..... | ..... | ..... | ..... |
| Sacahuiste, Nolina texana | ..... | ..... | 5 | 8 | ..... | ..... | ..... |
| Prickly pear (Buds and Young fruit of prickly pear) | ..... | ..... | 4 | 2 | ..... | ..... | ..... |
| Mescal bean (Sophora secundiflora) | ..... | ..... | 1 | 4 | ..... | ..... | ..... |
| Tasajillo (Opuntia leptocaulis) | ..... | ..... | 1 | 1 | ..... | ..... | ..... |
| Aristida spp. Three-awn grass | ..... | ..... | ..... | ..... | 1 | ..... | ..... |
| Sacahuiste buds | ..... | ..... | ..... | ..... | 1 | 1 | ..... |
| Juniperus Pinchotii (foliage) | ..... | ..... | ..... | ..... | ..... | 2 | ..... |
| Forestiera neomexicana | ..... | ..... | ..... | ..... | ..... | 2 | ..... |
| Lepidium lasiocarpum Wrightii | ..... | ..... | ..... | ..... | ..... | 10 | ..... |
| Astragalus Nuttallianus | ..... | ..... | ..... | ..... | ..... | 10 | ..... |
| Astragalus macilentus | ..... | ..... | ..... | ..... | ..... | 5 | ..... |
| Euphorbia dictyosperma | ..... | ..... | ..... | ..... | ..... | 4 | ..... |
| Vicia Leavenworthii | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| Plantago rhodosperma | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| Plantago spinulosa and other forbs | ..... | ..... | ..... | ..... | ..... | 10 | ..... |
| Evax multicaulis and other forbs | ..... | ..... | ..... | ..... | ..... | 10 | ..... |
| Yucca Treculeana (buds) | ..... | ..... | ..... | ..... | ..... | 1 | ..... |

**Table 10. Percentages of Forage Eaten by Range Goats**

| | May, 1931 % | June, 1931 % | July, 1931 % | August, 1931 % | September, 1931 % | October, 1931 % | November, 1931 % | December, 1931 % |
|---|---|---|---|---|---|---|---|---|
| Curly mesquite, Hilaria Belangeri | 24 | 35 | 45 | 10 | 63 | 43 | 18 | 7 |
| Live oak acorns | ..... | ..... | ..... | ..... | 5 | 12 | 8 | 1 |
| Live oak, Quercus virginiana | 8 | 8 | 9 | 40 | 24 | 34 | 26 | 50 |
| Shin oak, Quercus breviloba | 1 | 2 | 18 | 15 | 1 | ..... | 23 | 2 |
| Rhus microphylla | 4 | ..... | 15 | 4 | ..... | 1 | ..... | ..... |
| Rhus trilobata, Ill-scented sumac | 8 | 16 | 5 | 15 | 5 | ..... | 17 | ..... |
| Carex planostachys | 10 | ..... | ..... | ..... | ..... | ..... | 4 | 32 |
| Prunus minutiflora | 8 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Rhus virens | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... |
| Sacahuiste, Nolina texana | ..... | ..... | ..... | ..... | ..... | ..... | 1 | 8 |
| Forestiera neomexicana | ..... | ..... | 3 | ..... | ..... | ..... | ..... | ..... |
| Lepidium lasiocarpum Wrightii | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Centaurium calycosum | 10 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Tragia ramosa | 5 | 3 | ..... | 1 | ..... | ..... | ..... | ..... |
| Sida procumbens | 5 | 2 | ..... | ..... | ..... | ..... | ..... | ..... |
| Aphanostephus humilis | 1 | 4 | 1 | ..... | ..... | ..... | ..... | ..... |
| Actinea scaposa linearis | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Thelesperma simplicifolium | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Ratibida columnifera | 4 | 3 | ..... | ..... | ..... | ..... | ..... | ..... |
| Verbena plicata | 3 | ..... | ..... | 1 | ..... | ..... | ..... | ..... |
| Sophora secundiflora (leaves) | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Condalia obtusifolia | 4 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Cassia Roemeriana | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Cuscuta exaltata | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Rhynchosia texana | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... |
| Panicum Hallii | ..... | ..... | ..... | 3 | ..... | ..... | ..... | ..... |
| Amaranthus blitoides | ..... | 2 | ..... | 1 | ..... | ..... | ..... | ..... |
| Abutilon incanum | ..... | ..... | 1 | 1 | ..... | ..... | ..... | ..... |
| Zexmania hispida | ..... | 3 | ..... | 1 | ..... | ..... | ..... | ..... |
| Portulaca retusa | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... |
| Croton monanthogynus | ..... | 2 | ..... | 1 | ..... | 2 | ..... | ..... |
| Prosopis chilensis, Mesquite | ..... | ..... | ..... | 1 | ..... | ..... | ..... | ..... |
| Mimosa fragrans | ..... | ..... | ..... | 5 | ..... | ..... | ..... | ..... |
| Chamaesaracha sordida | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| Opuntia sp | ..... | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| Aristida purpurea | ..... | ..... | ..... | ..... | ..... | 5 | ..... | ..... |
| Houstonia angustifolia | ..... | ..... | ..... | ..... | ..... | 3 | 1 | ..... |
| Plantago Helleri | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Panicum hirticaule | ..... | 3 | ..... | ..... | ..... | ..... | ..... | ..... |
| Simsia calva | ..... | 3 | ..... | ..... | ..... | ..... | ..... | ..... |
| Desmanthus fallax | ..... | 3 | ..... | ..... | ..... | ..... | ..... | ..... |
| Schrankia angustata | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... |
| Acacia Roemeriana | ..... | 9 | ..... | ..... | ..... | ..... | ..... | ..... |

## Character of the Range Rations

The approximate grades of the range rations of the different kinds of animals was ascertained by combining the grade of the protein, lime, and phosphoric acid of the different feeds as given in Table 2 with the quantities eaten as given in Tables 5, 6, 7, 8, 9 and 10. A summary by months is given in Table 11.

With the cattle, the grade of the ration for protein is 3, except in February, March, April and November, when the grade is 4. This means that the forage is fair in protein most of the year, but was probably deficient in February, March, April and November. The grade for lime is 1 to 2 throughout the year. This means that the ration is good to high in lime at all times. The grade for phosphoric acid is 3 from March to August and also November and 4 for September through February except November. This means that the ration was fair in phosphorus part of the year, but probably deficient from September to March.

With sheep, the grade for protein was 3 excepting in February, March and July, when it was 2, and November, when it was 4. This means that the ration for sheep was fair to good in protein, except during November. The grade for lime (calcium) was 1 to 2 through the entire period, indicating that the ration was good to high in lime. The grade for phosphorus was 4 in September to December 1931, and December 1930 and January 1931, indicating a deficiency during these months. The remainder of the year, the ration was fair in phosphorus, except in February 1931, when it was good in phosphorus.

For goats, the grade for protein was 3, except for February, May and June when it was 2, and November, when it was 4. This indicates that the ration was fair in protein most of the year, and deficient in only one month. The grade for lime was from 1 to 2, indicating that the ration was well supplied with lime. The grade for phosphorus was 3 for March through August 1931 and 4 for October 1930 through February 1931, and October, November and December of 1931. This indicates a fair supply of phosphorus part of the year, but a probable deficiency during the fall and winter.

The grade for the protein, lime and phosphoric acid in the range forage will depend to a great extent upon the weather, especially on the rainfall or lack of rainfall, and the temperatures. Hence the grades will vary from year to year.

The data indicate that there is little deficiency of lime. Phosphorus is more likely to be deficient, especially during the winter months of very dry periods. Deficiencies of protein may also occur, likewise, during dry periods or the winter season.

The discussion of the data does not refer to the quantity of range vegetation available. It would appear, however, that a deficiency in quantity may often be accompanied by a deficiency in protein and in phosphorus.

**Table 11.—Grades of Vegetation Eaten by Range Animals**

| | Protein Grade | Lime Grade | Phosphoric acid Grade |
|---|---|---|---|
| **Cattle** | | | |
| October, 1930 | 3 | 2 | 3 |
| November | 3 | 2 | 4 |
| December | 3 | 2 | 4 |
| January, 1931 | 3 | 1 | 4 |
| February | 4 | 2 | 4 |
| March | 4 | 2 | 3 |
| April | 4 | 2 | 3 |
| May | 3 | 2 | 3 |
| June | 3 | 2 | 3 |
| July | 3 | 2 | 3 |
| August | 3 | 1 | 3 |
| September | 3 | 1 | 4 |
| October | 3 | 2 | 4 |
| November | 4 | 1 | 4 |
| December | 3 | 2 | 4 |
| **Sheep** | | | |
| October, 1930 | 3 | 2 | 3 |
| November | 2 | 2 | 3 |
| December | 3 | 2 | 4 |
| January, 1931 | 3 | 1 | 4 |
| February | 2 | 1 | 2 |
| March | 2 | 2 | 3 |
| April | 3 | 2 | 3 |
| May | 3 | 2 | 3 |
| June | 3 | 2 | 3 |
| July | 2 | 2 | 3 |
| August | 3 | 1 | 3 |
| September | 3 | 1 | 4 |
| October | 3 | 2 | 4 |
| November | 4 | 2 | 4 |
| December | 3 | 2 | 4 |
| **Goats** | | | |
| October, 1930 | 3 | 2 | 4 |
| November | 3 | 2 | 4 |
| December | 3 | 2 | 4 |
| January, 1931 | 3 | 1 | 4 |
| February | 2 | 1 | 4 |
| March | 3 | 2 | 3 |
| April | 3 | 1 | 3 |
| May | 2 | 1 | 3 |
| June | 2 | 1 | 3 |
| July | 3 | 1 | 3 |
| August | 3 | 1 | 3 |
| September | 3 | 1 | 4 |
| October | 3 | 2 | 4 |
| November | 4 | 1 | 4 |
| December | 3 | 1 | 4 |

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## SUMMARY

Feeding analyses, and analyses for potash, lime, magnesia and phosphoric acid were made of 349 samples of grasses, leaves, and other parts of range vegetation in Sutton and Edwards Counties.

In order to facilitate comparison, the protein, phosphoric acid and lime in the samples were graded, Grade No. 1 containing the highest percentages and No. 5, the lowest.

The percentages of the different kinds of vegetation consumed by cattle, by sheep and by goats were ascertained monthly for a period of 15 months. Cattle fed on the smallest number of different kinds of plants, sheep came next, while the diet of goats was quite diversified.

The approximate grades of the diet of the range animals were ascertained by considering the grades of the vegetation eaten in connection with the percentage of each plant.

The ration of the cattle was fair (grade 3) in percentage of protein most of the year but probably deficient (grade 4) in February, March, April and November. The lime content was good to high (grades 2 and 1) at all times. The phosphoric acid content was fair (grade 3) from March to August, but probably deficient (grade 4) September through February.

For sheep, the protein content was fair (grade 3) through most of the period, although in 3 months the grade was good (grade 2), and in November it was probably deficient (grade 4). The lime content was good to high. The phosphoric acid was fair most of the year, except in December 1930, January 1931, and September to December 1931, when it was probably deficient (grade 4).

For goats, the grade for protein was fair to good, except in November, when protein was probably deficient (grade 4). The lime content was high to good. The phosphoric acid content was fair for March through August 1931, but probably deficient (grade 4) for October 1930 through February 1931, and October, November and December 1931.

The data indicate deficiences of protein and phosphorus during the winter months, when the pasture is also short. The deficiency indicated is not, however, as great in other sections of the state.