



RANGE CATTLE instinctively seek variety in their diet. Here the fistulated steers leave the ample grass and eat prickly pear.

RANGE NUTRITION RESEARCH FINDINGS

By H. D. Galt and Brent Theurer

How do you tell what range cattle eat when the "table is set" with 15 to 25 different plant species?

A foremost problem of range nutrition has been in identifying the various kinds and quantities of plant species consumed by cattle grazing native grasslands. Earlier methods, in which the field investigator closely watched the grazing animal to see what species of plants were selected, have been found inadequate.

Through the use of ruminal and esophageal fistulated cattle, much more is being learned about the botanical and chemical composition of the grazing animal's diet. A knowledge of which plants are furnishing nutrients for adequate growth and production is basic to improving the nutrition of the beef cow and calf, as well as for proper management of the range. Range nutrition is becoming an increasingly important part of beef production, since growth of the cattle feeding industry is largely dependent

upon improved range livestock production.

An earlier study employing rumen fistulated steers grazing on the range (Shumway and Hubbert, 1963, *Progressive Agriculture*), showed that total crude protein in the diet (determined from rumen sample analyses) was deficient for several months

of the year. Crude protein content of the major range grasses, Lehmann lovegrass and Arizona cottontop, could account for only a part of the total protein in the rumen samples. Additional information on botanical composition was necessary in order to know which species were furnishing the remaining protein in the diet.

Rumen Content Analysis

In order to determine the botanical composition of the diet of growing cattle, two 3-year-old rumen fistulated Hereford steers were placed on a desert grassland pasture of the Santa Rita Experimental Range, U. S. Forest Service (40 miles south of Tucson). At bimonthly intervals (from Sept. 21 to Dec. 31, 1964), the rumen contents of each steer were completely removed during the early morning. After allowing the steers to graze on the range for approximately an hour, the steers were corralled and the freshly consumed forage was removed from the rumen for botanical and chemical analyses. The previously removed rumen contents were then replaced, and the animals were allowed to resume their normal grazing activities.

Field observations were also made of the steers at each date the rumen samples were selected to "guesstimate" the plant species selected. These plant species were hand clipped each time rumen samples were collected. The hand-clipped species and portions

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RUMEN CONTENTS are examined and identified by careful laboratory techniques.

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of the rumen samples were analyzed for crude protein. Botanical composition of the available forage in the range unit was measured at the end of the growing season in November.

The various kinds and amounts of plant species in the rumen samples were identified with a binocular microscope equipped with a pointer in one ocular. The microscope was placed over a small tray having a series of fixed stops. The masticated forages were thoroughly mixed and spread on the tray. The plant part appearing immediately under the pointer was recorded at each stop with 400 individual microscope points being recorded on each tray.

Several mixtures of known species composition were prepared by individually feeding plant species to fistulated steers, utilizing the rumen evacuation technique. The species mixtures were then prepared on a weight basis so that each mixture contained a different known percent weight of each species. A high correlation was found between percent microscope points and percent weight of a plant species in the known mixtures. Regression equations were then developed to predict percent weight from percent points for the six major plant species identified in the rumen samples.

Preferred Native Species

The botanical composition of the rumen samples was quite different from the percentage composition of

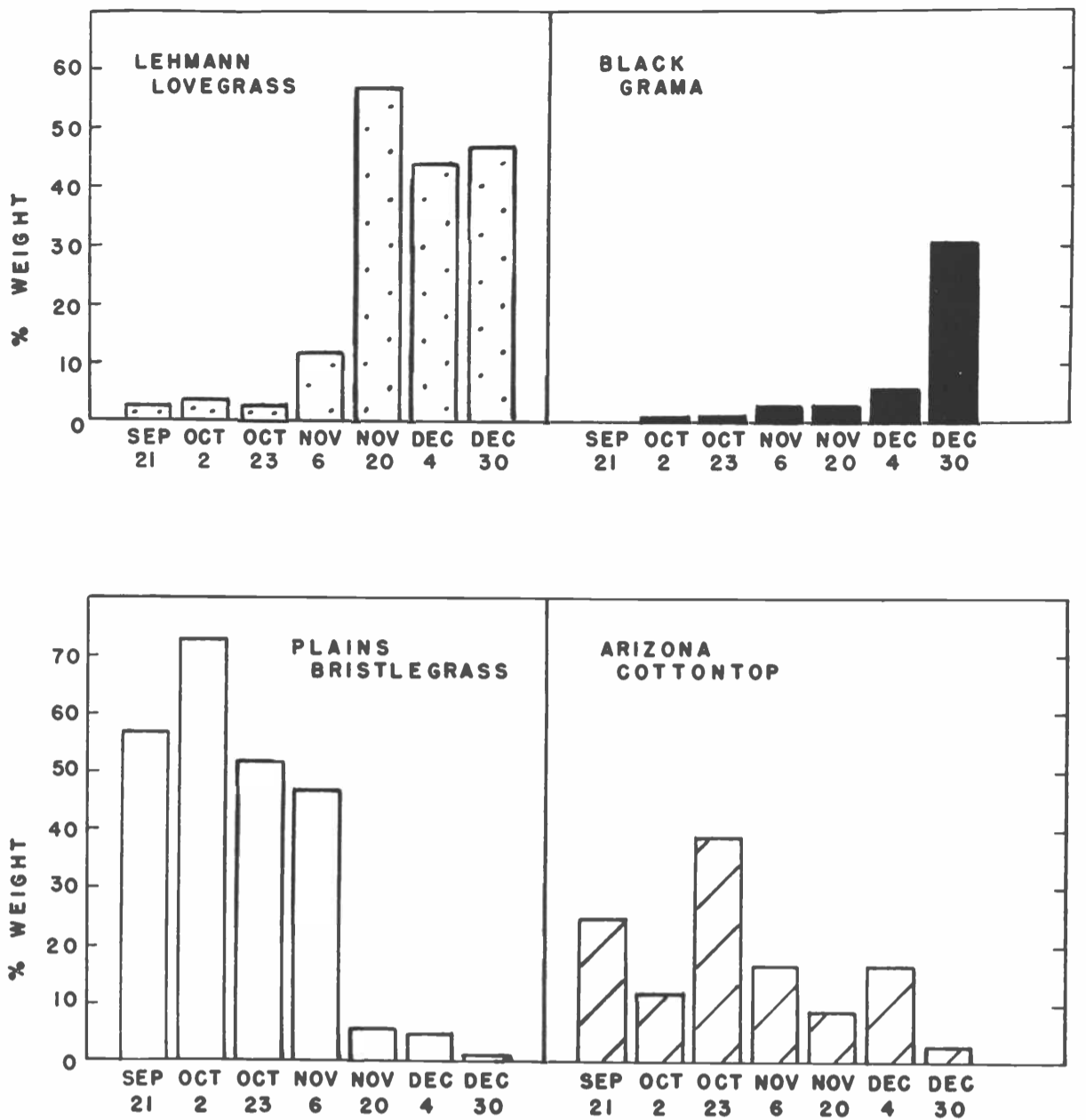
Botanical Composition of Range Forage vs. Diet of Grazing Steers

Plant Species	Average Percent Composition by Weight ^a	
	Grassland Range	Diet
Lehmann lovegrass	69	23
Black grama	13	6
Plains bristlegrass	7	36
Arizona cottontop	8	17
Velvet mesquite	2	trace
False mesquite	trace	3
Englemann prickly pear	trace	2
Wright's eriogonum	1	trace
Other ^b	trace	13
	100	100

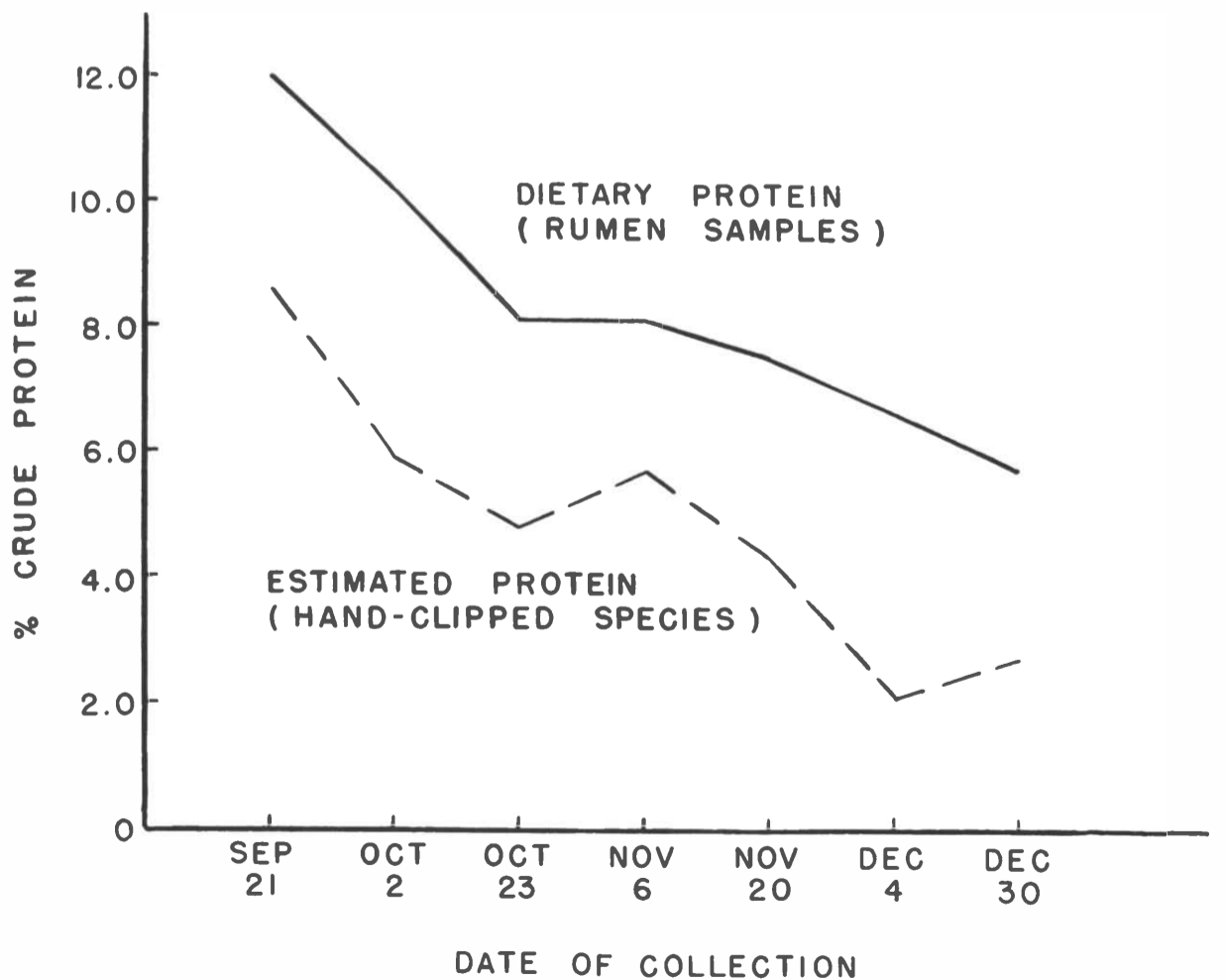
^a Dry matter basis.

^b Included 8 grass species; 7 forb species; and 7 shrub species.

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SEASONAL SELECTION of four principal grasses by steers on the Santa Rita range, as detected by rumen sampling.



PERCENT OF PROTEIN in rumen samples, as compared to protein content of hand-clipped forage, showing the monthly variations in both cases.

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the available plant species on the range. Lehmann lovegrass, which was clearly the dominant grass species, comprised only an average of 23 percent of the rumen samples. Arizona cottontop and plains bristlegrass, which made up only a small percentage of the available forage, constituted over half of the diet as analyzed in the 13 rumen samples.

The botanical composition of the rumen samples varied greatly with sampling date and effectively demonstrates the grazing steer's preference for certain species. Plains bristlegrass and Arizona cottontop comprised an average of 64 percent to 91 percent of the rumen samples from late September to early November; however, these species constituted less than one-fourth of the diet in late November and throughout December. The predominant species, Lehmann lovegrass, accounted for less than 12 percent of the diet until late November. The cattle then switched to a diet consisting primarily of Lehmann lovegrass during late November and throughout December. This dramatic change was probably because the lovegrass was growing during this latter period and remained green while the other grasses were in dormancy. Black grama was not grazed appreciably until December even though it was the second most abundant species.

Although sufficient grass was available, Englemann prickly pear was grazed in December (5 percent to 15 percent of the diet) when the steers seemed to be seeking variety in their diet. Certain shrub species such as velvet mesquite, catclaw and Wright's eriogonum were identified also in the November and December rumen samples.

Search For Protein

The total crude protein of the rumen samples averaged 1.6 times higher than the protein content of the major plant species identified in the rumen samples. A high correlation was found between the protein content of the rumen samples and the protein content of the primary plant species identified in these samples.

The higher protein content in the diet was believed to be due to steer selectivity for the higher protein parts of individual plant species (leaf and seed heads), as well as selection of small amounts of shrub and forb species. The steers tended to supplement the low protein in the diet by grazing higher protein shrubs in the fall; however, the total protein, ac-

Salt-marsh Caterpillar Preying on Mulberry

The salt-marsh caterpillar, which has done so much to raise the cost of producing cotton, lettuce and sugar beets in Arizona, was found last October, feeding on young mulberry trees in a home yard near Casa Grande. The salt-marsh caterpillars had destroyed over 50 percent of the foliage of the three 9-foot trees, which were the only trees in the yard, says Dr. George P. Wene, Associate Entomologist on the UA staff.

Salt-marsh caterpillar infestations on most crops, for example lettuce and sugar beets, result from half grown or larger larvae moving out of cotton fields in search of food, after the foliage has been eaten. This Casa Grande infestation was of a different character, since hatching eggs and shells from several previously hatched egg masses were observed on the leaves.

Approximately 50 percent of the larvae were in the first and second instar of growth and, therefore, too small to migrate. "No migrating larvae were seen in this area which was a considerable distance from any cotton field," said Dr. Wene.

For the past eight years or so, homeowners in south central Arizona have regularly planted mulberry trees instead of the previously popular Chinese elm. Thus far the mulberry has been free of injurious insects.

According to National Research Council standards, was not sufficient to meet the needs of a 400 to 600 pound growing steer in the late October through December period.

A study is now being conducted which includes more intensive analysis of the botanical composition of the grazing steer's diet and its relationship to total forage intake and digestibility throughout the year. Botanical composition and protein analyses will be based on plant parts rather than a consideration of whole plants as in the previous study. Energy consumption is also being investigated. Energy could well be one of the most important factors limiting productivity of Arizona's range cattle. Use of fistulated animals now appears to be a significant stepping stone for improvement of range livestock nutrition and management of native rangelands.

TUNE IN

Cochise County

KAWT, Douglas — 6:15 a.m.

KAPR, Douglas — 6:15 a.m.

Wednesday and Friday 12:10 p.m. Monday through Friday.

KHIL, Willcox — 6:10 to 6:15 a.m. Monday through Saturday.

Coconino County

KCLS, Flagstaff — Tues. and Thurs., 8:45 a.m.

KCLS, Flagstaff (Extension Home Economist — Wed. and Fri., 10:30 a.m.

Gila County

KIKO, Globe-Maimi
Monday, 12:15 p.m.

Graham County

KATO, Safford, Arizona
Saturday, 9:30 a.m., 12:45 and 9:05 a.m. (daily Monday thru Friday.

Maricopa County

KTAR, Phoenix—Mon. thru Fri., 5:55 a.m.

KOY, Phoenix—Tues. thru Sat., 5:40 a.m.

KOY, Phoenix—Sunday Garden Club of The Air, 8:35 a.m.

KPHO, Phoenix—Mon., Cotton Report, 12:40 p.m.

KPHO, Phoenix—Thurs., Dairy and Livestock Report, 12:40 p.m.

KUPD, Phoenix—Mon. thru Fri., 5:30 a.m. and 12:30 p.m.

Mohave County

KAAA, Kingman — Mon., 9:06 a.m. (Extension Home Economist)

Navajo County

KDJI, Holbrook — Tues., 12:45 to 12:30 p.m.

KINO, Winslow — Sat., 12:15 to 12:30 p.m.

Pinal County

KPIN, Casa Grande—Mon. thru Sat., 6:55 a.m.; Mon. and Fri., 9:30 a.m.; Tues., Thurs. 11:30 a.m. on Monday and Wednesday and Sat., 12:20 p.m.

Yavapai County

KYCA, Prescott — Mon., Tues., Wed., Thurs. and Fri., 3:45 p.m.

KNOT, Prescott — Mon., Wed. and Fri., 6:25 a.m.

KVIO, Cottonwood Mon., Wed. and Fri., 8:15 a.m.

Yuma County

KVOY, Yuma — Mon. thru Fri., 5:45 a.m.

KYUM, Yuma — Tues., Thurs. and Sat., 6:25 a.m.

KYUM, Yuma — Saturday, 4-H Program, 10:45 a.m.