

Even where the farm produces more than enough for a comfortable living, the shift cannot be made unless the farm is oversupplied with cropland relative to its labor and machinery, or unless it is undersupplied with grassland relative to the needs of the livestock necessary to utilize the feed crops produced, or unless the farmer includes "resource deterioration" as a cost in his accounting and can reduce this cost more than his income by shifting certain crop acres to grass. Farms on which these possibilities occur are few in the spring wheat and corn areas, however.

Rapidly expanding mechanization in both areas also retards the spread of grasslands even though farms are growing in size. Not only can the operator with modern equipment handle more crop acres, but he is compelled to do so in order to carry his investment in machinery. In the spring-wheat area, the wheat-range area, and the corn area, the increasing size of farms is only just barely keeping up with the expanding pressures of mechanization—if it is doing even that.

Thus, though grassland is important in these areas, its expansion, if left to the judgment of individual farmers, faces economic obstacles. Mechaniza-

tion of hay and silage equipment may help to increase the use of grass.

In the range area economic pressure for more grassland is a more compelling force; the tendency among ranchmen is to acquire lands from those who have moved away and to stabilize and secure the business by getting firmer control over grasslands that formerly were used but not leased or owned. Mechanization and high wheat prices with favorable weather have retarded the expansion of grassland, but conditions are more favorable for regrassing to take place with the return of weather and wheat prices more normal than they have been since 1920 or so.

The grasslands are essential in the economy of the Northern Great Plains. Without them there would be no economy at all (as in the range area) or a crippled economy (as in the corn area). Yet it is true that the importance of the grasslands and the need for managing them well are not yet appreciated.

To too many persons the grasslands need no management, only harvesting. To too many, they still are only an adjunct to farming—not farming itself. To too many, the yield on grassland is as natural as the weather—not to be affected for good or ill by man.

## THE TYPES OF PLAINS VEGETATION

LEON C. HURTT

THE FORAGE that grows on 176 million acres in the Northern Great Plains is the basic raw material for a great range livestock industry.

Hundreds of species, mostly grasses but including shrubs and weeds, make up the total forage crop. Even if they are not grazed, all are of value for holding the topsoil and as a source of humus to retain moisture and enrich the soil.

The plains vegetation is of five types, based on the native vegetation on 231 million acres before a fourth of the total was plowed.

The northern short-grass (mixed prairie) type covers about 228,000 square miles—most of eastern Montana and adjacent parts of the Dakotas and Wyoming, where average precipitation is from 11 to 17 inches a year. The dominant species are blue grama, bluestem wheatgrass or western wheatgrass, needle-and-thread and green needlegrass, buffalograss, Sandberg bluegrass, and threadleaf sedge. These seven provide about 75 percent of the total range forage, but shrubby plants (such as big, silver, and fringed sage-

brush, greasewood, and saltbush) are widely distributed and provide some winter forage. This type occupies the rolling plains, but badlands, semibadlands, and roughs of broken topography sometimes considered a separate type, are also included. These occupy many thousands of square miles along the Missouri, White, and Little Missouri Rivers, where geologic formations of low resistance sometimes erode into fantastic forms.

More productive roughs with natural shelter and browse feed are especially valuable for winter grazing. Grazing capacity on any large acreage of this type seldom exceeds 2 acres per animal-unit-month (that is, 1 cow or 5 sheep), but the average is now 3 to 4 acres. Ten acres or more a month is required for some of the roughs that have thin stands.

The tall-grass prairie type grows in northeastern North Dakota and in a zone 50 to 100 miles wide westward from the 98th meridian through South Dakota and Nebraska, a total of about 50,000 square miles, where precipitation ranges from about 17 to nearly 30 inches, and much of the best land is cultivated. This is the most productive type because of a thicker stand of taller grasses. The main species are prairie beardgrass, bluejoint turkeyfoot, blue- and side-oats grama, bluestem wheatgrass, prairie dropseed, and bluegrass.

The grazing capacity of the better parts was originally  $\frac{1}{2}$  to 1 acre per animal-unit-month, but up to 3 acres is now required for large areas. A large acreage is cut for wild hay of good quality.

The sand-hills type occupies about 21,500 square miles, mainly in west-central Nebraska; there are smaller areas in adjacent States. Precipitation there ranges from 15 to 22 inches, and is absorbed so rapidly by the sandy soil that there is little or no surface runoff. Stream flow is thus remarkably uniform, so that this is one of the best watered of all plains types. The principal species are prairie sandgrass, sand dropseed, sandhill muhly, and three of

the *Andropogons*—prairie beardgrass, bluejoint turkeyfoot, and turkeyfoot—often called bluestems. Ranchers of the sand hills have weathered drought periods better than elsewhere, partly because of the relatively stable water supply. Overgrazing, because it is so promptly followed by serious wind erosion, has been less prevalent. Any undue disturbance of the loose surface by plowing or heavy grazing accentuates soil drifting.

The sagebrush-saltbush grassland type (two closely associated and somewhat similar browse types are here considered together) includes a total of about 43,000 square miles of the driest part of the region, where average yearly precipitation drops to 7 to 12 inches. Soils are often highly alkaline or saline, and elevations reach upward to 7,500 feet. The principal species are bluestem wheatgrass, needle-and-thread, bluebunch wheatgrass, Indian ricegrass, Sandberg bluegrass, and sand dropseed. Black and big sagebrush, two or more saltbushes, and greasewood are important shrubs. This type, mainly browse, grows in the Big Horn and Wind River basins, and parts of the so-called Red Desert, a high, windswept, dry area of scanty forage. It is grazed mainly by sheep in fall, winter, and spring, when snow supplements the water supply.

The open-forest type grows on mountain uplifts—Black Hills, Big Horn, Little Snowies, Laramie Mountains, and others—that break the monotony of the plains. Ponderosa pine, Douglas-fir, and spruce occur at the higher elevations. About 18,000 square miles is within this type, a large part of which produces usable forage. Still more important is the extra water for irrigating ranches from snow stored in the mountains. The grasses include bluebunch and bluestem wheatgrass, Idaho fescue, mountain brome grass, pinegrass, and others. Some of the better forest-range areas can carry one animal-unit-month for 3 or 4 acres, but on the average more is required because of waste range on steep slopes and

in dense timber. Succulent forage for a short summer grazing period and ample water make this type especially desirable for producing fat range lambs.

Though not abundant in the Northern Plains, some plants need special at-

tention because they are poisonous. Among these are deathcamas, lupine, loco, waterhemlock, and several selenium-bearing plants. Cockleburs, leafy spurge, and other noxious plants tend to increase with poor management.

## FOR A BETTER RANGE MANAGEMENT

LEON C. HURTT

EVEN ON the mixed farms that predominate in the eastern part of the Northern Great Plains many cattle are produced. Farther west, as precipitation declines to 15 inches or less, crop farming is secondary to range-livestock production. Large units are needed in these drier areas, where ranches of 100,000 acres and more are not uncommon. Up to 100 acres may be required on some ranges to carry one cow a year—in the East many complete farms have fewer than 100 acres.

Public land, usually the rougher areas too poor for private ownership, is concentrated in the western part. Counties, States, and various Federal agencies control these lands, which are widely used under lease by local ranchers.

County ownership changes from month to month, so recent totals for the region are not available. R. R. Renne and O. H. Brownlee, in publications of the Montana Agricultural Experiment Station, reported that more than 3.1 million acres were owned by 37 eastern Montana counties in 1936. For all Montana counties the total was approximately 4.5 million acres; 4.5 million acres more were tax delinquent 5 years or more, and thus were subject to county tax deed. All phases of the economy, including income for schools and local government, are disrupted by such high tax delinquency.

This tangled ownership pattern is complicated further by thousands of privately owned tracts that are leased to the highest bidder, often for only a

year or two. These ranchers are under a severe disadvantage as compared with those who have leases or permits for 10-year periods. Overcompetition for leases has been especially prevalent in favorable periods among in-and-out speculators and established ranches. Excessive prices paid for poor range land is even a greater, more permanent burden than high prices for leases. Land bought at inflated prices has bankrupted hundreds of ranchers.

The experience of the past half century has somewhat clarified broad outlines of a program of better use of range and water resources, so essential for the welfare of this semiarid region.

Good range management aims to regulate grazing to safeguard resources and get sustained, maximum production of livestock and the best forage species.

The need for it is plain enough: Thousands of cattle and sheep were shipped out of the region as a result of the 1919 drought; there were heavy death losses besides. In 4 years, 1934-38, reductions amounted to 1,200,000 animal-units (43 percent) for Montana as a whole, and nearly 900,000 units (30 percent) for South Dakota. On some ranches more than 80 percent of the livestock were liquidated during the 1934 drought. Heavy shipments were again necessary in 1936.

State averages can give no adequate idea of the distress on thousands of drought-stricken ranches after all feed reserves were exhausted. Forced sales of half-starved livestock brought only a fraction of prices paid during long