

# The Place of Range Livestock in the Missouri Ozarks

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THE Ozark region of Missouri lies near the center of the United States, separating North from South and East from West. It is a mixture of grassland and forest, mountains and plain, corn and cotton. In this area of mixed crops, conditions and cultures, the agricultural methods and standards of adjacent regions have only limited application. How well is such an area suited for range livestock production?

## Climate

Because of its inland location the weather of the Ozark region is changeable. However, extremes of heat and cold, drought and moisture, are not so marked as farther north or west. The average January temperature is about 34°F., the average July temperature 76°F., and the average frost-free period 180 days. Range forage is rarely covered with snow or ice for more than 2 or 3 days at a time, and cool-season grasses usually remain green all winter. Average annual precipitation ranges from 40 to 50 inches. Average warm-season precipitation (April through September) ranges from 24 to 30 inches. Within the region, precipitation is lightest in the northwest and heaviest in the southeast (U.S.D.A., 1941). In all parts of the region rainfall usually is adequate for growing trees, pasture,<sup>1</sup> tilled crops or native range forage.

One disadvantage of Ozark forest

<sup>1</sup>"Pasture" here refers to forage established and maintained with the aid of tillage, mowing and fertilizers using species that have such exacting moisture or fertility requirements that they will not compete successfully with the native vegetation under range conditions.

range for nearby farmers is its general climatic uniformity. There are no consistent local differences in climate comparable to those caused by differences in elevation in mountainous areas of the West. So range forage and pasture forage are usually green, or dry, at the same time. However, observations in the drought years of 1952 and 1953 indicate that accumulated range herbage is valuable when other forage is scarce. If supplemented with protein concentrates, such herbage provides economical roughage for cattle.

## Vegetation

More than 60 percent of the Ozark area is in forest—chiefly second-growth stands of oak and other hardwoods (King *et al.*, 1949). Some shortleaf pine (*Pinus echinata*) occurs, mainly in the eastern Ozark counties (Liming, 1946). Forests occupy all land except that cleared for other uses and where the soil is too thin for trees to grow.

Many of the common Ozark range grasses are prairie species. These include little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardi*), broomsedge (*Andropogon virginicus*), side-oats grama (*Bouteloua curtipendula*), switchgrass (*Panicum virgatum*), Indian grass (*Sorghastrum nutans*), purple-top (*Tridens flavus*) and prairie dropseed (*Sporobolus heterolepis*). Several of these species can be found in almost any forest opening, but little bluestem is by far the most common. In addition to little bluestem other grasses and grass-like plants such as wild oat-grass (*Danthonia spicata*), several species

of panic grass (*Panicum* spp.), and sedges (*Carex* spp.) are commonly found in wooded areas.

Most of the important herbaceous non-grasses are either legumes or composites (Martin *et al.*, 1955). Native lespedezas (*Lespedeza* spp.) and tick clovers (*Desmodium* spp.) are among the most common Ozark legumes. They are grazed in the late summer and early fall, especially in times of drought. Asters (*Aster* spp.), goldenrods (*Solidago* spp.), brown-eyed susan (*Rudbeckia* spp.), and pussytoes (*Antennaria* spp.), are common composites.

## Soils and Topography

Most Ozark soils are low in plant nutrients but respond well to fertilizers (U.S.D.A., 1938). Recent experience indicates that almost any site that is not too steep or rocky to till can be made to grow forage. About half of the land in the Ozark region is considered non-arable (Krusekopf, 1954); range grazing and forestry usually are confined to this land. Range and forest interests differ as to whether such non-arable land should be growing grass or trees. The land will support either, except where the soil is too thin to grow trees. However, some slopes are too steep for practical cattle grazing and most of the uncleared land has too many trees and sprouts to produce much grass.

## How the Range Is Used

The average Ozark farmer has about half as much cultivated land as does the Missouri corn-belt farmer. He owns or leases about 150 acres of which 90 acres are cleared and 60 acres are in forest.

In January, 1950 there were 900,000 cattle and 600,000 hogs on 75,000 farms in the 17-million-acre Missouri Ozark Region (see Fig. 2). Thus, the average Ozark farmer had only 12 cattle and 8 hogs. Even so 85 percent of the total value of reported farm sales was from livestock



FIGURE 1. The "glades" in the southwestern Ozarks support a mixture of perennia and annual grasses that provide an important forage resource. Eastern redcedar the conspicuous evergreen, is increasing and a serious threat to the forage resource

and livestock products (U.S.D.C., 1950). Part of this livestock income is derived from range livestock operations.

Cattle, horses, mules, sheep, goats and hogs are all range animals in the Ozarks. In recent years dairying has increased, especially around the edges of the Ozarks. However, successful dairying depends on pasture and an abundance of other feed and cannot logically be classed as a range enterprise. Sheep are raised mainly on fenced range or pasture. Goats are kept chiefly because their browsing helps clear the land of brush and sprouts. Beef cattle and hogs are the important income-producing animals.

#### Beef Cattle

Many early Ozark farmers "grew" into the beef cattle business via the family milk cow. Although many Ozark range cattle are of mixed breeding, the "yellow hammer" cow is being gradually replaced by the Hereford, Angus or Shorthorn. The Hereford is the most popular breed, and many herds are essentially purebreds. Many others have beef-type body conformation but still show their dairy ancestry.

#### Hogs

In the heavily wooded eastern Ozarks, range hogs outnumber range cattle (U.S.D.C., 1950). Since hogs feed mostly on acorns, roots and nuts rather than on grass, they are better suited than cattle for grass-poor forest range. For the small farmer of this area, a sow is a better investment than a cow. Usually a range sow will pay for herself in about a year. On similar range the cow will not pay for herself in less than 2 or 3 years. The hog is also a better animal for home use because the carcass is smaller and easier to preserve by home methods.

Despite the apparent economic advantages of hogs over cattle, hogs are not well adapted for range operations. On open range that is also used for cattle grazing or timber production, hogs are objectionable because they root out forage plants and seedling trees. In a closed-range area the income from range hogs probably does not justify the cost of a hog-proof fence.

#### Range Management

Range management receives little attention in the Ozarks. The better managed ranges are on the national

forests where grazing is confined to an 8-month season (May through December) and where there is some control of numbers. A few private ranges may be managed even better than the national forests but many are very poorly managed. The poorest management is on open range where there is no control over numbers and classes of animals, or season of use. In the open-range counties cattle and hogs may graze the range the year around. Livestock is turned out when other feed is scarce or at any other time that seems convenient or profitable for the stockowner.

#### Grazing-Forestry Relationships

Most Ozark ranges are all or partly forested. Nevertheless, practically all Ozark sites will grow dense stands of grass if the forest stand is removed or kept open. Without control of woody plants, most forests eventually become so dense that forage production is negligible. The only Ozark sites that stay in grass without persistent sprout and brush control are those where the soil is too thin and dry to grow common Ozark hardwoods. But even the thin-soiled areas are being invaded by eastern redcedar (*Juniperus virginiana*), winged elm (*Ulmus alata*) and associated drought-tolerant trees (Fig. 1).

Forage and timber are the natural crops on these ranges but the per-acre incomes from these products are so low and the average Ozark farmer controls so little land that he cannot make a good living from range and forest operations. The need for higher incomes is so great that most sites not too steep or rocky for cultivation have been cleared at one time or another. The persistent need to convert forest and range land to more intensive, higher-paying uses seems likely to confine forestry and range-livestock production in the future to areas where tillage is impractical.

Many thousands of acres of

forested, non-arable land in the Ozarks are also used for range. Forage production is related inversely to the density of the forest stand (Read, 1951). Since good crops of timber and forage cannot normally be grown together, range and forest interests frequently differ over land-management practices. Those who want to grow trees insist that fire be kept out of the woods and that grazing be restricted so the forests can reproduce themselves. Those who need grass say that tree reproduction must be kept down in order to maintain a stand of forage.

Any Ozark farmer has the right to burn or goat his own land. But too often his fires and livestock escape onto land that is not his. The public land and much of the privately-owned land in the Ozarks is held by people who are interested in growing trees. Most absentee land owners in the open range counties cannot expect to harvest a crop of timber because the local people frequently burn the open range to maintain forage production. This grazing-forestry conflict is largely a conflict between the farmer who makes his day-to-day living from the land and the private investor, public forester or corporation who can better afford to wait for long-time gains.

Overcutting, burning and overgrazing have left many Ozark forests in such poor condition that there is no merchantable timber left to provide immediate income. On both open and closed range, the Ozark farmer favors livestock over timber because he can raise a calf or a shoat quicker than he can grow a sawlog.

#### Open Range

Under the Missouri Stock Law, local elections decide whether the range in a given township or county shall be open, closed or open only to certain classes of livestock. Some townships are closed to sheep, goats and hogs but are open for cattle and

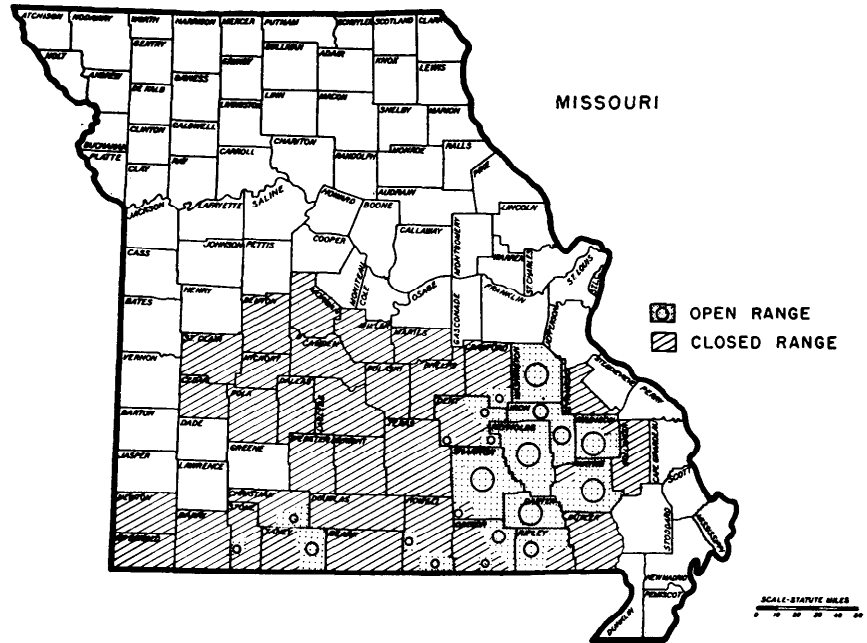


FIGURE 2. Open and closed range in the Missouri Ozark region as of August, 1951.

horses. The number of open-range townships in the Ozarks decreased from 143 in 1935 to 96 in 1951. Most of the open range remaining is in the heavily wooded eastern Ozark counties (Fig. 2). The open range is often overgrazed, repeatedly burned and rarely improved. Lack of control on open range is an obstacle to land management for the forester and non-resident land-owner.

Why does open range still exist where more than 90 percent of the land is privately owned? One reason may be that much of the private land is held by absentee owners and corporations with comparatively few votes in local elections. Only 31 percent of the land in Reynolds County and 25 percent of that in Carter County is held by resident farmers (U.S.D.C., 1950). Economically, it is to the advantage of these farmers to vote for free and unrestricted use of an area 2 or 3 times as large as their own holdings. The farmers in such counties probably hold the majority vote in township elections.

Range hogs are another consideration in the almost solid block of

open range in the eastern Ozark counties. On this heavily wooded, grass-poor range, hogs outnumber cattle. The farmer can make a few dollars by running his hogs on open range. If the range is voted closed, he will have to confine his hogs to land that he is permitted and can afford to fence. Many absentee owners would not be willing to have their land fenced for range. And even if they were, a hog-proof fence might cost more than exclusive use of such range would be worth. Under existing conditions open range appears to be a better bet than closed range for the range-hog grower.

#### Burning

Burning—to kill sprouts and seedlings, to make the grass “green up” early, or to kill ticks, snakes or other pests—is a common Ozark range practice. At present, the greatest point of controversy between grazing and forestry is over the use of fire.

Ozark foresters object to burning because it kills back young trees, injures old trees and consumes the protective cover of litter. Burning, to the forester, means that the little



FIGURE 3. *Left.* Severe overgrazing on little bluestem burned during the previous winter. *Right.* On adjacent unburned range, grazing use on little bluestem was scarcely detectable. Photographed October, 1950.

trees will not get big, the big trees may be riddled by insects and diseases that enter through fire scars, the soil will erode, the streams will be muddy and the soil that is left will dry out faster after each rain because there is no litter to protect it. Repeated burning changes a hardwood forest from a dense, all-age stand to a two-story stand composed of widely spaced, old, defective trees and a thicket of sprouts and seedlings that have grown up since the last burn. Most Ozark hardwoods sprout from the base if the top is removed or killed by fire, but unless burning is prevented these sprouts rarely become big, sound trees.

Ozark cattlemen burn the range to kill back young trees, remove the dense leaf cover, help maintain herbage yields, make the forage more palatable and more nutritious, and make the grass "green up" earlier in the spring. Although the forester condemns fire as being detrimental to the woods, the cattleman's beliefs about the effects of burning on forage yield and quality are not to be dismissed lightly.

Numerous observations show that the densities and yields of herbaceous plants are related inversely to the density of the forest stand and that a heavy leaf litter is detrimental to grass (Read, 1951; Gaines et al., 1954; Wahlenberg et al., 1939). Likewise the higher palatability of forage on burned range is indicated by the tendency for cattle to concentrate on burned-

over range areas (Fig. 3). Some chemical analyses also show that the nutritive value of grass on a burned-over area is higher than that of the same species on unburned range (Shepherd, 1953; Wahlenberg et al., 1939).

The stockmen's belief that burned range "greens up" earlier is more controversial. Burning removes any accumulation of dead material so that the green shoots are visible as soon as they emerge from the burned stubble. New grass shoots on unburned range must grow up through several inches of old "rough" before they can be seen and are available to livestock. So the early "green up" on burned range may be more apparent than real.

The success of a burn depends somewhat on the sizes of the trees because large trees do not sprout as readily as do small ones (Clark and Liming, 1953). If the stand is composed mostly of large trees, the area may remain open for several years. Sprouts from small trees, if abundant, will quickly shade out any new forage.

The results of burning are also complicated by overgrazing. The effects of fire and overgrazing together are often severe enough to almost eliminate the perennial forage species. While fire alone tends to hold back the trees and encourage grass, fire and overgrazing together hold back both trees and grass. Frequent burning will retard sprout growth, but it will not insure a lush stand of grass. More

effective, less destructive methods of controlling woody plants are needed.

#### Goating

Goating, as usually practiced in the Ozarks, is not an economical way to eliminate sprouts. To prepare an area for goating, all top growth must be killed or removed by some combination of logging, girdling, chopping and burning, and the area must be enclosed by a goat-proof fence. Then it must be stocked with about three goats per acre for about three years. Successful goating requires very heavy stocking because goats will not eat all of the sprouts until after the grasses and forbs are gone. Even with heavy stocking goats usually pass up the hickory.

The total cost of goating includes the price of the goats and a goat-proof fence, the labor required to cut or girdle the trees and saplings, about 3 years of total crop loss because the land brings in no return, plus an untold amount of soil erosion and loss of soil fertility. In some areas, coyotes, dogs and other predators kill so many goats that a band cannot maintain its number. After the goating is done, the land still needs reseeding.

Despite the obvious disadvantages of goating as now practiced, proper manipulation of livestock may provide a practical way to control woody plants. According to some early writers, much of the Ozark region was originally rather open forest with abundant grass on the forest floor between the trees (Marbut, 1911; Sauer, 1920). Since deer are natural browsers, it is conceivable that recurrent fires and the relatively large deer population in pre-settlement days were sufficient to keep tree reproduction from filling in between the big trees.

Skagg's ranch in Taney County is a modern example of the effect of a large deer population on the vegetation in the southwestern

Ozarks (Fig. 4). This ranch, first set up as a private game park in 1900, has not been burned over for at least 20 years and has been enclosed by deer-proof fence most of the time for more than 50 years (Dalke and Spencer, 1944). The deer population inside has been so large that starvation has occurred in critical times.

The forest stands on Skagg's ranch are rather open and are made up mostly of post oak (*Quercus stellata*), black oak (*Q. velutina*), and associated hardwoods ranging upward in size from about 4 inches d.b.h. Eastern redcedar (low enough on the deer's scale of food preference to survive under high deer population) is the only commercial tree that is reproducing itself. It is represented by numerous 1- to 6-foot trees and small seedlings beneath the old hardwood overstory and by scattered patches of larger trees.

The herbaceous cover on Skagg's ranch consists mostly of little bluestem, purpletop, Indian grass and associated prairie grasses. Most of the forbs are so small or so well concealed that deer have overlooked them. Likewise, the broad-leaved trees on the ranch either are tall enough that their leaves are out of reach of deer or are small enough to escape notice (Fig. 4 upper). Outside Skagg's fence the grass cover is sparse but forbs and woody reproduction are abundant (Fig. 4 lower).

What has all this to do with range management? If deer are responsible for the absence of brush and tree reproduction on Skagg's ranch, perhaps a similar result could be obtained with deer on other forested ranges. On fenced private land similar results might be obtained with goats and sheep. Overstocking was involved in the browsing job on Skagg's ranch. No one knows whether the result under lighter stocking would have been as good or to what extent overstocking has damaged the site. However,

the results suggest that it may be possible to maintain a satisfactory forage cover by manipulating the kinds and numbers of livestock.

#### Reseeding

There has been little effort to reseed undeveloped Ozark range but many attempts have been made to increase the quantity and quality of the forage on old fields. In the Ozarks, high yields of herbage do not always produce high yields of beef. In the average-to-wet year, range-beef production probably is limited more by low forage quality than by low forage yield. In drought years low forage yield usually is the limiting factor. The bluestems and

their associates, which make up the bulk of the range forage, are warm-season grasses. These grasses start growing rather late in the spring, dry up early in the fall and become relatively unpalatable as they approach maturity.

Most successful reseeding in the Ozarks have actually been pasture developments. Usually the site is plowed, treated with lime and fertilizer, and seeded to a mixture of pasture grasses and legumes. Most pasture species are more palatable than native range species and they "green up" earlier in the spring and remain green much later in the fall. Orchardgrass (*Dactylis glomerata*) and tall fescue (*Festuca*



FIGURE 4. Effects of persistent overstocking by deer. Upper. Area heavily browsed by deer during the past 50 years with few forbs, no visible hardwood reproduction and a dense grass cover. Lower. Adjacent area fenced against deer, showing abundant forbs and tree reproduction but very little grass.

*elatior* var. *arundinacea*) probably are the most productive and reliable perennial pasture grasses. On better sites, the ladino variety of white clover (*Trifolium repens*) may be used with either species. On poorer sites, Korean lespedeza (*Lespedeza stipulacea*) is more reliable than ladino clover and furnishes good forage during the late summer when the grasses are growing very slowly. Pastures that will carry a yearling steer per 2 acres from May through October with an average gain of 1.5 pounds per day are not unusual.

Despite their higher yields and longer "green" seasons, pastures are not always a good cure for shortages of range forage. Small, unfenced pastures create difficult livestock distribution problems on large range areas. If left to their own devices, cattle will concentrate on a small acreage of pasture while native forage goes to waste. The pasture is then severely overgrazed, and the cattle make poor gains. So far these undesirable results have been avoided only by fencing the pasture separately or by stocking the entire area at the approximate carrying capacity of the reseeded portion. Sometimes neither of these measures is practical. A possible solution to the problem is to use species that are no more palatable than the native range forage.

Pastures offer good possibilities for resolving grazing-forestry conflicts in the Ozarks. The average farmer's forest is in such poor condition that he cannot rely on forest products for his day-to-day living. If he decides to fill out his income by running cows in the woods, he must do something to keep the stand from getting too thick. But if he uses fire and the ax to increase forage production, he eliminates his chances for future timber income.

One way the farmer can solve this problem is to devote part of his farm to timber and part to grass. By separating the trees from the grass he can avoid the natural

conflicts between forest management and range management and can provide good growing conditions for both trees and grass. He can get immediate income from his pasture and livestock, let his forest build up at the same time and obtain better yields from both.

#### Forest Grazing

Forest grazing is taboo to many foresters in the Central States Hardwood Region. Grazing studies on fenced woodlots have led to the general conclusion that cattle grazing destroys tree reproduction and that protection from grazing is second in importance only to protection from fire. However, some of these studies employed such heavy stocking of cattle that the experimental animals lost weight (DenUyl and Day, 1934; Johnson, 1952). Sometimes grazing periods were cut short or supplemental feed was provided to keep the cattle from starving to death. Such studies throw little light on the relationship between grazing and forestry on an area that is stocked with animals in accordance with the available forage supply. Such severe overgrazing is not common on Ozark forest ranges, except on natural concentration areas, because cattlemen know that starving cattle will not pay the grocery bill.

Although heavy grazing on fenced woodlots often injures the trees, observations indicate that properly managed forest-range can be grazed by cattle without serious damage to tree reproduction. Grazing usually is not permitted on the National Forests in the late winter and early spring because some browsing of tree reproduction is apt to occur during this period of feed shortage (Hornkohl and Read, 1947). However, cattle grazing during the growing season does not appear to conflict with forest management objectives on properly stocked range.

Ozark forests can be made to

yield several times as much timber as they are now producing but it will take many years of good forest management to restore full productivity. However, it is not easy to convert the average Ozark farmer to good forestry. His forest has been burned over and cut over until there is no merchantable timber left. He knows that he will not have any timber to sell until he grows it and feels that he cannot afford to wait 10, 20 or 50 years for his first crop. The same farmer will admit that the forage yield on his forest land is not great, but it provides current income he can ill afford to lose. Good forestry would be more attractive to the farmer if it did not require giving up the much needed current income from forest grazing.

Research is needed to work out methods of using and improving the forage on forested range. It may even be desirable to vary somewhat from cutting practices currently recommended in order to make more or larger openings if increased forage production is needed for immediate income. Such cutting practices would delay full forest productivity but might be justified if they enabled the farmer to keep his land instead of losing it. However, the average farmer probably will find it easier to grow his forage and timber on separate areas than to develop a satisfactory system of multiple use.

#### Summary

The average Ozark farmer does not have enough land to make a good living from forest and range products. He gets about 85 percent of his farm income from livestock but has only 12 cattle and 8 hogs. Part of his livestock income is derived from native or range forage.

The climate and topography of the Ozark region are generally favorable for range livestock, but there is enough precipitation to grow higher paying crops than native range forage on most arable

land if it is fertilized. Consequently, the farmer probably should use most of his arable land for tilled crops or pasture rather than for native forage.

Most non-arable Ozark land is occupied by forests of oak and associated hardwoods. However, except where the soil is too thin for trees to grow, these non-arable lands can be made to grow either trees or grass. Without control of tree reproduction the forests eventually become so dense that forage yields are negligible.

Fire is a major issue between grazing and forestry interests. Both sides have plausible arguments and both are sincere. Certainly a forest owner cannot grow hardwood timber successfully without fire control, nor can a stockman grow grass successfully without woody-plant control. Fire will keep small trees from getting big, but fire alone will not assure a good forage stand. Too often fire and overgrazing go together to the detriment of both forest and forage.

The forage yield of Ozark forest range is not great but the average farmer cannot afford to pass it up where range livestock can provide badly-needed income. Reseeding,

plant control, pasture development and better range management are all needed to resolve grazing-forestry conflicts and to provide a higher standard of living for Ozark residents.

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