

*How Good Is*

# OZARK FORAGE

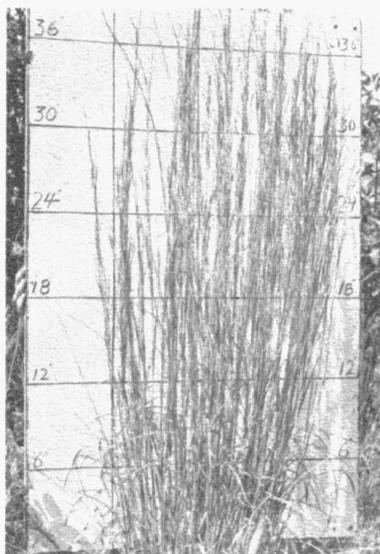
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Figure 2.—Little bluestem, a very desirable native grass in the Ozarks, frequently makes up more than half of the total herbage cover. Because of its great abundance this is probably the most important forage plant in the Ozarks.



## How Good Is OZARK FORAGE ?

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COVER PICTURE

Figure 1.—Angus Cattle in a relatively open hardwood stand with a better-than-average ground cover of grasses and forbs. Forage production in forest range may vary more than 1,000 pounds of air-dry material per acre per year in an open stand such as this one to less than 50 pounds of air-dry material per acre under dense timber stands.

Sound range management must be based on a realistic appraisal of forage—knowing not only how *much*, but how *good*.

To learn more about the nutritive value of Ozark forage, samples of important forage species were collected and chemically analyzed during 1954 and 1955. Forage samples were taken from sites similar to those usually grazed by cattle in the Missouri Ozarks. These sites included relatively open hardwood and pine stands on the Sinkin Experimental Forest near Salem, an open glade area south of Ava, and on several old fields and pastures near Bradleyville.

Samples of current year's growth were collected during the summer, air-dried, and chemically analyzed for water, crude protein, phosphorus, calcium, nitrogen-free extract, fat, crude fiber, and ash by the Experiment Station chemical laboratories.

### Nutrient Requirements

The amount of nutrients required by cattle depends on their size, age, stage of pregnancy or lactation, or other conditions. For instance, young ani-

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*Figure 3.—Indian grass, an important native grass found throughout the Ozarks. Though not as abundant as little bluestem, this high-yielding grass is more palatable and*

*generally has a slightly higher protein and phosphorus content.*

mals and nursing cows need nearly twice as much protein as non-pregnant, dry cows.

Nutrients most likely to be deficient in native forages at some time during the year are protein, phosphorus, and calcium. For acceptable performance of growing animals, breeding cows, or nursing cows, the minimum requirements of these nutrients (in percent of oven-dry weight) are: crude protein, 9 percent; phosphorus, 0.18 percent, calcium, 0.24 percent. For non-pregnant, dry cows the approximate minimum requirements are: crude protein, 6 percent; phosphorus, 0.10 percent; and calcium, 0.15 percent (Guilbert *et al.*, 1950).

#### **Forage Quality on Forest Range**

Most grasses in forest range contain adequate protein until mid-summer while many broadleaf

plants (forbs) have adequate protein until late summer. Phosphorus content of most forest range forage is adequate until late summer and calcium content is adequate all year (Fig. 1). Little bluestem, the most abundant native grass in the Ozarks, usually has adequate protein during April, May, and June (Fig. 2). Some other very palatable native grasses such as big bluestem, Indian grass, and switchgrass contain slightly more protein and can furnish more than the minimum requirement for most cattle until mid-July (Fig. 3).

Native legumes, such as tick trefoil and bush clover, and some other forbs, such as black-eyed-susan and sunflower, are still high in protein by mid-summer (Figs. 4 and 5). These forbs can provide the necessary protein from mid to late summer even



Figure 4.—Native legumes such as this bush clover are very nutritious and usually make up a small but important part of the total plant composition.

though the grasses are deficient. However, protein content of all species continues to decline with plant maturity, and it is doubtful if forage on forest range can provide the necessary protein for most classes of cattle by late summer (Read, 1951).

Forest range forage still has adequate phosphorus by mid-summer to supply more than the minimum cattle requirements. Phosphorus content, however, usually falls off rapidly after July and becomes deficient for most classes of cattle by late summer. This phosphorus deficiency may not have an apparent effect on cattle for several months, because needed phosphorus is drawn from that stored in bones.

All forest range forage is high in calcium and can furnish more than the minimum calcium requirement at all times during the year (Read, 1951) (Table 1). Some of the native forbs, such as black-eyed-susan, have an exceptionally high calcium content—12 times that of some grasses.

Nitrogen-free extract and fat, which together with protein make up the digestible portion of the plants, are also fairly abundant in forest range forage.



Figure 5.—Woods sunflower and some other forbs, although not very abundant on range in good condition, are grazed by cattle at certain times during the year.

Fiber content of forage, which is part of the undigestible portion of the plant, is lower in Ozark ranges than in most other grazing regions, especially in some of the forbs such as black-eyed-susan.

The amount of forage produced on forest range is variable and may range from less than 50 pounds air-dry material per acre in dense forest stands to more than 1,000 pounds air-dry material per acre in open forest stands (Halls *et al.*, 1956; Ehrenreich and Crosby, 1960).

### Glade Forage Quality

Glade forage has a slightly lower nutrient content than forage on forest range (Fig. 6). On glade range, little bluestem and baldgrass, which frequently make up from  $\frac{1}{2}$  to  $\frac{3}{4}$  of the total herbage yield, can provide adequate protein and phosphorus for cattle during April, May, and June (Table 2). Some of the other desirable native grasses, such as big bluestem and switchgrass, have a slightly higher protein and phosphorus content and furnish adequate amounts of nutrients until mid-July. Unfortunately, big bluestem and switchgrass make up a small part

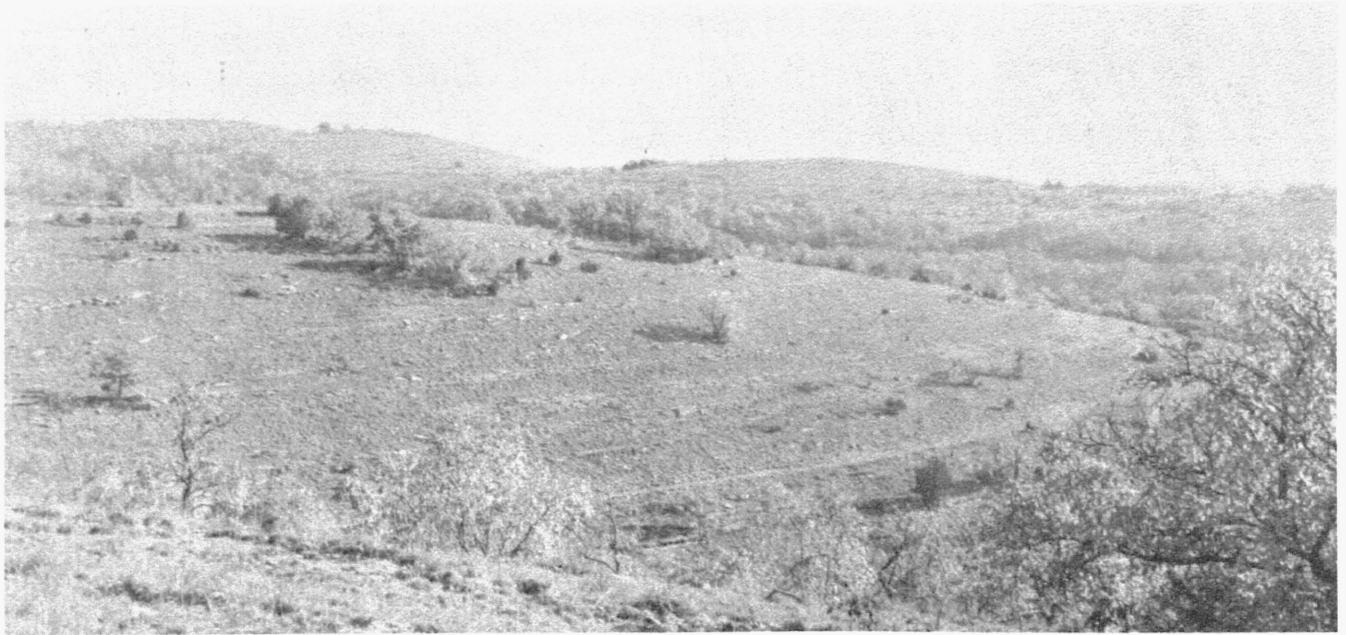


Figure 6.—Glade ranges such as this one occupy about 600,000 acres in the Ozarks. Under proper management they can produce from 2,000 to 2,800 pounds of air-dry

forage per acre. Native glade forage provides adequate nutrients for most classes of cattle only during spring and early summer.

TABLE 1-CHEMICAL COMPOSITION OF SEVERAL FORAGE SPECIES IN OPEN WOODS DURING JULY\*  
(In percent of dry weight)

	SPECIES										
	Little Bluestem	Indian Grass	Switch- Grass	Panic Grass	Sedges	Poverty Oat Grass	Tick Trefoil	Bush Clover	Bush rue	Sun- flower	Black- eyed- Susan
Dry Matter	6.47	7.85	8.38	7.50	5.94	5.41	13.28	12.32	14.01	8.54	9.78
Crude Protein	.19	.25	.26	.24	.15	.16	.29	.27	.31	.23	.22
Phosphorus	.46	.46	.48	.30	.49	.31	1.05	1.00	1.03	2.91	5.90
Calcium	1.74	2.27	2.29	3.64	1.63	3.41	2.11	2.01	2.07	2.34	1.16
Fat	47.93	46.17	45.28	46.41	51.44	48.33	43.99	44.53	43.99	47.22	48.51
Nitrogen-Free Extract	30.06	31.03	29.23	28.55	27.88	29.94	26.69	27.02	27.69	17.32	9.67
Fiber	5.14	4.87	5.33	7.50	5.82	5.41	5.56	5.61	4.97	13.64	19.84
Ash	8.01	7.10	8.75	5.86	6.65	7.03	7.03	7.24	5.93	7.80	4.92
Water											
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

\*Average of samples collected about mid-July during 1954 and 1955.

TABLE 2-CHEMICAL COMPOSITION OF SEVERAL GLADE FORAGE SPECIES DURING JULY\*  
(In percent of dry weight)

Dry Matter	SPECIES					
	Little Bluestem	Big Bluestem	Switch- grass	Prairie Dropseed	Bald- grass	
Protein	6.77	7.16	7.22	6.97	6.69	
Phosphorus	.15	.19	.19	.13	.15	
Calcium	.50	.47	.45	.47	.45	
Fat	1.83	2.40	2.02	1.84	1.33	
Nitrogen-Free Extract	46.31	46.20	46.91	45.71	44.96	
Fiber	30.62	30.18	30.21	33.67	33.92	
Ash	5.52	5.69	4.77	4.25	5.59	
Water	8.30	7.71	8.23	6.96	6.91	
Total	100.00	100.00	100.00	100.00	100.00	100.00

\*Average of samples collected about mid-July, during 1954 and 1955.

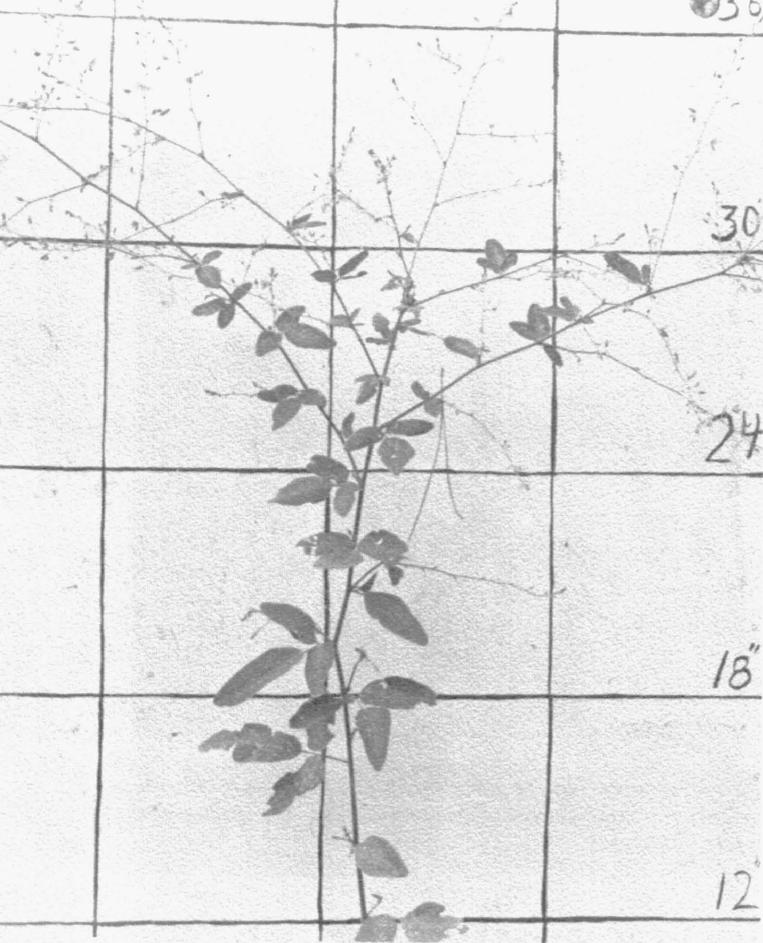
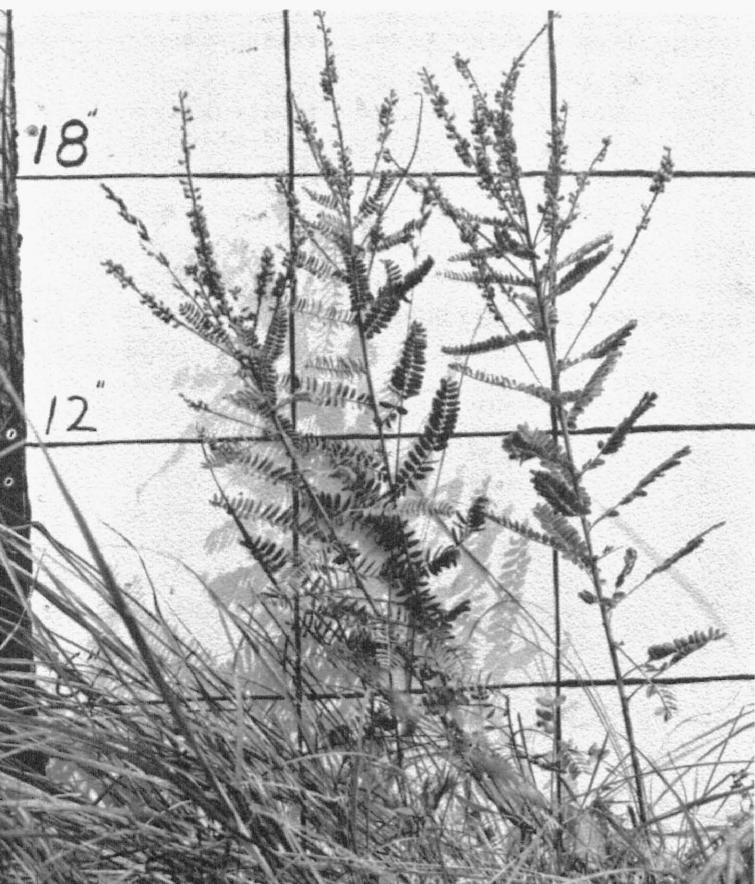


Figure 7.—Tick trefoil (top) and goatsrue (bottom) have a higher nutrient content than the native grasses. Glade range generally has fewer legumes and other forbs than forest range.



of the total herbage yield except on glades in good condition. Glade forage also has fewer desirable native legumes and other forbs than forest-range forage (Fig. 7). However, an introduced legume, Korean lespedeza, does well on glade ranges. It provides high-quality forage during July and August.

Calcium content of glade forage is always adequate. Nitrogen-free extract, fat, and fiber content are about the same as in forage on forest range except in prairie dropseed and baldgrass, which have a slightly higher fiber content.

Under proper management glade range can produce from 2,000 to 2,800 pounds of air-dry forage per acre. The best time to use glade forage is during the early part of the growing season when nutrient content is adequate.

#### Forage Quality in Old Fields and Pastures

Seeded and fertilized stands of big bluestem, switchgrass, and orchardgrass maintain more than the necessary protein, phosphorus, and calcium through mid-summer (Figs. 8 and 9, Table 3). Moreover, orchardgrass, a highly palatable introduced species commonly used for improved pastures, usually makes fall regrowth which has a very high nutrient content. Orchardgrass also has a higher fat and lower fiber content than most native grasses.

Broomsedge, which commonly invades overgrazed old fields and pastures, is low in nutrients by mid-summer compared with the desirable native species and orchardgrass. Presence of this relatively unpalatable species greatly reduces the value of an old field or pasture.

Seeded and fertilized stands of native grasses or orchardgrass can produce from 3,000 to 3,500 pounds of air-dry forage per acre.

#### Ozark Forage Quality Adequate

Although many Ozark forage species are low in certain nutrients by mid-summer, cattle on most Ozark ranches can obtain the minimum nutrient requirements throughout most of the season because of (1) the variety of forage species and types, and (2) the high nutrient content of forage regrowth.

Cattle seem to select the most nutritious forage plants first whenever given a choice. They have a large number of forage species to choose from on forest and glade range besides the more abundant ones already mentioned. Some of these other species start growth in February or March and mature in



Figure 8.—Old fields such as this one can provide high yields of very nutritious forage under proper management.

TABLE 3-CHEMICAL COMPOSITION OF SEVERAL FORAGE SPECIES IN OLD FIELDS AND PASTURES DURING JULY\*  
(In percent of dry weight)

Dry Matter	SPECIES				
	Big Bluestem	Switch- grass	Broom- sedge	Orchard- grass	Sweet Clover
Protein	9.06	9.60	5.94	12.56	12.84
Phosphorus	.35	.30	.18	.58	.35
Calcium	.36	.39	.22	.41	.40
Fat	1.87	1.62	1.90	4.66	2.58
Nitrogen-Free Extract	43.63	43.59	51.80	41.38	41.03
Fiber	30.55	29.63	29.12	26.53	30.06
Ash	7.07	7.43	3.78	7.40	5.93
Water	7.11	7.44	7.06	6.48	6.81
Total	100.00	100.00	100.00	100.00	100.00

\*These old fields and pastures were fertilized and limed in 1948 or 1949 as recommended for forage production by the county agent (based on requirements as shown by an analysis of soils). Average of samples collected about mid-July, during 1954 and 1955.



Figure 9.—Pastures, improved by seeding and fertilizing, have high-quality forage and can produce fat steers such

as these. Improved pastures usually make up a small but important part of the ranch acreage.

May or June; others may start growth in May or June and mature in August or September. In addition, some plants, such as the wildryes and bluegrasses, start growth early in the spring, go dormant during the summer, and make fall regrowth. Moreover, many of the native legumes and other forbs have a higher nutrient content than the native grasses and maintain it longer.

Even though the protein and phosphorus content of many of the more abundant native grasses on these ranges falls below the minimum cattle requirements by mid-summer, many other grasses and legumes and forbs still contain adequate amounts of these essential nutrients. Thus these less abundant species may make up a small but important part of the cattle diet on forest and glade ranges.

In addition to forest and glade ranges, most Ozark ranches have several old fields or improved pastures which have forage of higher nutrient content than forest or glade range forage.

The new young growth of grasses following grazing or harvesting is high in nutrients. Cattle usually graze this new plant growth in preference to older plant growth (Shepherd *et al.*, 1953). Campbell *et al.* (1954) found that new fresh growth following harvesting every 14 days contained adequate protein (from 10.9 to 8.6 percent) throughout the summer and early fall. However, Cassady (1953) reported that if continued, such frequent harvesting would seriously harm or even destroy the grass plants and might result in the plant being replaced by a less desirable species.

Quality of Ozark forage compares favorably with quality of forage from other important grazing areas of the United States. Well-managed Ozark forage can provide cattle with adequate amounts of essential nutrients during most of the growing season.

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### Appendix

(Herbaceous Plants Referred to in the Text)

Species	
Scientific Name	Common Name
<i>Grasses and Grass-Like Plants</i>	
<i>Andropogon gerardi</i> (Vitman)	big bluestem
<i>Andropogon scoparius</i> (Michx.)	little bluestem
<i>Andropogon virginicus</i> (L.)	broomsedge
<i>Carex</i> spp. (Laiche)	sedges
<i>Dactylis glomerata</i> (L.)	orchardgrass
<i>Danthonia spicata</i> (L. Beauv.)	poverty oat grass
<i>Panicum</i> spp. (L.)	panic grasses
<i>Panicum virgatum</i> (L.)	switchgrass
<i>Sorghastrum nutans</i> (L. Nash)	Indian grass
<i>Sporobolus heterolepis</i> (Gray)	prairie dropseed
<i>Sporobolus neglectus</i> (Nash)	baldgrass
<i>Broadleaved Plants (Forbs)</i>	
<i>Desmodium marilandicum</i> (L. D.C.)	tick trefoil
<i>Helianthus</i> spp. (L.)	sunflower
<i>Lespedeza virginicus</i> (Michx.)	bush clover
<i>Melilotus officinalis</i> (L. Lam.)	sweet clover
<i>Rudbeckia hirta</i> (L.)	back-eyed-susan
<i>Thephrosia virginiana</i> (L. Pres.)	goatsrue