AN EDUCATIONAL PROGRAM IN PASTURE MANAGEMENT FOR THE CEDAR VALE COMMUNITY

By

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CHAPTER I

INTRODUCTION

> The human race obtains its major foods directly or indirectly from grass. (Even the major cereals are in the grass family.) Millions of acres of non-cropland can be used as food for man because grazing animals are able to convert grass to useful products. Because it can be so utilized, we need to properly care for and improve our native grassland.[1]

Grass, and the production of it, is one of the most important phases of the livestock industry. The rancher considers himself a cattleman, the dairy farmer thinks himself a milk producer, and the farmer with sheep assumes he is a producer of mutton and wool.

However, on the other hand, does the farmer of western Kansas and Oklahoma consider himself a combine man? No, of course not. He is a wheat farmer. Wheat is what he raises on his land, and wheat is what he sells. The combine is only a means of harvesting his crop. The aforementioned individual then, is not a meat, milk, or wool producer, he is a producer of grass. The livestock he cares for is only his harvesting machine.

REASON FOR STUDY:

The author feels that the farmers in the area mentioned have overlooked the great potential of their native grass by observing the apparent abuse in recent years. It is for this reason that the author desired to make a study pertaining to pasture management problems

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[1]Clarence Bunch and Edd Roberts. "Know Your Native Grassland," Oklahoma Extension Service, Cir. No. 558. p. 1.

encountered by farmers in this area. The aim of the author is to present some of the results and findings related to the problems of pasture management encountered in the teaching of the vocational agriculture classes, and the evening adult farmer group of the Cedar Vale High School Vocational Agriculture Department.

STATEMENT OF PURPOSES:

The purposes of this study are: (1) to promote a better pasture management program for the Cedar Vale community; (2) to determine what should be emphasized in teaching pasture and range management to all day boys and adult farmers; and (3) to suggest a detailed procedure in giving instruction in pasture and range management.

DESCRIPTION OF AREA:

Cedar Vale, Kansas, is located to the north of Osage County, Oklahoma, in the extreme southeast corner of the Flint Hill section of Kansas. The portion of the Flint Hills in Oklahoma is known as the Osage Hills or the Bluestem Hills. The area is primarily native grassland. It is in the "tall grass" region of Kansas and is considered to be located in one of the most desirable native grassland areas in the United States.

> The Flint Hills is an important livestock region supporting a year-round cattle population of some 500,000 head plus about 300,000 additional ones shipped there each summer to fatten, extends from the Nebraska line into northern Oklahoma between the 96th and 97th meridians. Its 4,000,000 acres constitute a major segment of the true prairie.[2]

Soil Scientist, Dr. Claude L. Fly of the Soil Conservation Service, states in a Kansas State Board of Agriculture Bulletin, the following:

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[2]Kling L. Anderson and Claude L. Fly. "Vegetation-Soil Relationships in Flint Hills Bluestem Pastures," Journal of Range Management. Vol. 8, No. 4. July, 1955. p. 32.

The Flint Hills of Kansas separate the eastern Kansas acid prairie soils from the western Kansas soils which are slightly acid, neutral or limey. Elevations range from 1,550 feet above sea level at the central part of the region to 850 feet in the southeastern corner. The terrain is rolling to hilly, with steep breaks and escarpments adjacent to stream valleys. Cultivation is limited chiefly to narrow divides, moderately to strongly sloping colluvial soils below limestone ledges, and bottomlands. Average annual rainfall ranges from thirty to thirty-eight inches north to south, growing seasons from 170 to 190 days, and average annual temperatures from fifty-four to fifty-eight degrees. Winters are open with occasional severe cold spells. Summers are warm to hot with warm nights. Soils suitable for cultivation include those on smoother slopes on the high divides, which have ten inches or more of dark brown to nearly black granular silty clay loams over heavy dark clay or claypan-like subsoils. Soils with very thin topsoils over tight brownish clays occupy some of the lower divides adjacent to flinty limestone outcrops, but they are so shallow and hard to till that their cropland use is limited. The soils are well supplied with mineral nutrients. This and the favorable climate, enable them to produce the abundance of bluestem and other tall grasses that make this the best grazing area in the state and one of the most important in the United States. Soils developed over massive limestone usually are very dark to nearly black silt loams which grow lighter in color and rest directly on partially weathered limestone at depths ranging from a few inches to more than a foot.[3]

A map of the Flint Hills may be found on page four of this report.

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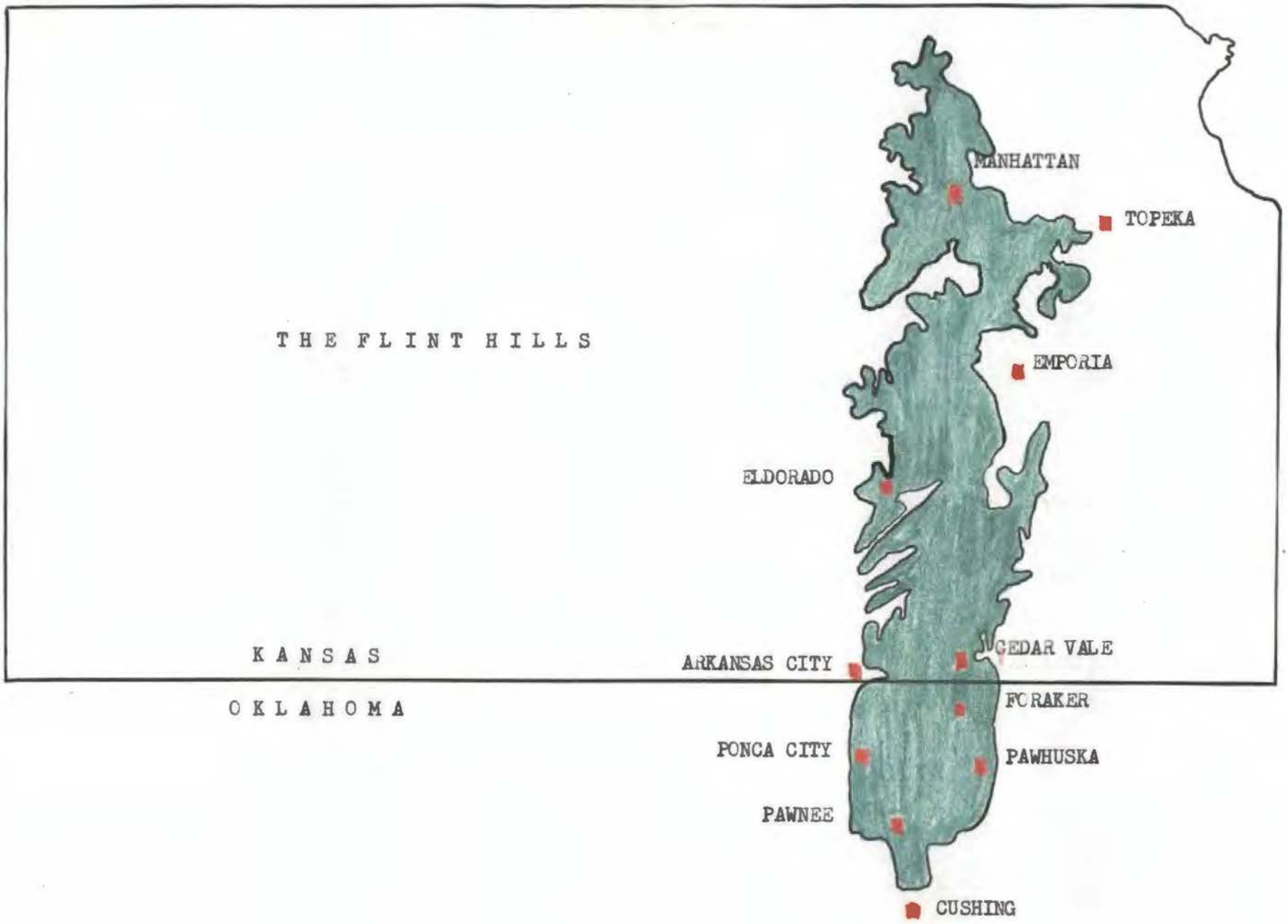
[3]Claude L. Fly. "Natural Agricultural Resource Areas of Kansas," Kansas State Board of Agriculture, Soil Conservation in Kansas, State Printer, Topeka, Kansas. Vol. LXV, 1946. pp. 176-178.


THE FLINT HILLS
MANHATTAN
TOPEKA
EMPORIA
ELDORADO
KANSAS
ARKANSAS CITY
CEDAR VALE
OKLAHOMA
FORAKER
PONCA CITY
PAWHUSKA
PAWNEE
CUSHING

CHAPTER II

METHODS USED IN SECURING DATA

After residing in Cedar Vale for three years as the teacher of vocational agriculture, the author recognized the need for pasture improvement on his own and, therefore, chose to make a study of the pasture management problems encountered by farmers in the Cedar Vale service area.

The questionnaires and much technical aid and assistance in this study were obtained from the Agronomy Department of the Oklahoma State University. Helpful assistance was also obtained from the Adams Ranch Agricultural Demonstration Project personnel at Foraker, Oklahoma, and the Agronomy Department of the Kansas State College.

In determining how large an area should be studied and how many farmers should be involved, the author and his advisors decided upon a study of twenty-five farmers taken from a cross section of the school district which includes some 99,000 acres.

In analyzing the figures given in the Kansas State Board of Agriculture's Thirty-Eighth Biennial Report,[4] the author found that 280,000 acres, or about two-thirds of the total county acreage of Chautauqua County, Kansas, is in tame or prairie pasture. Approximately, this proportion of land would be very nearly correct for acres of

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[4]Roy Freeland. "Thirty-Eighth Biennial Report," Kansas State Board of Agriculture, Vol. XLIII, State Printer, Topeka, Kansas, 1953. p. 159.

pasture found within the Joint School District No. 1, Cedar Vale, Kansas.

Sixty per cent of the farmers included in the study are enrolled in the evening adult farmer classes of Cedar Vale High School. In addition to the farmers enrolled in the evening class, the author selected the remainder of the group at random, using only those who had no less than 160 acres, but no more than 600 acres. It will be noted, however, that four farmers enrolled in the evening class have 1,000 acres or more.

All the farmers interviewed were most cooperative in supplying information and spent much of their valuable time in working with the author. As the questionnarie was quite extensive and the farmer's pastures must be visually observed, a minimum of two to three hours was required in visiting each farmer, and in some cases, all day was necessary to fully cover the farm.

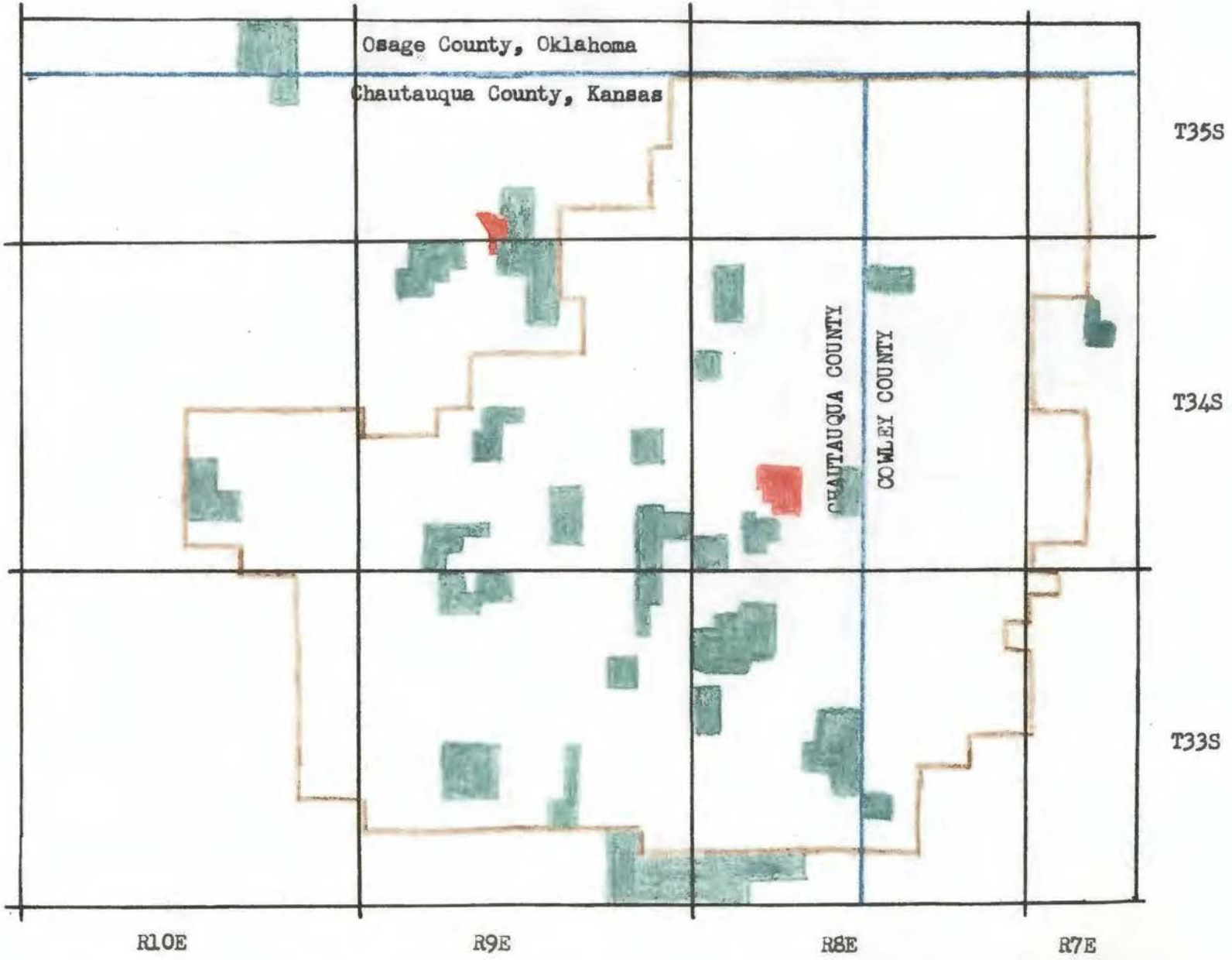
A sample of the questionnaire used in the study may be found at the end of this chapter.

After the 25 farmers were surveyed, the data were compiled and summarized in tabular form and appropriate analyses were made.

A map of Joint School District No. 1, Cedar Vale, Kansas, may be found on the next page of this report. The map is divided vertically by Ranges, which are six miles wide, and horizontally by Townships, which are six miles wide.

The brown lines designate the boundaries of Joint School District No. 1. The areas in green indicate the farms owned and/or rented that are included in the study. In some instances, additional acreage is rented that is not located within these map boundaries. All 25 farmers, however, live within the map boundaries. The blue lines designate state and county boundaries. Map scale is three-eighths of one inch equals one mile.

A Map of Joint School District No. 1, Cedar Vale, Kansas



FARM SURVEY FOR PASTURE IMPROVEMENT

IN THE CEDAR VALE COMMUNITY

Name _____ Date Survey Made _____

A. Total Acres Farming____ Acres rented_____ Acres owned_____

B. Kind and number of livestock - (past year)

Cattle: Cows or steers two yrs. old or over_____ Yearlings____ Calves____

Sheep or Goats: Ewes and rams_____ Lambs or kids_____

Horses or Mules: Over two years_____ Under two years_____

Swine Pastured: Over six months_____ Pigs _____

C. Kinds of crops - (acres past year)

(1) Corn____ Wheat_____ Oats_____ Others_____ Total Acres____

D. Kinds of pasture - (acres past year)

(1) Native prairie_____ Timberland pasture_____ Tame Grass_____

(2) Small grains_____ Legume and grass mixture _____

(3) Others (Temporary or Supplementary)____ Total acres in all pasture_____

E. Feed grown on the farm and fed to livestock - (past year)

Grain (bu.)_____ Hay (prairie, sudan, etc., tons)_____

Legume hay (tons)____ Roughages (Silage, stover, etc., tons)____

F. Feed grown on the farm and sold - (past year)

Grain (bu.)_____ Hay (tons)_____ Roughages, etc. (tons)____

G. Feed bought and fed on the farm - (past year)

Grain (bu.)_____ Hay (tons)_____ Roughages, etc. (tons)_____

Concentrates (kind) (100 lbs.)_____

H. Pasture Management Practices:

1. Native prairie:

a. Years in Pasture_____Kinds of grasses reseeded (Mixtures, rate, time, how)

_____

_____

_____

b. Fertilizers (Kind, time applied, rate, how applied)_____

_____

c. Grazing (Rotation, continuous, etc.)_____

_____

d. Stocking rate (acres per head)_____

e. Condition of pasture now _____

f. Weed control (Kinds, time of mowing, number of mowings)

_____

g. Legumes added (Kinds, time, rate)_____

_____

2. Timberland pasture:

a. Time of year grazed_____Number of months grazed_____

b. Stocking rate (acres per head)_____Reseeding (Time and mixture)_____

c. Fertilizers (Kinds, rate, time)_____

_____

d. Improvement practices used _____

_____

3. Tame Grass Pasture:

a. Kinds of grasses_____

b. When established _____

c. Fertilizers (Kind, rate, time)_____

d. Stocking rate (Acres per head)_____Number months grazed_____

e. Weed Control practices used_____

f. Legumes added (Kinds, time, rate)_____

_____

4. Small Grain Pasture:

a. Kinds Seeded_____

b. When Planted_____Rate of seeding_____

c. Fertilizers: (Kind, rate, time)_____

d. Weed control practices used_____

e. Grazing: Time of year_____Number of Months_____

f. Stocking rate (Acres per head)_____

5. Legume and Grass Mixture: (Ryegrass, lespedeza, clovers, etc.)

a. Kinds seeded _____

b. When planted_____Rate of seeding_____

c. Fertilizers: Kind_____Amount per acre_____

When applied_____

d. Weed control practices used _____

e. Grazing: Time of year_____Number of months_____

f. Stocking rate (Acres per head)_____

6. Other Pastures: (Lespedeza-small grains, Sudan, etc.)

a. Kinds seeded_____

b. When planted _____Rate of seeding _____

c. Fertilizers (Kind, rate, time)_____

d. Weed control practices used _____

e. Grazing: Time of year _____Number of months_____

f. Stocking rate (Acres per head)_____

I. Your Plans for Improving Pastures:

1. Native prairie _____
2. Timberland _____
3. Tame _____
4. Small Grains _____
5. Tame grass and legumes _____
6. Other _____

J. General

1. Number acres of pasture needed for the livestock _____
2. Number of months livestock is kept on all pasture _____
3. How many months grazing are possible if a careful program is developed _____
4. Are the pastures overgrazed _____
5. Can the feed costs be reduced by improving pastures _____
6. Kinds of fertilizers needed: Tests made _____
7. Interested in pasture development _____
8. Make a sketch of the farm, showing all fields including pastures. (Size of sketch should be 6" x 6" for a quarter section of land.) Use back side of these pages.

CHAPTER III

PRESENTATION AND ANALYSIS OF DATA

The information presented on the following pages was obtained by personally interviewing 25 farmers representing a cross-section of Joint School District No. 1, Cedar Vale, Kansas.

The numbers and/or percentages shown in the tables represent the conditions or extent of participation found in that particular phase of the survey.

A. Size of Farms

As shown in Table I, farmers included in this study have farm acreages of from 160 acres to 2,040 acres. Five farmers do not rent any land and four farmers are renters, owning no land. The average size of farms surveyed was 582 acres. It is interesting to note that the average number of acres owned is only 295, as compared to an average of 438 acres rented. The majority of these acres are, however, pastureland which might explain the large number of acres rented over the number of acres owned, when one considers the area is largely native rangeland.

Approximately two-thirds of the land under cultivation on the farms surveyed is located on creek or river bottom soils. The less productive, upland farms make up the remaining one-third of the farms included in the survey.

Total acreage of the 25 farms surveyed is 14,603 acres, with 8,763 of the total acres being rented, and 6,200 acres owned.

TABLE I

SIZE OF FARM ACREAGE OF THE 25 FARMS SURVEYED

Farmer Number	Total Acres Farming	Acres Rented	Acres Owned
1	340	160	180
2	160		160
3	1,480	1,160	320
4	480	180	300
5	240	240	
6	900	660	240
7	320	160	240
8	1,920	1,680	240
9	673	353	320
10	460	460	
11	210	80	130
12	2,040	1,970	70
13	650	250	400
14	400	400	
15	340	160	180
16	460	200	260
17	400	80	320
18	760		760
19	1,000		1,000
20	320	100	220
21	250	90	160
22	160	160	
23	200	40	160
24	240		240
25	200		200

B. Kind and Number of Livestock

Of the 25 farmers in the study, 21 have beef as their major enterprise. Two of the farmers have Angus herds, one farmer has Shorthorns, and one farmer has Polled Herefords. The other 17 farmers, with beef as their major enterprise, have grade Herefords. One farmer has registered Herefords. Ninety-five per cent of these farmers use registered sires in their cow herds.

The beef cow herds included in this study drop big thrifty calves, and on the whole, are a good quality commercial cattle.

TABLE II

KIND AND NUMBER OF LIVESTOCK FOUND ON THE FARMS SURVEYED

Farmer Number	Cows	Yearling Steers	Calves	Sheep	Lambs	Horses	Swine 1 yr.	Pigs
1		25				3		
2	40	4	26			2		
3	125	100	100			1		
4*	21	5	7					
5*	19	3	19					
6	48		48			1		
7	35		35	15		1	3	16
8	120		98			4		
9	55	7	53			2	7	57
10	20	6	20					
11*	15	15	5			2		15
12	120	50	50			3	15	250
13	45	17	38			3	7	49
14	12		12					
15	28	1	18			2		
16	44	38	40			2		
17**	8		6	160	130		6	58
18	58	4	53			2	12	45
19	60		60					
20	50	50	50			2		
21	30		30			3	4	32
22	20	40	20			2	2	10
23	50		50			1		50
24	30		30			3		
25	50		50			2	8	70

* Dairy farmer
** Sheep farmer

As Table II indicates, three of the farmers surveyed have dairy as major enterprise. One farmer has grade Holsteins, and the other two dairys are using Ayrshires. Neither of the Ayrshire herds is registered, but both herds are being improved through artificial breeding.

One of the 25 farmers studied is in the sheep business. He is using Western ewes and Shropshire rams.

The author purposely included the three dairys and the sheep farmer in the study to get a true over-all picture of the pasture problems encountered in all phases of livestock production in the Cedar Vale service area.

The percentage of beef cattle operators compared to dairy and sheep operators included in the study, compare favorably to the county figures given in the 1954 county census report of agriculture for Chautauqua County. This document states that in 1954, Chautauqua County had 43,602 cattle and calves, 2,326 milk cows, and 1,706 sheep and lambs.[5]

Table II indicates that 19 of the 25 farms studied have horses two years old or older on their farms. The author found that none of these animals were draft horses, however. All horses listed in the table are "cowponies" and are being used on all of the beef cattle enterprises and on one of the dairys.

Eleven farmers have included swine as a supplemental enterprise, but in the opinion of the author, the number found on each farm is insignificant insofar as the study of this problem is concerned.

Not including the hogs, there are 1,038 animal units on the farms studied, with an average of 41.5 animal units per farm.

Dr. Harlan, in his book, Theory and Dynamics of Grassland Agriculture, defines an animal unit as follows:

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[5]Chautauqua County, Kansas, 1954 Census of Agriculture, Bureau of Census, U. S. Department of Commerce, Series AC 54-1, July 1955, p. 2.

The grazing equivalent of one mature cow for twelve months and her suckling calf for six months. The forage required to support an animal unit. Five sheep or five goats or one horse are rated as an animal unit, and a yearling calf at about 0.6 animal unit.[6]

TABLE III

KIND AND NUMBER OF ACRES OF CROPS FOUND ON THE FARMS SURVEYED

Farmer Number	Acres Wheat	Acres Oats	Acres Other	Total Acres
1	30	50	7	87
2	14	25		39
3	43	55	45	143
4	47	87	46	180
5	40	56	44	140
6	37	66	77	180
7	18	45	80	143
8	108	110	115	333
9	55	57	88	200
10	30	30	20	80
11	15		65	80
12	35	60	245	340
13	18	55	28	101
14	108	14	122	244
15	100	49		149
16	49	91	64	204
17	33		77	110
18	60	45	75	180
19	100	100		200
20	100	150	75	325
21	45	30	40	115
22	35	30	40	95
23	20	20	40	80
24	18	45	80	143
25	35	20	65	120

C. Kind of Crops

The 1954 county agriculture census report for Chautauqua County listed 2,885 acres of corn found in the county, but none of the farmers

[6]Jack R. Harlan, Theory and Dynamics of Grassland Agriculture, D. Van Nostrand Company, Inc., Toronto, New York, London, 1956, p. 211.

included in this study indicated any acres of corn. The author wishes to point out that from personal observation, most of the corn raised in this county is in the eastern part, due to the larger number of acres cultivatable. Cedar Vale is located on the western side of the county.

In analyzing Table III, the author found that all the farmers interviewed had some wheat acreage, ranging in size, from 14 acres to 108 acres, and the average number of acres was 24. Several of the farmers pasture their wheat, as will be brought out later in this report.

Twenty-three of the farmers had oat acreage the past year, ranging from 14 to 150 acres, and averaging about 35 acres per farm. The majority of the oats in this area are of the spring variety.

The remainder of the cropland is made up of barley, rye, sudan, combine and forage sorghums, and alfalfa.

As was mentioned previously in this chapter, the 25 farmers surveyed have a total acreage of 14,603 acres. Of this total acreage, 4,011 acres are in cropland. Table IV indicates that wheat makes up 30 per cent of the total cropland acreage, oats 32 per cent, and other crops make up 38 per cent of the cropland.

TABLE IV

NUMBER OF ACRES OF VARIOUS CROPS

Crop	Acres	Per cent
Corn	0	0.
Wheat	1,193	30.
Oats	1,280	32.
Other	1,538	38.
Totals	4,011	100.

D. Kinds of Pasture

The 25 farmers studied have a total of 11,770 acres of pasture. This acreage includes the native range grass pastures as well as the tame grass pastures. The term "tame grass pastures," as it will be used in this report, is meant to include all pastures containing grass species that are not native to this area. The tame grass pastures are established after careful seed or root selection and seedbed preparation. These pastures are made up of both annual and perennial grasses and legumes. Tame grass pastures discussed in this chapter include bromegrass, Kentucky fescue, Bermuda grass, and legume-grass mixtures.

Table V shows that 83 per cent of the total acres of pasture included in the survey are in native grasses. All 25 farmers had some native grass pasture, ranging from 60 acres to 1,587 acres. Seven of the farmers had timberland pasture, devoting 3.1 per cent to the total pasture acres. Only six farmers indicated any tame grass pasture, and half of that is in waterways. The total tame grass acres is only 0.5 per cent of the total pasture acres.

Small grain pasture contributed 11.2 per cent to the total pasture acreage, and is being pastured on 23 of the 25 farms. The three farmers not pasturing their winter small grains indicated they would do so if the areas were under fence. The smallest number of acres being pastured is 15 and the largest number is 149 acres. Most of the small grain pasture is wheat. Oats in this area are largely of the spring variety. However, farmers with winter oats pasture them and the farmers also pasture barley.

The legume-grass mixture, which is found only on two of the farms is a bromegrass-sweetclover mixture and is only 0.3 per cent of the total. Other pastures, as it is labeled in Table V, includes all other temporary or supplementary pastures not previously mentioned, and in this case pertains to eight farmers who have either sudan or lespedeza-small grain mixtures. These eight farmers have acreages of 10 to 60 acres and contribute 1.9 per cent of the total acres in pasture. Some of the totals of pasture and cropland add up to more than the total acres of some of the individual farms. The reason for this being that many of the small grain acres are listed in both crops and pastureland.

TABLE V

NUMBER OF ACRES OF DIFFERENT KINDS OF PASTURE

Kind of Pasture	Acres	Per cent
Native	9,762	83.0
Timberland	355	3.1
Tame	60	0.5
Small Grain	1,320	11.2
Legume-Grass Mix	40	0.3
Others	233	1.9
Totals	11,770	100.0

E. Feed Grown on the Farm and Fed to Livestock

Table VI indicates that 92 per cent of the farmers raised 30,210 bushels of grain which they fed to their livestock. The largest number of bushels being produced was 3,000 and the smallest, 150 bushels.

Of the 23 farms reporting, an average of 1,313 bushels of grain are raised and fed. Oats make up the largest percentage of the grain raised and fed to livestock, with barley and combine sorghums being less than 10 per cent of the total.

One of the farmers not raising any grain for feed has a dairy. His farming program consists of raising his roughage along with a cash crop (wheat) and buying concentrates for the dairy herd. This farmer has limited land for farming and does custom hay-baling to supplement the roughage he raises.

The other farmer not feeding home grown grain has a 30 cow Angus herd and sells weanling calves. He also has a supplemental poultry enterprise of cage layer hens and buys all grain fed on the farm.

TABLE VI

NUMBER FARMERS FEEDING HOME GROWN FEED TO THEIR LIVESTOCK AND AMOUNT PRODUCED

Feed Grown and Fed to Livestock	Per cent Participating	Tons or Bushels Produced
Grain (Bushels)	92.0	30,210
Hay, Prairie (Tons)	44.0	205
Hay, Legume (Tons)	44.0	437
Roughage, Silage, Stover (Tons)	48.0	1,445

Forty-four per cent of the farmers cut 205 tons of hay from native meadows and fed it to livestock; this was an average of about 18½ tons of hay cut per farm.

Forty-four per cent of the farmers also have alfalfa acreage. These 11 farmers are not the same 11 who have native grass meadows, however.

These farmers produced 437 tons of alfalfa hay last year which was an average of about 40 tons per farm.

Forty-eight per cent of the farmers produced 1,445 tons of silage last year which was fed to livestock. This is an average of 120 tons per farm producing silage.

The information given in Table VII indicates that no roughage was sold by the 12 farmers who produced silage.

F. Feed Grown on the Farm and Sold

All 25 of the farmers sold some grain from their farms, ranging from 300 bushels to 1,720 bushels annually. The average amount of grain sold per farm was 927 bushels. The total amount of grain sold by the 25 farmers studied was 23,182 bushels. The author wishes to state that the total bushels of feed grain sold is somewhat misleading as over half of this cash crop grain is wheat. Table VII is entitled, "Number of Farmers Raising and Selling Feed," and, of course, wheat is not used as a livestock feed.

Table VII indicates that only 121 tons of hay were sold on the farms studied. The 121 tons of alfalfa hay were produced on one farm. This individual has 100 acres of alfalfa which has made only about 1½ tons per acre in recent years.

Of the 12 farms raising silage, none were sold.

TABLE VII

NUMBER OF FARMERS RAISING AND SELLING FEED

Feed Grown and Sold	Per cent Participating	Tons or Bushels Produced
Grain (Bushels)	100.0	23,182
Hay, Alfalfa, Prairie (Tons)	4.0	121
Roughage, Silage, Stover (Tons)	0.0	0

G. Feed Bought and Fed on the Farm

Fourteen of the 25 farmers bought 11,023 bushels of grain for livestock feed in 1956 for an average of 787 bushels of grain purchased per farm, as is indicated in Table VIII. Only four farmers purchased hay last year, all of which was prairie hay. The four farmers purchased a total of 60 tons, averaging 15 tons hay purchased per farmer. One farmer bought 40 tons of silage in 1956. This individual has a 20 cow dairy herd. He harvested 30 tons of his own silage and 35 tons of alfalfa hay. All 25 farmers bought and fed some kind of concentrate feed.

In Table VIII, "Concentrates," are listed separately from "Grain". The author wishes to point out that the column, "Concentrates," as it is used in Table VIII, pertains to protein and mineral supplements. Where a commercial feed was purchased that contained a complete ration, it is also shown in the "Concentrate" column. The 25 farmers bought and fed a total of 150 tons of "Concentrates," averaging six tons per farm.

TABLE VIII

NUMBER OF FARMERS BUYING FEED FOR LIVESTOCK

Feed Bought and Fed	Per cent Participating	Tons or Bushels Bought
Grain (Bushels)	56.0	11,023
Hay, Prairie (Tons)	16.0	60
Roughage, Silage (Tons)	4.0	40
Concentrates, Protein Sup. (Tons)	100.0	150

H. Pasture Management Practices

The remainder of this chapter will deal largely with summarizing and analyzing information obtained from the questionnaires pertaining to pasture management practices. The author found that of the 14,603 acres covered in the survey, 11,770 acres were in some kind of pasture. Pastures of all kinds then, include 80 per cent of the total acreage covered in this study.

1. Native Prairie

On page 19 of this report, Table V shows that of the 11,770 acres in pastures, 9,762 acres are in native grasses. This is 83 per cent of the total pasture acres.

Table IX shows that only one individual has done any reseeding in his native pastures. This farmer has done an outstanding job of managing his native pastures as the table indicates; however, none of the farmers have fertilized any of their native pastures.

Grazing practices were either continuous or some type of rotation plan. Table IX indicates that, with one exception, farmers with 280 acres or less, grazed their pastures continuously. The farmers using a rotation plan of some kind, for the most part, had a larger number of acres of native grass than did the farmers who grazed continuously.

The author wishes to point out in the "Stocking Rate" column, that the figures shown represent the number of acres allowed per animal unit. The stocking rate in these pastures ranged from three to 12 acres per head.

Four of the farmers used mowing as a means of weed control, and one farmer sprayed 30 acres with 2,4-D in 1956.

Two farmers added Korean lespedeza to their native pastures, but the recent drought killed out the plants.

The author used capital letters to abbreviate words in the column, "Pasture Condition". (E = Excellent, G = Good, F = Fair, and P = Poor) Dr. Harlan defines range condition as follows:

> One system of range classification developed by the Soil Conservation Service of the United States Department of Agriculture illustrates the ecological approach. Ranges or pastures are classed simply as "excellent," "good," "fair," and "poor" if, as a whole, the climax vegetation is 75-100 per cent intact, 50-75 per cent intact, 25-50 per cent intact, or less than 25 per cent intact, respectively.[7]

The author purposely listed the number of native grass acres possessed by each of the farmers studied to give a true picture of why pasture conditions are as they are, on the given farms. In reviewing Table IX, the author found that a much more extensive analysis could be made.

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[7]Jack Harlan, Theory and Dynamics of Grassland Agriculture, D. Van Nostrand Company, Inc., Toronto, New York, London, 1956, p. 195.

TABLE IX

NATIVE PASTURE MANAGEMENT PRACTICES FOUND ON THE FARMS SURVEYED

Farmer Number	Acres Pasture	Acres Reseeded	Acres Fertilised	Grazing Practice	Pasture Condition	Stocking Rate	Weed Control	Legumes Added
1	130	0	0	Continuous	P	5		
2	100	0	0	Continuous	P	3		
3	1,340	0	0	Continuous	F	8	Div. ditch	Lesp.
4	170	0	0	Rotation	F	7		
5	60	0	0	Rotation	P	3		
6	420	0	0	Rotation	P	7		
7	210	0	0	Continuous	P	5		
8	1,587	0	0	Rotation	G, F	10		
9	475	0	0	Rotation	F, P	6		
10	280	0	0	Rotation	F, P	12		
11	80	0	0	Rotation	P	4	Mow once	
12	1,480	0	0	Rotation	E, G, F	12	Mow, spray	
13	370	0	0	Rotation	F	7		
14	85	0	0	Continuous	P	8		
15	95	0	0	Rotation	F	4		
16	255	0	0	Rotation	F, P	3	Mow Twice	
17	235	0	0	Rotation	F	6		Lesp.
18	500	0	0	Rotation	F	9		
19	800	40	0	Rotation	E, G	12	Mow	
20	275	0	0	Continuous	F,P	7		
21	105	0	0	Rotation	F	6		
22	100	0	0	Continuous	F, P	3		
23	120	0	0	Continuous	F	3		
24	210	0	0	Continuous	F	7		
25	280	0	0	Continuous	F, P	6		

Table X shows the relationship of pasture condition on the different size acreage of native grass pastures possessed by the farms studied.

Where percentages appear in Table X, the author found two or more pastures per farm, and classified them accordingly, with the use of the Kansas Soil Conservation Service Range Technician's Guide.[8]

The Table indicates that farms of 640 acres or less, have pastures that are classified no better than fair, and that 21 of the 25 farms are in this category. One farm, having 800 acres of native pasture, had 400 acres classified excellent and 400 acres classified as good. Only three farms have native grass pastures totaling 1,000 acres or more, with approximately 11 per cent of these pastures classified as excellent, 29 per cent classified as good, and 60 per cent of the pastures were classified as being in fair range condition.

The Table also shows that of the 9,762 acres of native pasture surveyed, only 894 acres were classified excellent. This excellent pasture is found on only two of the farms. Only three farms possess pastures that can be classified good. Seventeen farms have pastures classified fair with a total of 5,264 acres or about 54 per cent of the total acres of native pasture.

Pastures classified as poor are found on 13 of the 25 farms totaling 1,918 acres. As Table X indicates, all the poor classified pastures are found on farms of 640 acres or less.

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[8]Kansas Soil Conservation Service, Technician's Guide to Range Sites and Condition Classes in the 35 to 39 Inch Rainfall Belt, pp. 1,2.

TABLE X

RELATIONSHIP OF PASTURE CONDITION WHEN COMPARED TO THE NUMBER OF NATIVE GRASS ACRES ON DIFFERENT SIZE FARMS

Pasture Condition	Acres of Pasture and Number Reporting											
	Acres 60-160	Number Farms	Acres 161-320	Number Farms	Acres 321-640	Number Farms	Acres 641-1000	Number Farms	Acres 1000-over	Number Farms	Total Acres	Total Farms
Excellent							400	.5	494	.33	894	.83
Good							400	.5	1,286	.66	1,686	1.16
Fair	370	3.5	1,159	5.0	1,108	2.5			2,627	2.00	5,264	13.00
Poor	505	5.5	756	3.0	657	1.5					1,918	10.00
Totals	875	9.0	1,915	8.0	1,765	4.0	800	1.0	4,407	3.00	9,762	25.00

Of the 9,762 acres of native grass pasture included in this study, Table XI shows that 2,850 acres are being grazed continuously on 19 of the 25 farms.

By continuous grazing, the author means that cattle are grazing the pastures at all times, with the stocking rate fluctuating with those farmers who have supplemental wheat pasture, etc.

Fifteen farmers have some type of rotation plan on 6,912 acres of native grass. The rotation plans do not include any annual resting of the grass for the most part, however. Only two of the 15 farmers indicated that a years resting period was included in their rotation plan. The remainder of the plans did not include over a six months resting period for their native pastures.

As Table XI shows, of the pastures that were grazed continuously, none were classified higher than fair.

The rotated pastures have 894 acres classified excellent and 1,686 acres classified good. However, 1,066 acres of rotated pasture is classified poor. In the opinion of the author, the reason for this latter classification may be found in Table XII.

TABLE XI

RELATIONSHIP OF PASTURE CONDITION WHEN COMPARED WITH GRAZING PRACTICE ON DIFFERENT FARMS

Pasture Condition	Grazing Practice Acres Reported	
	Continuous	Rotation
Excellent		894
Good		1,686
Fair	1,998	3,266
Poor	852	1,066
Totals	2,850	6,912

Table XII shows the relationship of pasture conditions when compared to the stocking rates on the pastures studied. As it is indicated by the Table, there seems to be quite a difference in thought among the farmers as to what the proper stocking rate on native pastures should be.

The Table shows seven farmers stocking at a rate of three acres per head and seven farmers stocking at a rate of 12 acres per head; the remainder of the farmers show a stocking rate somewhere between these two figures. Six farmers stock at six acres per head, and six farmers stock at seven acres per head, with the acreage stocking rate being about seven acres per head.

In examining this average stocking rate alone, it would appear that, on the average, farmers in this area are stocking their pastures somewhere near the recommended stocking rate. However, in looking at Table XII, the author found that only five of the 35 pastures indicated, were classified as being in good or excellent condition, the remainder being classified either as fair or poor. As it will be brought out in the next chapter, seven acres have been found insufficient for improving or maintaining pastures presently classified as poor or fair.

TABLE XII

THE RELATIONSHIP OF PASTURE CONDITION WHEN COMPARED TO THE STOCKING RATE ON DIFFERENT FARMS

Pasture Condition	Stocking Rate - Acres per Head* Farms Reporting **									
	3	4	5	6	7	8	9	10	11	12
Excellent										2
Good								1		2
Fair	3	1		3	4	1	1	1		2
Poor	4	1	2	3	2	1				1
Totals	7	2	2	6	6	2	1	2		7

* Acres per Head is meant to be synonymous with Animal Units.
** Where farms had pastures classified in more than one range classification, both classes are listed, making the grand total more than 25.

2. Timberland Pasture

There is 355 acres of timberland pasture included in this study, which, for the most part, is found along the savanna or fringe area of the Flint Hills. C. P. Barnes describes savannas in the 1948 edition of the U.S.D.A. Yearbook entitled "Grass" as follows:

> Characteristic of the savannas are scattered trees that usually are small and scrubby and grow singly or in groups. The vegetation is dominantly grass, however. Where the rainfall is greater or where the soils collect and hold more moisture, the trees grow close enough to form woodland. In some areas, the grasses are tall, in others short, corresponding to zones of greater or less moisture. They generally do not form sods as in the prairies and short grasslands. During the dry period they become dormant and dry out and scattered trees lose their leaves. Fires burn over much of the grassland in this period and hinder the spread of woodland.
>
> Soils of the savannas are generally far less fertile than those of the prairies and short grasslands.[9]

[9] C. P. Barnes, 1948 United States Department of Agriculture Yearbook, U. S. Government Printing Office, Washington, 1948, p. 49.

The author found through personal observation that 10 to 15 miles east of Cedar Vale, soil type changes from the limestone type soils of the Flint Hills to the Bates, or sandy type soils. It is in these sandy type soils that the author found evidence of the black-jack and postoak plant species that are so prevalent through the eastern half of Chautauqua County in Kansas and Osage County in Oklahoma.

As Table XIII indicates, seven farmers have timberland pastures. All of the farmers practice summer grazing for a period of three to six months, the average being about four months. Stocking rates range from three to 12 acres per head and the average rate is about six acres per head. All of the pastures are in native grass and none have been fertilized or reseeded.

One farmer, with 230 acres of this type pasture, sprayed 100 acres with 2,4,5,-T in 1952. He also bulldozed 60 acres in 1956. With the exception of the 230 acre pasture, the remaining 125 acres, or about 35 per cent, of the timberland pasture is located in low marshy areas or on overgrazed hillsides. The latter having been invaded by sumac and persimmon creates very sparse vegetation.

In examining the range condition of these pastures, the author classified the 230 acre pasture as fair and the remaining 125 acres as poor.

TABLE XIII

TIMBERLAND PASTURE MANAGEMENT PRACTICES
FOUND ON FARMS REPORTING*

Farmer Number	Time yr. grazed	No. Months Grazed	Stocking Rate	Improvement Practices
1	Summer	3	7	
2	Summer	3	3	
3	Summer	4	4	
4	Summer	6	12	Spray, Bulldoze
5	Summer	4	7	
6	Summer	4	4	
7	Summer	4	3	

* As no fertilizing or reseeding was done in these pastures, they do not appear in the table.

3. Tame Grass Pasture

Six of the 25 farms studied have tame pasture, totaling only 60 acres and occupying only 0.5 per cent of the total pasture acreage.

Four of the six farmers with tame grass only have it established in waterways. The two farmers with tame grass pasture, that has been established as such, are both dairy farmers with one farmer having 20 acres and the other farmer 10 acres.

Table XIV shows three of the farmers with bromegrass pasture, two farmers with a bromegrass-Kentucky fescue mixture, and one farmer with Kentucky fescue pasture. All the pastures have been established since 1950, the latest having been the Kentucky fescue pasture which was established in 1954.

Three of the six farmers fertilized their pastures. Two used 16-20-0 at 150 and 100 pounds per acre. The third farmer used 13-30-0 at 80 pounds per acre. All the fertilizer was applied in the fall.

These pastures were grazed from two to five months, with four months being the average. All six farmers stocked the pastures at one animal unit per acre.

Weed control measures consisted of two of the farmers practicing early annual mowing.

The latter part of 1955, the County Soil Conservation District purchased a Bermudagrass spriging machine and in the spring of 1956, five of the farmers included in this study put in small acreages of common Bermudagrass.

However, due to the drought and grasshopper infestation, at the time this study was made there was not a significant amount of the grass in any of the plots to warrant including it in this study.

TABLE XIV

TAME GRASS PASTURE MANAGEMENT PRACTICES
FOUND ON FARMS REPORTING*

Farmer Number	Kind Grass	When Estab.	Fertilizer Applied	Rate Time	Stocking Rate	Months Grazed	Weed Control
1	Brome	1950			1	4	
2	Brome	1950	16-20-0	150# Fall	1	5	
3	Brome	1953			1	4	
4	Brome Fescue	1953	13-30-0	80# Fall	1	2	
5	Brome Fescue	1952			1	4	Mow
6	Fescue	1954	16-20-0	100# Fall	1	4	Mow

* As no legumes were added to these tame grass pastures, it does not appear in the table.

4. Small Grain Pasture

Grazing small grains is a common practice in this area. All the farmers included in this study have a cash crop of wheat and or other small grains. There is a total of 1,320 acres of small grains which are being used for pasture in this study, with 10 acres being the smallest number per farm, and 149 acres being the largest number of acres pastured. The average number of acres per farm is 60 acres.

Three of the 25 farmers do not use their small grains for winter pasture. They indicated, however, that they would do so if the areas were under fence.

Table XV indicates that most of the small grain pasture is wheat, with very little oats or barley being used. None of the farmers indicated they had any rye.

Wheat is the primary cash crop in this area, with the other small grains being used as feed for livestock.

Most of the oats being raised in this area are of the spring variety. However, those farmers raising winter oats, pasture them.

Eight of the 22 farmers with small grain pasture, plant in September with the remainder of the group planting in October. Seeding rate is from one to two bushels, averaging 1½ bushels per acre.

Seventeen of the farmers use fertilizer. Fifteen of the 17 use 16-20-0 at 90 pounds per acre as an average. One farmer uses 100 pounds of 0-45-0, and one farmer uses 100 pounds of 33-0-0. All fertilizers are applied at seeding time.

Only one farmer indicated any weed control measures. This individual uses certified seed.

All the farmers practice winter and spring grazing, putting cattle in the pastures around the middle of November.

The cattle graze the winter pastures four months, and then they are removed when the plants begin to joint or about the middle of March. None of the farmers indicated that they took any of their small grain pastures out of grain production, stating that all cattle were out of the fields by April 1st.

The stocking rate on the small grain pastures is one acre per animal unit.

TABLE XV

SMALL GRAIN PASTURE MANAGEMENT PRACTICES
FOUND ON FARMS REPORTING

Farmer Number	Kind Seeded	When Planted	Fertilizer Rate	Grazing Time	Months Grazed	Stocking Rate
1	Wheat Oats	Oct.		Winter Spring	4	1
2	Wheat	Sept.		Winter Spring	4	1
3	Wheat Oats	Sept.	16-20-0 90#	Winter Spring	4	1
4	Wheat Oats	Sept.	16-20-0 90#	Winter Spring	4	1
5	Wheat	Oct.	16-20-0 100#	Winter Spring	4	1
6	Wheat	Oct.	16-20-0 80#	Winter Spring	4	1
7	Wheat	Sept.	16-20-0 90#	Winter Spring	4	1
8	Wheat	Oct.	16-20-0 90#	Winter Spring	4	1
9	Wheat Barley	Oct.	0-45-0 100#	Winter Spring	4	1
10	Wheat	Sept.	16-20-0 90#	Winter Spring	4	1
11	Barley	Oct.	16-20-0 90#	Winter Spring	4	1
12	Wheat Oats	Sept.	16-20-0 80#	Winter Spring	4	1
13	Wheat Oats	Oct.	16-20-0 80#	Winter Spring	4	1
14	Wheat	Sept.	33-0-0 100#	Winter Spring	4	1
15	Wheat Barley	Oct.	16-20-0 90#	Winter Spring	4	1
16	Wheat	Oct.		Winter Spring	4	1
17	Wheat	Oct.	16-20-0 90#	Winter Spring	4	1
18	Wheat	Sept.	16-20-0 80#	Winter Spring	4	1
19	Wheat	Oct.		Winter Spring	4	1
20	Wheat	Oct.	16-20-0 90#	Winter Spring	4	1
21	Wheat	Oct.		Winter Spring	4	1
22	Wheat	Oct.	16-20-0 90#	Winter Spring	4	1

5. Legume and Grass Mixtures

Only two farmers indicated any pastures of a legume-grass mixture. One farmer has 20 acres of a mixture of bromegrass and sweetclover. This pasture was established in 1955 at a seeding rate of 12 pounds per acre for the brome, and five pounds per acre for the clover. He did not fertilize the field. Weed control measures include annual mowing. He grazes this pasture for two months in the late spring at a rate of one animal unit per acre.

The other farmer also has 20 acres of a legume-grass mixture, bromegrass and alfalfa. This pasture was established in 1950 at a seeding rate of 10 and five pounds per acre of the bromegrass and alfalfa. This farmer did not fertilize his pasture. He also practices annual mowing and grazes his pasture in late spring. However, this farmer pastures only one month at one animal unit per acre.

6. Other Pastures

Other pastures pertains to those type pastures not previously mentioned in this chapter, and in this case, refers to sudan, lespedeza, and lespedeza-small grain mixtures.

Table XVI shows that eight of the 25 farms have pastures falling into the temporary or supplementary pasture category. Three of these eight farms possess two different kinds of temporary pasture. The size of these pastures range from eight to 60 acres with 21 acres being the average size pasture.

Seven of the 11 pastures are in sudangrass. This constitutes 80 per cent of the total acres in temporary pasture. All of the sudangrass is seeded in May at rates ranging from eight to 20 pounds seed per acre.

Three of the seven sudangrass pastures are fertilized. Two pastures receive 100 pounds of 16-20-0 per acre and one pasture receives 75 pounds of 33-0-0. All the fertilizer is applied at seeding time. None of the sudangrass pastures are mowed.

All of these pastures are grazed during the summer. Grazing begins when plants become 18 to 20 inches tall and continue until frost, which is usually about three months.

One of the seven sudangrass pastures is stocked at a rate of two acres per animal unit. The other pastures are stocked at one animal unit per acre.

Two farmers have temporary pastures of Korean lespedeza, totaling 24 acres. Both pastures were seeded in early spring at 20 pounds of seed per acre and both were fertilized with 16-20-0 at seeding time. They are grazed in the summer for three months at two acres per animal unit. These two farmers practice annual mowing for weed control.

Two farmers have a lespedeza-small grain mixture. One pasture is Korean lespedeza overseeded with 90 pounds of rye in October. One hundred pounds of 16-20-0 fertilizer is also applied at seeding time. This pasture is used for five months in the winter and spring months at one animal unit per acre.

The other mixture is Korean lespedeza and spring oats. The oats are drilled into the lespedeza about the middle of March at 50 pounds per acre. This pasture received no fertilizer. It is spring grazed for three months at one animal unit per acre.

TABLE XVI

TEMPORARY OR SUPPLEMENTARY PASTURE MANAGEMENT PRACTICES
FOUND ON THE FARMS REPORTING

Farmer Number	Acres Pasture	Kind Seeded	When Planted	Rate	Fertilization Rate	Fertilization Time	Weed Control	Grazing Time	Number Months	Stocking Rate
1	10	Lesp.	Feb.	20#	16-20-0 80#	Feb.	Mowed	Summer	3	2
2	20	Sudan	May	13#	16-20-0 100#	May		Summer	3½	1
2	14	Lesp.	Mar.	20#	16-20-0 150#	Mar.	Mowed	Summer	3	2
3	10	Sudan	May	12#	16-20-0 100#	May		Summer	3	1
3	15	Lesp. Rye	Oct.	90#	16-20-0 100#	Oct.		Winter Spring	5	1
4	60	Sudan	May	20#				Summer	3	1
5	16	Sudan	May	8#				Summer	4	2
6	25	Sudan	May	18#	33-0-0 75#	May		Summer	3	1
6	8	Lesp.	Mar.	50#				Spring	2	1
7	35	Cats Sudan	May	10#				Summer	3	1
8	20	Sudan	May	12#				Summer	3	1

I. Farmers Plans for Improving Pastures

Some of the farmers seemed somewhat reluctant to answer these questions. They seemed to think the condition of their pastures was due largely to the drought and that they were powerless to do anything about it. The general consensus was, "When it rains again, we'll have plenty of grass."

The author wishes to partially substantiate this theory. He has observed some of the moderately grazed native grass pastures in this area that did not produce their forage potential through the recent drought years. However, the author was not aware of any substantial decrease in cattle numbers by the above mentioned farmers through the recent drought years. However, the author was not aware of any substantial decrease in cattle numbers by the above mentioned farmers through the drought years either. The stocking rate appears to remain the same, whether climatic conditions are conducive to forage production or not.

Thirty per cent of the farmers indicated they planned to improve their native pastures by controlling brush and weeds through mowing. However, one farmer indicated he planned to improve his native grass through annual resting. One farmer also stated he plans to switch from a continuous to a rotation grazing program.

Of the seven farmers with timberland pasture, one farmer with 230 acres has a long range program planned to combat the blackjack and postoak through spraying and bulldozing.

Only six farmers have tamegrass pastures, and none of the other farmers indicated they planned any of this type pasture in the future.

Of the six farmers having tamegrass pasture, three farmers stated they plan to try to establish Bermudagrass again. As was mentioned previously in this chapter, five of the farmers surveyed tried Bermudagrass, but it failed due to the drought and grasshopper infestation. Two farmers indicated they planned to add legumes to their tamegrass pastures next year.

Of the 22 farmers pasturing small grains, none indicated any improvement practices planned for the future. The three farmers not using their small grains for winter pasture stated they hoped to use them in the future with the aid of an electric fence.

Only two farmers had a legume-grass mixture. Future plans are to reseed, as well as fertilize these pastures. One farmer indicated he would have had a pasture of this type before now had it not been for insufficient moisture and grasshopper infestation.

Temporary or supplementary pastures, which included eight farmers with either sudan, lespedeza, or a lespedeza-small grain combination stated they have had these pasture programs for some time and plan to keep them in production. One farmer indicated he would not be without his sudangrass pasture, which has served him well as supplemental pasture through the recent drought years.

None of the other farmers indicated they anticipated using supplemental pastures in their pasture programs as it would involve taking other cultivated crops out of production.

J. General

In reexamining Table IX, the author found that only one of the 25 farmers had native pasture that was not classified lower than good. The other 24 farmers possess pastures in the fair or poor range condition

category. In the opinion of the author, this would seem to indicate that these 24 farmers have over-stocked their own pastures in recent years or have rented pastures in a depleted condition.

Table IX also shows that the pastures classified in poor range condition had the highest stocking rate, on the average. The largest number of acres per animal unit is 12. Only one of the 13 farmers with pastures classified as poor allowed this many acres per animal unit. The average is about 5.5 acres per head.

All other types of supplemental pasture have not been sufficient to improve the condition of the native grass acres on the above mentioned farms. It appears that the farmers with insufficient pasture must improve the pasture acres they now have, provide more supplemental pasture, or reduce their livestock numbers.

Livestock are kept on pasture 12 months of the year in this area. Very few operators sell fat cattle, as this is primarily a feeder steer. section of the country, as is the majority of the Flint Hills. Therefore, if operators are to remain in business, sufficient pasture must be provided throughout the year. Careful planning and a flexible program will provide yearlong grazing for the farmers of this area, as will be brought out in Chapter IV.

It can definitely be said that pastures in this area have been overgrazed as Table X clearly indicates. Of the 9,762 acres of native pasture included in this study, 7,182 acres are classified either fair or poor.

In using tame and temporary pastures, most of the farmers of this area have done a good job of making fertilizer tests and applying the kind and amount recommended. It appears that proper precautions and

care are taken in farming the cultivated crops, but the native grass is overlooked and abused.

All the farmers included in this study indicated they were interested in pasture management. It is the intent of the author to teach some of the results and findings of this study to the evening adult farmer class and the all-day boys of Cedar Vale High School during the present school year.

CHAPTER IV

MAJOR PROBLEMS IN PASTURE MANAGEMENT IN THE CEDAR VALE COMMUNITY

In analysing Chapter III, the author found several major problems in pasture management confronting the farmers and ranchers in the Cedar Vale service area.

Some of these problems are listed below, with reference material cited by the author to help correct these problems or conditions.

1. Depleted condition of native grass pastures due to the size of the farm operation, grazing practice, and/or stocking rate presently being used.

1A. The author has listed size of farm operation as a factor contributing to the depleted condition of native pastures. Table X shows that farmers with 640 acres or less had abused their native grass pastures, as none were classified better than "fair".

Dr. Harlan defines "fair" range condition as pastures having only 25 to 50 per cent of the climax vegetation intact. Climax being the type of vegetation a given area will support under certain soil and climatic conditions, in the absence of the disturbing influences caused by man or animals.[10]

The size of the farm or ranch then, should be a determining factor on the number of animal units it will profitably accomodate.

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[10] Jack R. Harlan, Theory and Dynamics of Grassland Agriculture, D. Van Nostrand Company, Inc., Toronto, New York, London, 1956, pp. 22, 195.

As was brought out in Table XI, of the pastures being grazed continuously (year long), none were classified better than "fair". Several times in recent years, supplemental forage was hauled to many of these pastures in order to carry the cattle through the winter months due to insufficient forage in the pastures.

The remaining 15 farms were using various rotation grazing plans. Some considered grazing only in the summer, grass growing months, and then resting the pastures, as a satisfactory plan. Others, who possessed the good and excellent ranges, rotated their pastures within the growing season.

The author has observed native grass ranges in Osage County, Oklahoma, that have been improved by resting in the summer growing months and grazing through the dormant, winter months giving the native ranges a summer resting period every four or five years.

The stocking rates found on the farms studied vary from three to 12 acres per head, as is indicated in Table XII of this report.

The Kansas Range Technician's Guide was studied by the author, pertaining to proper year long stocking rates for various range conditions classes and the following generalities were noted. The stocking rate for "excellent" range condition is about eight acres per animal unit, about 10 to 11 acres per animal unit for "good", 15 to 17 acres per animal unit for "fair", and 25 to 30 acres per animal unit for ranges classified as being in the "poor" range condition.[11]

Comparing this information with that of Table XII, it appears that very few pastures are presently stocked at the proper rate.

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[11]Kansas Soil Conservation Service, Technician's Guide to Range Sites and Condition Classes in the 35 to 39 inch Rainfall Belt, p. 2.

2. Recognizing change in pasture condition by observing the various indicator plant species.

2A. Dr. Harlan makes the following state ment in his book, Theory and Dynamics of Grassland Agriculture,

> It is not necessary that the livestock owner be familiar with the entire ecological picture in detail; but, if he is to do a good job of managing a range, he should be aware of the general ecological trends of his area and be familiar with a few indicator species that he can use to gauge the direction of range plant succession. By an awareness of the problem and by careful observation year by year of the "increasers" and "decreasers" of the range plant population, he can adjust his livestock numbers and control their distribution to give a near approximation to the ideal of maximum sustained production without abuse of range resources.

Dr. Harlan defines decreasers, increasers, and invaders as follows:

> To determine the degree of degradation from pure climax, certain key species are used. Some are members of the climax that decrease in frequency under grazing and are called "decreasers"; some are members of the climax that increase under certain degrees of use and are called "increasers"; and some are not members of the true climax, but come into the area under certain degrees of use and are called "invaders". The key species, of course, vary from region to region and from site to site in a region.[12]

Page one of the Kansas Range Technician's Guide offers information of key plant species and their response to grazing as judged from climax.[13]

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[12]Jack R. Harlan, Theory and Dynamics of Grassland Agriculture, D. Van Nostrand Company, Inc., Toronto, New York, London, 1956, pp. 195, 218.

[13]Kansas Soil Conservation Service, Technician's Guide to Range Sites and Condition Classes in the 35 to 39 inch Rainfall Belt, p. 1.

3. Recognizing the value of tame grass pastures in the year-round pasture program.

3A. As has been mentioned previously in this chapter, farms of 640 acres or less had no native pastures classified better than "fair". the author also noted that only six of the 24 farms studied were utilizing any tame grass pasture, for a total of only 60 acres. These smaller sized farms are not taking advantage of the use of tame grass pastures in their year-round pasture program. Depleted native pastures could be improved if relieved of the grazing pressure temporarily. Reseeding might also be done where needed.

Many of the farms not using tame grass pasture at the present, could do so by retiring some of their marginal cropland and putting them to tame grasses and/or legume mixtures, thereby increasing total production from the fields and providing needed forage for their animal enterprise.

4. Recognizing the value of temporary or supplementary pasture in the year-round pasture program.

4A. With the exception of wheat pasture, only eight farmers have any temporary or supplementary pastures. As Table XVI indicates, seven of the eight farmers are using sudangrass. Several of the farmers, with limited native pasture who are not utilizing some type of temporary pasture, should do so for increased forage production.

Dr. Harlan says,

> Temporary pastures are designed to occupy the ground for only one year, or sometimes for only a few months. They have many uses, as special purpose pastures to supply forage over a critical period when other pastures are not adequate, as a one-year or one-season stage in a cash-crop rotation system

to maintain soil fertility, as an aid in cleaning up weed or restoring soil structure, and for other purposes.[14]

Stoddart and Smith, in their book, Range Management, describe temporary pasture as follows:

> Much can be done to increase feed for livestock during emergency periods and early spring by planting of such crops as sudan grass, winter rye, and oats. These annuals give heavy yields, are well liked by livestock, are easily grown, and produce usable forage within a few weeks of planting. The great advantage of such crops is their flexibility. They can be produced as the need is foreseen and can be omitted during years of good range production. Although perennial grasses are generally more satisfactory than these annuals, the annual grasses often are planted on range land, especially for the purpose of supplying abundant forage while another area is being retired from grazing to allow perennial grass seedings to volunteer readily and, even though closely grazed, may persist for many years without reseeding. Their grazing capacity generally is very high.[15]

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[14]Jack R. Harlan, Theory and Dynamics of Grassland Agriculture, D. Van Nostrand Company, Inc., Toronto, New York, London, 1956,, p. 242.

[15]Lawrence A. Stoddart and Arthur D. Smith, Range Management, McGraw-Hill Book Co., New York and London, 1943, p. 266.

CHAPTER V

A BRIEF SUMMARY OF SUBJECT MATTER FOR PASTURE MANAGEMENT THAT MAY BE TAUGHT TO STUDENTS ON FARMS OF THE CEDAR VALE COMMUNITY

1. Introduction of Subject.[16, 17]

Footnote numbers are shown on subheadings instead of on the actual quotes in this chapter due to the many references used, often from the same publication.

The following are introductory statements or facts that would ordinarily be used as motivating factors when bringing a new subject or lesson to a class.

A. Pastures may provide one-third of the subsistence of cows at only one-seventh the total feed cost in producing market milk.

B. An earlier study conducted in the corn belt indicated that digestible nutrients in pasture may be produced for 48 cents per 100 pounds, while corn silage or alfalfa hay are produced at $1.22 per 100 pounds on similar land.

C. Corn yielding 20 bushels per acre produced digestible nutrients at a cost of 64 cents per 100 pounds and alfalfa, yielding 2.5 tons per acre, produced digestible

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[16] A. E. Aldous, Management of Kansas Permanent Pastures, Agri. Expt. Sta. Bull. 272.

[17] Agronomy Hand Book, U.S.D.A., Soil Conservation Service, Oklahoma.

nutrients at a cost of 25 cents per 100 pounds and a tame grass pasture yielding two tons of forage per acre over a four year period produced digestible nutrients at a cost of ten cents per 100 pounds.

D. Cost of pasture is low because it is harvested by the livestock.

E. Beef cattle in the United States obtain about 60 per cent of their total feed from pasture.

F. Where grass is treated as a cash crop, it takes its place in a conservation cropping system, contributing to cash income, while protecting and improving the soil. A good grass crop with its supply of active organic material improves the soil structure, thereby increasing soil productivity.

2. Identification of Some of the Major Indicator Plant Species.[18, 19, 20, 21]

Before the student of range management becomes proficient in determining range condition, he must first learn to identify some of the indicator range plants. He must learn to recognize those plants in the climax that decrease in number under various degrees of use; to recognize those plants that are classified as increasers and to be able to determine when and how they too will decrease if subjected to continued

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[18] Agronomy Hand Book, U.S.D.A., Soil Conservation Service, Oklahoma.
[19] Phillips Petroleum Company, Pasture and Range Plants, Series 1, 2, 3.
[20] H. I. Featherly, Manual of the Grasses of Oklahoma, OSU.
[21] University of Illinois, Weeds of the North Central States, Agricultural Experiment Station Cir. 718.

misuse through improper grazing. He must also be able to determine fair or poor range condition by observing the percentage of climax and invader plants present on a given site.

Range sites and condition classes will be discussed later in this chapter. In the opinion of the author, the above mentioned topics, range condition and range sites, can be better understood after the student has a knowledge of some of the more common indicator plants.

The following plants are grouped into three categories: decreasers, increasers, and invaders, as they appear in the Kansas Range Technician's Guide for the 35 to 39 inch Rainfall Belt.[22]

Decreasers:

A. Big Bluestem (Andropogon gerardi)

A native, warm-season, perennial, tall grass with short scaly underground stems and roots that saturate the top two feet of soil and may reach depths up to 12 feet. It begins growth in early April and seed stalks three to eight feet tall appear from late August to October. The grass is sometimes called "Turkey foot" bluestem because the seed head usually branches into three parts, resembling a turkey's foot. The young shoots are somewhat flattened at the base and the lower leaves are usually covered with silky hairs. Big Bluestem grows in large clumps and is extremely leafy. The lower leaves of this native grass curl when dry, pulling off easily at the base. Mature plants have a reddish cast after frost.

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[22]Kansas Soil Conservation Service, Technician's Guide to Range Sites and Condition Classes in the 35 to 39 inch Rainfall Belt.

B. Indiangrass (Sorghastrum nutans)

A native, perennial, warm-season tall grass which reproduces from seed and short, scaly, underground stems. The beautiful golden plume-like seed heads are on stems from four to eight feet tall. It is easily identified by the claw-like ligule where the blade attaches to the sheath. This grass is found growing throughout the bluestem belt of the United States and is one of the important tall grasses.

C. Switchgrass (Panicum virgatum)

A native, perennial, warm-season, sod-forming tall grass with vigorous roots, which reproduces from underground stems and seed. It can be identified by a small nest of hair where the blade attaches to the sheath. Switchgrass has rather large seed with a sprangled-type seed head on stalks three to six feet tall.

D. Prairie Cordgrass (Spartina pectinata)

A native, warm-season, tall, coarse, perennial grass that forms a dense underground sod. It spreads by heavy, woody, much-branched, creeping rhizomes, and by seed that is produced on stalks six to 10 feet tall. The blades are 12 to 30 inches long, one-fourth to five-eighths inch wide, flat when fresh, but rolled up when dry. These coarse blades are rather tough and have short points or teeth on the margins, which explains the sometimes used name "ripgut". It has also been called "marshgrass" and "sloughgrass" because it grows on deep, heavy, wet lowlands throughout North America. This grass is eaten by livestock in its early growth stages, but is used principally for hay.

E. Gamagrass (Tripsacum dactyloides)

A native, warm-season, perennial, tall grass that grows in large clumps fron one to four feet in diameter. It spreads by thick, one-half to one inch knotty, short jointed rhizomes and produces seed from July to September on stems three to nine feet tall. The blades are 18 to 24 inches long, smooth and one-half to one and one-half inches wide. Seed heads consist of one to three spikes with the female (pistillate) part below and the male (Staminate) part above. The spikes are six to 10 inches long and the seed are sunken in the joints of the lower one-fourth of the spike. When mature, the seed bearing parts break at the joints with each part containing one seed. Eastern gamagrass is palatable, nutritious and readily eaten by all classes of livestock. Cattle, particularly, like this grass and it has been killed out by close grazing on most ranges.

F. Little Bluestem (Andropogon scoparius)

A native, warm-season, perennial mid-grass with a dense root system that may reach five to eight feet in depth. This bunch grass spreads by seed, tillers and short underground root-stocks. Growth begins in early April with seed stalks from two to five feet tall appearing from late August to October. Little Bluestem can be identified by its flat, bluish colored basal shoots and its leaf blades which tend to fold. Mature plants have a reddish cast after frost. It is one of the most widely distributed perennial grasses in America and grows well on deep, shallow, sandy, fine-textured, and rocky soil.

At one time Little Bluestem was the most abundant grass in the midlands of America and is still the most important grass in the Flint Hills of Kansas and in eastern Oklahoma.

G. Prairie Dropseed (Sporobolus heterolepis)

This grass has stems three to 10 dm. tall, erect tufted; sheaths longer than the internodes; blades mostly basal, slender, erect, 2.5 dm. long or less; panicle 1 to 2.5 dm. long, branches erect or ascending; spikelets 5 to 6 mm. long; glumes unequal, first half as long as second, which is usually awn pointed; lemma shorter than second glume. This species is found on dry or moderately moist soil. It is not abundant enough to be of any economic importance.

H. Porcupine Grass (Stipa spartea)

Stems about 1 m. tall, simple, tufted; sheaths longer than the internodes; ligule conspicuous, hyaline; blades 2 to 3 dm. long, 3 to 5 mm. wide, flat, involute when dry; panicle slender, nodding, branches few, spikelets few; glumes 3 to 4 cm. long, papery; lemma subcylindric 1.6 to 2.5 cm. long, pubescent below; crown ciliate; awn 19 to 20 cm. long, twisted twice geniculate. A good forage or hay crop when young. At maturity quite coarse and sharp-pointed fruits often do injury to eyes, ears, nose, and mouth of grazing animals. Also called "needlegrass".

I. Canada Wildrye (Elymus canadensis)

A native, cool season, perennial, bunch grass which reproduces by tillering and seed. It reaches a height of two to four feet, and can be identified vegetatively by the spear-

like appearance of the blades. After seed heads appear they curve downward which accounts for another of its common names, "nodding wildrye". It is best adapted to medium textured soils, but grows on most all types of prairie soils.

J. Virginia Wildrye (Elymus virginicus)

A native, cool-season, perennial bunch grass which reproduces by tillering and seed. It reaches a height of two to three feet, differing from Canada Wildrye in being shorter, with seed heads that remain straight and upright after maturity, and much shorter awns. This winter-hardy native grass will grow in more dense shade and seems to prefer a heavier and more fertile soil than Canada Wildrye. However, it requires more moisture than Canada Wildrye and, thus, is usually found in moist lowland areas.

K. Compassplant (Silphium laciniatum)

A native, warm-season, deep-rooted, perennial forb. It grows three to seven feet in height and can be readily identifed by the large wide oak-like vertical leaves which point north or south with the leaf surface facing the morning or afternoon sun. Compassplant has golden yellow flowers which resemble the blooms of the annual sunflower except they are smaller with several flowers appearing on each stem. This forb extends upright like a sunflower with extremely large leaves on the lower one-third of the plant. It is readily eaten by livestock when young and tender. When in bloom, the compass-plant forms a gummy material which appears along the upper one-third of the main stem; the Indians used this material as a chewing gum.

L. Leadplant (Amorpha canescens)

A deep-rooted, warm-season, perennial shrubby legume which reproduces from seed. It reaches a height of two to four feet and if allowed to grow undisturbed, some of the stems may reach one-half inch in diameter. Leadplant has dark purple flowers that are small with a single petal, these single petals, however, are so numerous up and down the seed stem they appear as a cluster. The grey, leadlike appearance of the leaves of this native legume account for its common name.

There are, of course, several additional perennial legumes and sunflowers too numerous to mention in this report.

Increasers:

A. Sideoats grama (Bouteloua curtipendula)

A native, warm-season, perennial, mid-grass with short scaly underground stems. Seed stalks appear from July to September and are 18 to 36 inches tall. The small oatlike seeds hang down uniformly on one side of the seed stem as indicated by the name "sideoats". Leaf blades are flat with hairs and bumps along the edges. When dry, the lower leaves of this grass are usually curled and whitish in color.

B. Tall Dropseed (Sporobolus asper)

A native, warm-season, perennial, bunch grass which grows to a height of two to four feet. It is a drought resistant grass and is common throughout the prairies although it generally forms only a small part of the total vegetative cover.

Tall Dropseed produces seed heads three to ten inches long in the fall. The stems and long leaves of this grass bleach white in the winter. The upper leaf blades are short, the basal blades are very long, tapering to a rolled tip and somewhat hairy along the base. Leaf sheaths are usually hairy at the throat and shorter than the internodes. Spikelets are one-flowered. This grass is sometimes known as "flag-grass" because the top leaves open up and wave in the wind. This is most noticeable in the fall on cutover native meadows and on low conditioned ranges. West of the Bluestem Belt, in the short and mid-grass regions, Tall Dropseed is considered a decreaser and soon disappears under heavy use.

C. Fall Witchgrass (Leptoloma cognatum)

Stems tufted 2 to 7 dm. tall, slender, branched; sheaths usually loose, the lower ones pubescent; blades 12 cm. long or less and 3 to 5 mm. wide; panicle diffuse, broader than long at maturity, included at the base before maturity, bearded in the axils; spikelets solitary, lanceolate, about 3mm. long, borne on long slender pedicels; first glume minute, the second as long as the spikelet; the second glume and sterile lemma enclosing the fertile floret. This plant is found on dry soils. It is palatable, but not abundant enough to be of any importance.

D. Purple Lovegrass (Eragrostis spectabilis)

Stems tufted, 3 to 6 dm. tall, firm, simple and smooth; sheath overlapping, the upper one often including the base of the panicle; blades rigid flat or involute, smooth below, often hairy above; panicle diffuse, compound, often purple, 2 to 3 dm.

long; bearded in the axils; spikelets linear, five to 12 flowered, 4 to 8 mm. long; glumes one-nerve, scabrous on the keels; lemmas 1.5 to 2 mm. long, lateral nerves prominent; palea ciliate on the nerves. This species is found on dry soil. It is of but little economic importance.

E. Scribner Panicum (Panicum scribnerianum)

A native, cool-season perennial grass that forms small bunches one to five inches in diameter. During the fall and winter months, the small wide, new leaves form a beautiful rosette like cluster on the soil surface. This leaf cluster is pushed upward on seed stems which are from eight to 15 inches high. Leaf blades are nearly as wide as they are long and are spear-shaped. Fine, short hairs are prominent on the underside of the leaves and the leaf sheaths are covered with short stiff hairs which grow from minute bumps or papilla. Beginning growth in early fall, this grass remains green all winter and produces seed in June. This grass never contributed a large quantity of forage, but furnishes grazing in the late fall, winter and early spring when green feed is needed. Normally, this native grass grows between the bunches of taller grasses and develops best where other vegetation is not dense.

F. Blue grama (Boutelous gracilis)

A native, perennial, warm-season, short grass with narrow leaves three to six inches long that form a curly mass of bunchy sod. Seed stalks vary from 10 to 20 inches high. It is often mistaken for buffalograss and hairy grama. Blue grama grows erect in definite bunches and reproduces only by

seed. As the seed heads mature, they usually bend into a curve resembling a humaneyebrow. Blue grama will stand extreme drought, reviving and making rapid growth when favorable conditions return. Like Buffalograss, its weak point is its low forage productivity.

G. Hairy Grama (Bouteloua hirsuta)

A native, perennial, warm-season, short grass that grows from 10 to 18 inches in height. It grows erect with narrow leaves that are hairy on the edges and upper surface. The sheaths are hairy and the seed head has a spikelike spur on the outer end. It is found throughout the Great Plains growing on sandy, rocky soils, sometimes too shallow or thin for better grasses.

H. Buffalograss (Buchloe dactyloides)

A native, perennial, warm-season, sod-forming short grass that reproduces by seed and vigorous surface runners which root at the joints. The plants are seldom more than five inches tall and the leaves grow so near the ground that much of the plant remains even under close-grazing. There are usually both male and female plants in evidence. Seed is produced in small hard burs, usually close to the ground, but burs may be borne on elongated seed stems one to three inches above the base of the plant. Each bur contains one to four seeds. This grass is usually found growing with Blue grama in the lower rainfall part of the Great Plains and in continually over-grazed areas of the tall grass country.

I. Western Wheatgrass (Agropyron smithii)

A native, cool-season, perennial, sod-forming grass which

reproduces from underground stems and seed. It starts growth in early fall, remaining green during winter and makes its maximum growth in the spring. This grass reaches a height of one to three feet and because of its bluish-colored stems and leaves, it is often called "Bluestem Wheatgrass". The blades have very prominent, raised, harsh veins on the upper surface which feel rough when pulled through the fingers. Spikelets are six to 10 flowered, and rather stiff. This grass does best on low areas of heavy soils where runoff water accumulates and is often found in old lake beds.

J. Heath Aster (Aster ericoidas) (Aster multiflorus)

A native, warm-season, deep-rooted perennial forb that reproduces from much branched vigorous rhizomes and seed. This perennial makes rapid growth and the stems stand well above the grasses in May. The larger bush-like climps are 12 to 18 inches across and grow to two feet in height, when mature. Heath Aster may occur as single stems or in clusters where the plants are connected by tought, woody rhizomes eight to 12 inches long. Heath Aster sometimes called "Many-flowered Aster" adds considerable beauty to the ranges from August to September with its mass of tiny white or purplish-white blossoms. This deep-rooted forb is palatable and nutritious during early growth; however, it is rarely eaten by livestock when mature. It is most commonly found in the mid and tall grass regions, and seems to prefer the heavier, tighter sites.

K. Hop Sedge, Sloughgrass (Carex lupulina)

A perennial, reproducing by seeds and rootstocks. Root system

is shallow and fibrous. Stems smooth, two to two and one-half feet tall, three-sided, filled with pith, with few nodes and internodes, ending in a spike. The plant grows in dense mats. Leaves three-ranked, without hairs, but harsh, mostly basal with long blades and short sheaths. The relatively few stem leaves have long, narrow, V-shaped blades, pronounced midribs, closed sheaths, no auricles, and much reduced ligules. Spikes are one to three inches long, bearing male and female flowers on the same plant with the male flowers uppermost on the inflorescence. Blooms in July and August. Found in swamps, ditches, and other poorly drained areas.

L. Goldenrod (Solidago nemoralis)

A perennial, reproducing by seeds and rootstocks. Stems six to 30 inches tall, hairy, grayish. Leaves on lower part of plant petioles and tongue-shaped; upper leaves smaller, oblong, grayish-hairy. Flower heads small, cylindrical in a slender, curving, one--sided cluster, two to eight inches long. Found in recently abandoned fields, fence rows, and open woods especially on dry sites.

Several other plants of the woody type fall in the increaser category.

Invaders:

All annual plants should be listed in the invader category.

A. Tumblegrass (Schedonnardus paniculatus)

A native shallow-rooted, warm-season, short bunch grass with leaves crowded at the base. It spreads by seed produced from

July to September on seed stems eight to 20 inches tall. These seed heads turn downward when mature, then break off and roll with the wind like a tumbleweed. The blades are one to two inches long, 1/16 to 1/8 inch wide, flat, stiff, wavy, and spirally twisted when dry. The loose, flattened sheaths are crowded at the base. This grass usually produces several seed heads which represent more than half the height of the entire plant. Tumblegrass spikelets are one-flowered, stiff and alternate on opposite sides of the slender seed branches. This grass is sometimes called "ticklegrass".

B. Windmillgrass (Chloris verticillata)

This grass is also called tumble windmillgrass, fingergrass, and ticklegrass. It is a native, warm-season perennial short bunchgrass. It spreads by seed and by rooting at the lower nodes. The stems grow out and up four to 12 inches from the base leaving the center of the crown somewhat open and flat. A heavy mass of short, folded and abruptly pointed blades are crowded at the base of the plant. The sheaths are shorter than the internodes, loose and flattened. Each plant may produce several seed heads. The seed heads break away at maturity and are blown by the wind in tumbleweed fashion.

C. Little Barley (Hordeum pusillum)

A native, cool-season, tufted, annual grass which reproduces by seed. Stems are slender, four to 12 inches tall, erect, bent slightly at each node, and grow in a close bunch or tuft. This annual has a shallow, refined fibrous root system that feeds mostly in the top six inches of soil. Leaf blades are

one to three inches long, flat, somewhat rough on the upper surface and extend stiffly outward from the stem. Seed heads are one to three inches long, appear in May and June. The heads are dense, stiff and appear rather bristly. Spikelets are in groups of three at each node on the seed head and awns are attached. These spikelets will break off when mature and stick to clothing and to the fleece of sheep. Other members of the Hordeum group have spikelets that will lacerate the mouths of livestock. Being an annual, it is especially noticeable along roadsides, in waste areas, and abandoned fields.

D. Sand Paspalum (Paspalum stramineum)

Stems two to 8 dm. tall, erect, slender, glabrous; lower sheaths densely pubescent, overlapping, the uppersheaths pubescent or glabrous; blades 1 to 2 dm. long, ciliate on margins, pubescent above and usually below; racemes one to three, usually two on main stem and one on the branches; spikelets in pairs, orbicular, about 2 mm. in diameter. This species found on sandy soils. Furnishes some grazing.

E. Silver Bluestem (Andropogon saccharoides)

A native, warm-season perennial bunch grass which grows to a height of two to four feet. It forms a loose bunch with stems growing outward and then up from the crown. This grass reproduces by rooting at nodes of low stems and from seed. Silver Bluestem is easily identified by its slender, silver-colored seed heads; by its main stems which are somewhat crooked and often by a ring of stiff hair at the nodes. The plume-like

seed heads of this native grass are from one to three inches long and seed is borne in tufts of fine silky hair. Silver Bluestem is most noticeable on the rocky slopes of limestone and heavy soil areas. It moves in fast on disturbed areas, abandoned fields and is found on roadside banks and gullies. This native grass is stemmy, produces a small quantity of leafy forage and by choice is grazed only in its early stage of growth. It is considered an invader in the true prairie bluestem country, and as an increaser on the mixed prairie grama buffalograss ranges.

F. Broomsedge Bluestem (Andropogon virginicus)

A native, warm-season, mid-tall bunchgrass that reproduces by seed and the old bunches increase in size by tillering. It has a coarse, shallow feeding root system and can be pulled up by hand on most sites. The main stems are from two to four feet tall, in bunches, and branch freely toward the upper part. The blades are flat or folded, 10 to 15 inches long, 1/8 to 1/4 inch wide, with scattered longhairs at the base on the upper side. Leaf sheaths are shorter than the internodes, somewhat flattened at the base and usually have hairs along the lower margins. This grass produces seed at the upper nodes. The downy, fuzzy flowering parts are partially enclosed in the sheath and from a distance appear silvery. It is a poor range plant and a common invader on abused native ranges. This coarse plant, with a characteristic straw-yellow color, is not relished by livestock. Some green shoots are eaten in early spring, but it is usually

grazed only if desirable, palatable grasses are not present. This is one of the first perennials to move into old sandy fields and if not disturbed may form a solid, pure stand that resembles some of the better bluestem grasses.

G. Western Ragweed (Ambrosia psilostachya)

A native, warm-season, perennial forb which reproduces by seed and long slender rootstocks. The erect stems, one to two feet tall, branch into a bushy growth and are covered with dense, minute hairs. Most of the leaves are rough surfaced, alternate or opposite and deeply lobed; divided into several irregular parts. Two kinds of small green flowers are formed from June to October; male (staminate) and female (pistillate). The male or nodding flowers are borne in clusters on the upper part of the flowering stalks. The female flowers appear inconspicuously near the base of the flowering stalks in the axils of the upper leaves. The dark colored seed, about 1/8 inch long, are characterised by their woody hull with a pointed tip surrounded by short spines. Under good growing conditions, this weedy pest spreads rapidly by its long underground stems. The stems, two to four inches below the surface, produce new plants and it is not uncommon to find six or more shoots originating from one underground stem. This plant is not palatable, but is eaten only when nothing else is available in early spring or late summer.

H. Baldwin Ironweed (Veronia baldwini)

A native perennial, warm-season forb that reproduces by seed and heavy, tough, underground stems or rootstocks. The stiff woody stems are covered with short dense hairs, erect, the upper portion branched, and are two to five feet tall. These stems usually grow several together, from a heavy rootstock which gives off a mass of coarse fibrous roots that penetrate deeply into the soil. Leaves are one to two inches wide, four-eight long, densely hairy on lower surface, lance shaped, distinctly toothed and alternate. Sometimes the upper leaves are opposite and are attached to the main stem by a very short leaf stem. The beautiful reddish purple seed heads are 13 to 34 flowered and form a dense mass of striking color. These seed heads are rather uniform in shape and the small individual flowers are enclosed by tiny leafy bracts whose smooth tips usually curl outward when mature. Ironweed is so named because of its toughness and is a troublesome invader on abused native grasslands and a mean pest on tame pastures. Mowing in June or spraying with chemical sprays in June, plus a vigorous stand of grass gives best results for control on tame pastures. The best control on native pastures is a thick vigorous stand of the better grasses.

I. Curlycup Gumweed (Grindelia squarrosa)

A native, warm-season, short-lived perennial (sometimes biennial) forb that reproduces by seed and by offshoots from short vertical rootstocks. Stems are erect, rough, one to

three feet tall, branching near the top, stiff, somewhat sticky and grows from a rather deep, fibrous root system. The tooth-edged leaves are oblong, thick, coarse, alternate and "fold around" or clasp the stem. Flower heads are about one inch in diameter and composed of many single florets. The rays of outer flowers of the head are yellow; the dish or inner flowers are darker in color. The flower head is surrounded by small pointed bracts that curl outward and give off a sticky substance - thus the names "curlycup" and "gumweed". These flowers appear from June to September and are borne mostly on the upper branches. This tough weedy forb is a common invader of native ranges and a tough pest when it occurs in tame pastures.

The author wishes to state that it is presumed readers of this report are aware that it is a near impossibility to learn plant identification without the aid of actual plant specimens and they, of course, are not included here for obvious reasons. It should be brought out, however, that the author has plant specimens available which will be used in this phase of pasture management instruction for all day-boys and adult farmers.

3. Determining Range Sites[23, 24]

The student of range management must, after learning to identify some of the more common indicator range plants, learn that different range sites accomodate different plant communities.

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[23] Range Handbook, Series I, U.S.D.A., S.C.S., Western Gulf Region pp. 3, 4.

[24] Kansas Soil Conservation Service, Technician's Guide to Range Sites and Condition Classes in 35-39 inch Rainfall Belt, pp. 1, 2.

Distinct variations in range land sites are usually due to abrupt changes in water relationships, soil and topography. These changes may alter both the kind and productivity of range forage that is original to the site.

Six major flint hills range sites are listed below.

A. Low Land Site - Has no more than 2% slope, with either deep clay, medium or sandy textured soils.

B. Ordinary Upland Site - Has 15% to 30% slope, with deep, medium to sandy textured, permeable soils that have 10 inches or more of loamy soil material present.

C. Limestone Break Site - Has 30 to 40% slope, rocky or bluff like areas.

D. Clay Upland Site - Nearly level sites with gradual change to massive clay at 18 to 24 inches.

E. Clay Pan Site - seldom more than 2% slope with a thin surface four to eight inches thick, with gray A2 layer and abrupt change in massive clay.

F. Very Shallow Site - Six to eight per cent slope with 0 to four inches of soil over solid rock.

4. Determining Condition Classes[25]

A. In determining range condition, one must classify native pastures or ranges into four possible categories. This may be accomplished in several different ways. The author has chosen the method used by the Soil Conservation Service of the United States Department of Agriculture.

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[25]Jack R. Harlan, Theory and Dynamics of Grassland Agriculture, D. Van Nostrand Co., Inc., New York, 1956, pp. 194, 195.

B. Native ranges are classified into four classes.

a. Excellent - 75 to 100 per cent of the climax vegetation intact.

b. Good - 50 to 75 per cent of the climax vegetation intact.

c. Fair - 25 to 50 per cent of the climax vegetation intact.

d. Poor - less than 25 per cent of the climax vegetation intact.

C. Climax is the type vegetation a given area or site will support under certain soil and climatic conditions and in the absence of the disturbing influences of man and animals.

D. To get an adequate concept of climax, one should give careful botanical study to relic areas found on the various range sites. These areas are usually hard to find. Fence corners, cemeteries, old homesteads and other undisturbed areas can be of great value.

E. Ranges in "excellent" condition have 75 per cent or more of climax frequency of "decreasers" and no more than a corresponding increase of "increasers". In a "good" pasture, the decreasers are found at a frequency at least half of that in the climax, etc.

5. Determining Proper Stocking Rates[26]

A. Reproduced below is Part II of the Kansas S.C.S. Range Technician's Guide to Range Sites and Condition Classes for use in determining proper stocking rates on a given area.

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[26]Kansas Soil Conservation Service, Technician's Guide to Range Sites and Condition Classes in 35-39 inch Rainfall Belt, pp. 2, 3.

B. The suggested stocking rates are based on precipitation belt, range site, and range condition in percentage. The per cent value columns correspond to the range condition classes - excellent, good, fair, and poor. For Ordinary Upland use values in line with normal precipitation belt. For Low Land use values for belt higher than normal. For Limestone Breaks and Clay Upland use values one belt lower than normal. For Claypan and Very Shallow use values two belts lower than normal.

TABLE XVII

GUIDE TO RANGE SITES AND CONDITION CLASSES

Ave. Annual Precipitation	Range Condition Percentage			
	100	75	50	25
(Inches)	(Animal Unit Months Per Acre)			
40 - 44	1.6	1.2	.8	.4
35 - 39	1.4	1.05	.7	.35
30 - 34	1.2	.9	.6	.3
25 - 29	1.0	.75	.5	.25
20 - 24	.8	.6	.4	.2

C. The proper stocking rate is found by multiplying the animal unit months per acre by the number of acres, divided by 12 months, equals the stocking rate for 12 months. The stocking rate for 12 months divided into the total acres equals the number of acres per animal unit.

D. Example Problems

a. Problem - A native pasture containing 160 acres has been classified as being an ordinary upland site in good range

condition. What should be its recommended carrying capacity and/or stocking rate for the next year?

Answer - (Cedar Vale, Kansas, is located in the 35 to 39 inch precipitation belt) Animal unit months per acre for Ordinary Upland in "Good" range condition is 1.05. Multiply this figure times 160, (the number of acres involved), equals 168, divided by 12 months equals 14.0, the recommended carrying capacity or number of animal units to be maintained on the area for 12 months without overstocking the pasture.

b. Problem - A native pasture containing 1,000 acres has the following range sites and condition classes with the approximate number of acres for each site.

1. Ordinary Upland site in "Good" range condition, 600 acres.
2. Lowland site in "Excellent" range condition, 100 acres.
3. Shallow site in "Fair" range condition, 90 acres.
4. Limestone Break site in "Good" range condition, 100 acres.
5. Claypan and/or Very Shallow site in "Poor" range condition, 110 acres.

What should be the recommended carrying capacity and/or stocking rate for the next year?

Answer -

1. Ordinary Upland - Animal unit months per acre - 1.05 times 600 acres equals 630, divided by 12

months, equals 52.5, the recommended carrying capacity of animal units for 12 months.

2. Lowland - Animal unit months per acre - 1.6, times 100 acres equals 160, divided by 12 months, equals 13.3, the recommended carrying capacity of animal units for 12 months.
3. Shallow - Animal unit months per acre - 0.6, times 90 acres equals 54.0, divided by 12 months, equals 4.5, the recommended carrying capacity of animal units for 12 months.
4. Limestone Break - Animal unit months per acre - 0.9, times 100 acres equals 90.0, divided by 12 months equals 7.5, the recommended carrying capacity of animal units for 12 months.
5. Claypan - Animal units months per acre - .25 times 110 acres equals 27.5, divided by 12 months equals 2.3, the recommended carrying capacity of animal units for 12 months.

Hence;

Carrying capacity on 600 acres of Ordinary Upland	52.5 AUs
Carrying capacity on 100 acres of Lowland	13.3
Carrying capacity on 90 acres of Shallow	4.5
Carrying capacity on 100 acres of Limestone Break	7.5
Carrying capacity on 110 acres of Claypan or Very Shallow,	2.3
Total carrying capacity of 1,000 acre pasture	80.1 AUs

6. Revegetation of Depleted Pastures[27]

A. Depleted condition of native pastures is due chiefly to overgrazing.

a. The 1934 climatic conditions rather than grazing practice is an exception, however.

B. Depleted Bluestem pastures may be improved and restored to their original condition through a few years of continuous resting if all the climax vegetation has not been killed out.

C. Removal of weed competition in early June of each year by mowing is beneficial.

D. When climax forage is too scattered to justify, several years resting period productivity may be regained by reseeding.

E. Stubble mulch planting method.

a. Drill adapted grasses early in spring, in protective stubble left by a previous crop of close drilled sorgo, Sudangrass, or other sorghum.

b. The noncompetitive mulch of stubble helps control erosion, hold moisture and prevents soil crusting.

c. Sorghum is sown the first year and pasture grasses the second year.

d. Drill sorghum crop late, (June or July) to prevent seed maturity, but early enough to insure adequate forage production.

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[27]D. A. Savage, James E. Smith and D. F. Costello, 1948 United States Department of Agriculture Yearbook, U. S. Gov't. Printing Office, Washington, 1948, pp. 509-512.

e. Rate of sorghum seeding is same as ordinarily used.

f. If cover crop (sorghum) shows signs of maturing, mow to stubble height of eight to ten inches to insure seedbed protection the following spring.

g. Grazing standing sorghum in fall makes good feed and also helps pack the ground by trampling.

h. Crop residue should be left evenly distributed, with at least 75 per cent of the ground covered.

i. Small grain stubble is not satisfactory as volunteer plants and weeds usually develop after harvest and before grass planting time.

j. Grass seed should be spring planted except the cool-season grasses. They should be made in the fall or early spring.

k. Special drills are needed for the chaffy native grass seeds such as Bluestem. Cotton planter cans have been adapted and used successfully.

l. Planting at about one inch depth and packing gives best results in dry areas.

m. Heavy press wheels should be standard equipment in planting.

n. Companion crops should not be sown as they compete for moisture.

o. Mowing weeds is essential, with two mowings the first year and one the second year.

p. Grazing may start the second year. However, judgment should be used. Grazing may start when height and vigor of growth are comparable with moderately grazed native range.

q. After seedlings are well established, management practices should be similar to those recommended for native range.

7. Protection of Pastures from Burning[28]

A. Burning pastures is not a problem in the Cedar Vale service area. However, no pasture management teaching outline would be complete without observing the detrimental effects of pasture burning.

B. What Fire Does

a. Destroys grass seed.

b. Destroys natural cover which prevents seed from washing away and provides protection for new plants from wind and hot sun.

c. Destroys mulch which protects young plant roots from freezing.

d. Destroys mulch which prevents sun from drying the soil.

e. Allows erosion to take away fertile top soil.

f. Destroys all winter growth of legumes.

g. Destroys fences, trees and farm buildings.

h. Destroys available livestock forage.

i. Allows earlier maturing weeds to invade.

C. Early spring burning of pastures provides abundant green forage for a few months. However, in June and August cattle may be found grazing unburned areas because of more water in the soil and more plant food in the plant leaves.

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[28]"Stop Grass Fires," Oklahoma Extension Service Circ. P-5.

a. Early seed germination due to warmed soil and exposure to sun's rays.

D. The lack of moisture is the most detrimental factor. Erosion is secondary on range sites.

E. Burning encourages overgrazing.

F. If annual burning is practiced, plant succession follows that of the drier climates.

a. Due to lack of moisture.

G. If fire benefits pastures, those that have been continually burned would be in wonderful shape.

8. Economic Importance of Native Grass Management[29]

A United States Department of Agriculture bulletin by Allred and Nixon graphically illustrates the difference in quality and quantity of forage produced on various native grass range sites with each of the four condition classes shown at Grand Prairie, Texas, in 1949. A table from the bulletin is reproduced on the following page.

[29]B. W. Allred and W. M. Nixon, "Grass for Conservation in the Southern Great Plains," U.S.D.A. Farmers' Bulletin No. 2093, p. 22.

TABLE XVIII

FORAGE YIELDS ON VARIOUS RANGE SITES AND RANGE CONDITIONS
GRAND PRAIRIE, TEXAS, MIDSUMMER, 1946-49

Site	Range Condition	Average Forage Yield Per Acre - Pounds			
		Climax Grasses	Climax Forbs	Invaders	Total Vegetation
Valley Site	Excellent	2,810	406	0	3,216
	Good	2,183	351	176	2,710
	Fair	1,720	244	344	2,308
	Poor	1,189	63	606	1,858
Upland Site	Excellent	1,616	371	0	1,988
	Good	1,266	274	164	1,704
	Fair	969	171	299	1,439
	Poor	523	83	509	1,114
Ridge Site	Excellent	1,193	200	0	1,393
	Good	906	158	138	1,201
	Fair	629	105	319	1,043
	Poor	346	43	399	729

A. The Table indicates that on similar range sites forage yield is usually highest on ranges in excellent condition than those in poor condition.

B. On the upland site, climax grasses made up eighty per cent of the total forage. The range in poor condition produced 46 per cent of its total forage from climax plants.

C. The bulletin states quality as well as amount of forage increased as range condition was improved. The excellent and good ranges produced more of the nutritious climax forbs and broad-leaved herbs than those in the fair and poor conditions. Although their yield is less, their protein is 20 to 40 per cent higher than grass forage.

Animals eat first the plants they like best. Usually these are the most nourishing. With continued overuse, these plants weaken and die. The animals then turn to the next most nourishing or palatable. The plants that survive heavy grazing are usually the least palatable, and often the least productive.

Native pastures in "good" and "excellent" conditions produce more pounds of beef per acre than pastures in "poor" or "fair" conditions. Hence, more dollars profit are derived from pastures possessing range in "good" and "excellent" conditions.

Proper year long stocking rates on "excellent" native grass range is generally about eight acres per animal unit. Pastures classified as being in "fair" range condition are properly stocked at about 15 acres per animal unit. The latter, providing more acres per animal unit in order to improve the range by affording the more desirable range plants a chance to come back into production.

The author assumes that references cited on the foregoing pages substantiate the theory that depleted ranges may be improved by stocking pastures at the rates recommended.

An "excellent" classified pasture of 640 acres would ordinarily be stocked at a carrying capacity of eight acres per animal unit under average conditions. This would be 80 animal units. A "fair" classified pasture of 640 acres would ordinarily be stocked at 15 acres per animal unit under average conditions. This would be 42.7 animal units.

In computing the correct number of animal units for a given area, Dr. Kling Anderson of the Agronomy Department of Kansas State College says that yearling steers, weighing approximately 450 pounds, at

fourteen to twenty months of age are ordinarily figures as being about 60 per cent of one animal unit. Therefore, approximately one and seven-tenths steers equal one animal unit.

The "excellent" classified pasture would be stocked at 1.7 times eighty, the number of animal units for this pasture which is 136 steers. The "fair" classified pasture would be stocked at 1.7 times 42.7, the number of animal units for this pasture which is 73 steers.

Table XVIII establishes the fact that the more palatable plants are found in the "excellent" classified pasture. There is also more forage produced. Thus, the 640 acre pasture classified "excellent" will produce more pounds of beef per acre in addition to a stocking rate of almost twice as many steers as the "fair" classified pasture.

9. Recognizing the Value of Tame Grass Pastures[30, 31]

   A. Since pasture is the cheapest forage livestock use, it is desirable to have as near a year-round grazing program as possible.

   B. A legume-grass mixture is usually more desirable than either grass or legumes alone for tame pastures. (It extends the grazing period and provides a better ration.)

   C. Care is necessary in making the right selection of grasses and legumes for tame pastures. Most of the plants used for forage production in tame pastures are introduced plants. Therefore, in order that their natural habitat be as nearly duplicated as possible, the following should be considered:

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[30] Agronomy Handbook, U.S.D.A., Soil Conservation Service, Oklahoma.

[31] Sam B. Durham, "Pastures of Oklahoma," Okla. Ext. Serv. Circ. No. 482.

a. Kind of soil on which they grow best.

b. Soil fertility level they require.

c. The season, or seasons, in which they do best. For example, are they cool-season or warm-season grasses?

d. Climatic conditions to which they are adapted.

e. Kind of legumes that grow well with the basegrass.

D. Maintain proper balance of grasses and legumes.

a. Sixty to 80 per cent grass is most desirable for summer pastures.

b. Legumes are high in protein, calcium, and phosphorus, while grasses are high in carbohydrates.

c. Timely reapplication of fertilizer is very desirable as soil nutrient requirements are high.

d. A Florida Experiment Station report states that to gain one pound in weight a cow has to graze:

1. On unfertilized pasture, 31 pounds dry weight or 155 pounds green weight.

2. On a good fertilized pasture, 13 pounds of dry weight or 65 pounds green weight.

E. Basegrasses should be renovated when density shows noticeable decline or when weeds or hardy native plants begin invading.

a. The Graham Hoeme plow has been used successfully.

F. Good grazing management means longer pasture life.

a. Three requirements for the best grazing management are to produce more than enough forage for every day of the year, set up seasonal pastures, and produce all the supplemental crops needed.

b. The area of leaf surface a plant has will largely govern its ability to grow; therefore, close grazing will reduce the quantity of forage available for grazing by reducing root and top growth.

c. To profitably utilize available plant nutrients in the soil and added fertilizer, the green plant "factory" must be kept large.

d. The plant's roots are its storehouse for surplus foods and energy. Close grazing reduces the ability of the plant to manufacture surplus food and also reduces the capacity of storage facilities in the roots.

e. Close grazing reduces the amount of cover needed to retard rain-drop splash and hold moisture.

f. "Proper grazing" is grazing at an intensity which will maintain adequate residues for plant and soil protection, maintain the most desirable vegetation or improve the quality of vegetation if in a depleted condition.

G. Some tame grass pastures that have been successful in this area are listed below.

a. Bermudagrass-rye-barley-vetch-Korean lespedeza.

Mr. W. C. (Dick) Whetsell, Manager of Grass Research for Phillips Petroleum Company, Adams Ranch, Foraker, Oklahoma (which is 15 miles south of Cedar Vale) gave the author the following experimental data on the above mentioned pasture.

1. A coarse strain of common Bermudagrass was sprigged into a 120 acre former crop field in the spring of 1955.

2. In the fall, (last of August to first of September), one bushel rye, one bushel barley, 20 pounds vetch with 100 pounds of ammonium nitrate were seeded and applied per acre. The rye, barley, vetch and fertilizer are applied each year in the fall.
3. Every other year it receives an application of 50 pounds of triple super phosphate per acre in the fall.
4. Top-dressings in March with 100 pounds nitrogen and seeds 15 pounds Korean lespedeza, (the lespedeza has not been well established to date, due to drought conditions in recent years).
5. In 1956 this pasture produced 213 pounds of beef per acre, being grazed by yearling steers from March 16th to June 23rd, 100 days.
6. In 1957 this pasture produced 242 pounds of beef per acre, being grazed by 200 head of short yearling steers from March 23rd to May 23rd, at that time 70 head were removed and 130 head remained on the 120 acre pasture, a total of 120 days.
7. Under normal conditions this pasture is available in November through June, with heavy stocking rates in April and May.
   (a) Tame grass pasture (Bermuda) is managed the opposite of native grass. Bermuda may be grazed extremely heavy and obtain maximum gains without damaging the grass. (Bermudagrass is usually

ready to graze around the 1st to the 15th of May.)

b. Bermuda-Korean lespedeza pasture

1. Thought should be given to the variety of grass or legume to plant. There are three major strains of Bermuda. The Midland variety has shown best results on the sandy, loam fertile soils. Greenfield variety has shown the best results on the clay type, less fertile soils. Korean lespedeza is the more desirable of the commonly known lespedeza varieties.
2. The sprigging machine is used with the improved Bermudas. The machines are usually available through local Soil Conservation Districts.
3. Under favorable conditions, the Bermuda-lespedeza pasture will provide grazing June through October.

c. Caucasian Bluestem

1. Will afford some grazing from May to October
2. Should receive nitrogen and be overseeded with Korean lespedeza.

d. Brome-alfalfa

1. An excellent tame grass mixture with grazing provided from about April 1 to early November. Mid-summer production is largely alfalfa.
2. Should receive plenty of phosphorus for optimum alfalfa growth.
3. Achenback brome, a southern type, is the more desirable variety for this area.

10. Recognizing the Value of Temporary or Supplemental Pastures[32, 33, 34]

A. Temporary pastures are usually occupied by annual or biennial plants. They are classified as either winter or summer pastures.

a. Winter pastures may include such cool-season plants as small grains, vetch, rye grasses, or wild ryes.

b. Summer pastures include such warm-season plants as Sudangrass, sweetclover, alfalfa, or lespedeza.

B. In establishing a year-round pasture program, it is very desirable to use temporary pastures.

C. Temporary pastures may be used to protect and safeguard the permanent pastures when they have suffered from lack of moisture.

D. Some farmers have experienced a 50 per cent reduction in dry lot feeding costs by using temporary pastures. It is not unusual for one acre of good small grain pasture to produce 2,000 pounds of air dry feed. This means about 600 pounds of protein per acre.

E. Some practices to consider in planning temporary or supplemental pastures are listed below.

a. Select crops that will be adapted to soil and moisture conditions.

b. Select kind of crop that will fill weak spots in seasonal pasture program.

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[32] Agronomy Handbook, U.S.D.A., Soil Conservation Service, Oklahoma.

[33] Kling L. Anderson, "Winter Wheat Pasture in Kansas," Agri. Expt. Sta. Bul. 345, 1956.

[34] Robert C. Pickett, "Sudangrass in Kansas," Agri. Expt. Sta. Cir. 311, 1954.

c. Plant sufficient acreage to meet the forage need - too much is more desirable than too little.

d. Plant good quality seed in well prepared seedbed.

e. Fertilize according to recommendations.

f. Do not graze too early - let plants develop vigorous root system.

g. Do not over-graze - close grazing reduces length of grazing season.

F. Grass and legume silage is increasing in popularity, it should not be overlooked. Some advantages of silage over cured hay are listed below.

a. Less risk of weather damage.

b. More protein, vitamins and carotene are preserved.

c. Presence of weeds does not lower the quality of silage as it does in hay.

d. Less storage space required and less fire danger.

G. Of the winter temporary pastures, wheat is very desirable in this area. Other small grains, however, should not be overlooked.

a. Effect of grazing wheat on yield of grain generally has not reduced yield, and has often increased it somewhat by moderate grazing up to about the jointing stage, or around the middle of March.

1. Grain yield is reduced by grazing when the crop has made only limited fall growth due to lack of moisture, late planting.

b. Grazing usually should not begin until around November 1st,

since until that time, plants are not rooted firmly enough to keep from being pulled out by grazing animals.

c. Close grazing will destroy too many of the tillers arising from the crown.

d. Grazing should be discontinued before plants begin jointing.

e. Varieties of wheat best adapted to grazing.

1. Varieties that tend to tiller profusely generally produce the most pasturage.

2. The more prostrate varieties recover more rapidly than those of more upright type growth.

3. Ponca wheat received a small premium price at local elevators this year. It is intermediate but tending toward prostrate in its growth habit.

f. In the fall, five to seven acres of green wheat are required to carry one animal unit, whereas in the spring two to four acres may be sufficient, depending on the amount of top growth. Approximately three acres per animal unit are needed when grazed continuously.

g. A good stand of wheat, supplemented with dry feeds has produced 200 to 300 pounds gain on grown cattle and 100 to 200 pounds on calves and yearlings.

h. Silage makes a good substitute when conditions require removing cattle from wheat pasture temporarily.

i. Livestock must be removed from wheat two to six weeks before native pasture is usually ready to use.

1. Other cool-season pasture should be available.

2. Livestock may be confined to a small area of the wheat field, or other small grains when jointing begins. This field the cattle remain on will be lost to grain production, but will provide needed pasture. It may be stocked at one-half acre per animal unit.

j. Double-cropping

1. Former wheat ground may be seeded to Sudangrass after wheat has been harvested or grazed out, thereby providing additional summer pasture if adequate moisture is available.

H. Of the summer temporary pastures, Sudangrass is very desirable in this area.

a. Sudangrass is the most widely used summer growing supplement, annual pasture crop now grown in the United States.

b. Sudan grass is well adapted throughout Kansas.

c. Sudangrass resists drought so well that it will produce pasturage under severe conditions.

d. Sudangrass has the ability to become somewhat dormant during severely dry conditions and resume growth when rains come in late summer.

e. Grazing season is from early July until frost, depending on the planting date. (Should be 18 to 24 inches in height before being grazed.)

f. Grows best under warm, moist conditions.

g. Sudangrass is better for pasturage than for silage.

1. Atlas and other forage sorghums will out-yield it for silage purposes.
2. It, however, may be ensiled or made into hay with excellent results.

h. Sudangrass responds to high soil fertility.

i. Seedbed preparation should be similar to other small seeded grasses or legumes, firm, well packed, and as weed-free as possible, planted about one inch deep.

j. Seeding rate - 20 to 25 pounds seed per acre, with grain drill.

k. Seeding date should be around the first of June.
1. The ground must be warm at planting time as with other sorghums.
2. Several different planting dates give successive grazing periods.

l. Hydrocyanic (prussic) acid poisoning
1. Young growth is potentially high in acid.

m. Grazing management should consist of rotating short grazing periods at heavy stocking rates.
1. Grazed down rather quickly and allowed to regain 18 to 24 inch regrowth before grazing again.
2. This system allows for maximum production and grazing at a nutritious, efficient, safe growth stage.

n. Carrying capacity per acre may vary from one or two animal units under good soil and moisture conditions.

o. Sudangrass fits into the year-round pasture program with late summer grazing.

1. Works in conjunction with fall and spring usage of cool-season perennial tame grass pastures such as brome and alfalfa.
2. A supplemental pasture to be used with native grass pastures during dry seasons, or when resting native grasses during their growing season.

11. Economic Importance of Tame Grass or Temporary Pastures.

All the farmers and ranchers included in this study indicate their major productive enterprise to be the production of beef, mutton and wool, or milk. Their goal, then, should be a year-round feed production program to support that major enterprise.

Many of the farmers are producing cash crops that are not directly associated with their animal enterprises. Often these cash crops are found on marginal land. The farmer with limited crop acreage may feel compelled to farm these fields rather than let them lay idle in order to supplement theincome from his animal enterprise. These fields are presently being seeded to spring oats, barley, etc.

In the opinion of some of the farmers, marginal fields would be more profitable if they were put to some type of tame grass or temporary pasture.

Below is a comparison of net profit derived from a cash crop of spring oats compared to pounds of beef produced from a tame grass and temporary pasture.

Wheat is not considered in this comparison for several reasons. Although wheat is a cash crop, it provides temporary winter pasture. With present government price supports, wheat is a more profitable crop than grass. Government acreage controls allow only limited wheat acreage; therefore, wheat is usually seeded on the more productive land.

In making the following comparison, prices on given years were used instead of average prices over several years. Climatic conditions and other factors effect yields and prices in given years, thereby, rendering average prices over several years too misleading.

A record of expenses, receipts, and net profits of the various crops are shown below on a per acre basis.

Spring Oats on Marginal Land, 1957

(A marginal field presently being seeded to spring oats by one of the farmers included in the study is used as an example.)

Expenses			
Seedbed preparation			
Plowing, discing, etc.	$5.25	*	
Seed and Fertilizer			
Seed oats, 2.5 bushels per acre at 80 cents per bushel	2.00	**	
Fertilize with 100 pounds of 16-20-0 per acre at $4.50 per 100 pounds	4.50	**	
Machinery cost - tractor, drill	1.50	*	
Harvesting - combine, trucking	4.00	*	
Total expenses			$17.25
Receipts			
Oats yield, 30 bushels per acre at 60 cents per bushel	18.00	*	
Total receipts			$18.00
Net Profit per acre			$ .75

Bermudagrass on Marginal Land, 1956-1957

(A 120 acre abandoned crop field of marginal land on the Adams Ranch, Foraker, Oklahoma, which has been previously discussed in this chapter.)

Expenses

Sprigging cost - March, 1955			
Seedbed preparation	$ 5.25	*	
Bermuda sprigs, 10 cubic feet per acre at 40 cents per cubic foot	4.00	***	
Sprigger rental	.80	***	
Machinery cost, tractor and sprigger	1.50	*	
Overseed and fertilize - September, 1955			
Rye, one bushel per acre at $1.00 per bushel	1.00	**	
Barley, one bushel per acre at .90 per bushel	.90	**	
Hairy vetch, 20 pounds per acre at .18 per pound	3.60	**	
Fertilizer, 33-0-0, 100 pounds per acre at $3.80 per 100 pounds and 0-45-0, 50 pounds per acre at $3.50 per 100 pounds	5.55	**	
Machinery cost - tractor, drill	1.50	*	
Total expenses, 1955			$24.10
Overseed and fertilize - March, 1956			
Korean lespedeza, 15 pounds per acre at 15 cents per pound	2.25	**	
Fertilizer, 33-0-0, 100 pounds per acre at $3.80 per 100 pounds	3.80	**	
Machinery cost - tractor, drill	1.50	*	
Total expenses, 1956			$18.35
Overseed and fertilize - March, 1957			
Korean lespedeza, 15 pounds per acre at 15 cents per pound (lespedeza did not get a stand in 1956 due to drought)	2.25	**	
Fertilizer, 33-0-0, 100 pounds per acre at $3.80 per 100 pounds	3.80	**	
Machinery cost - tractor, drill	1.50	*	
Total expenses, 1957			$ 7.55

The fall overseeding of rye, barley, and vetch is not included in the 1957 expenses as this is not an expense incurred by the 1957 group of steers.

Receipts

In 1956, good quality yearling steers weighing 700 pounds at the end of the grazing season (March 16 to June 23, 100 days) made a 213 pound gain per acre and were priced at $17.50 per hundred weight. $37.27 ****

In 1957, same kind and quality steers at the end of the grazing season (March 23 to August 19, 120 days) made a 242 pound gain per acre and were also priced at $17.50 per hundred weight 42.35 ****

Total receipts, 1956 - 1957	$79.62
Total Expenses, 1955, 1956, 1957	50.00
Net Receipts over the three year period	$29.62

Sudangrass on Marginal Land, 1956-1957

One farmer included in the study gave the author the following information on his Sudangrass pasture.

An 85 acre pasture was originally in two fields. One 50 acre field has been in spring oats for several years prior to 1956. It was fertilized annually with 100 pounds of 0-20-0 and has never yielded over 25 bushels of oats per acre.

The other field of 35 acres was in sweetclover in 1952 and 1953. It was planted in wheat in 1954 and made 35 bushels per acre. In 1955 the field made 20 bushels of wheat per acre. Both the fields are shallow, upland soils and rather droughty. They have been put to Greenleaf Sudangrass the past two years with the yield results shown below.

Expenses, 1956

Seedbed preparation	$ 3.50	*	
Sudan grass seed cost, 20 pounds per acre at 20 cents per pound	4.00	**	
Fertilizer, 100 pounds of 33-0-0 per acre at $3.80 per 100 pounds	3.80	**	
Machinery cost of seeding	1.50	*	
Total expenses, 1956			$12.80

Receipts, 1956

Good quality yearling heifers weighing 800 pounds at the end of the grazing season (June 20 to October 1, 100 days) made a 224 pound gain per acre and were priced at $17.00 per hundred weight.	$38.08	****	
Net Receipts, 1956			$25.28

Expenses, 1957

Same seeding cost as 1956			$12.80

Receipts, 1957

Good quality yearling heifers weighing 800 pounds at the end of the grazing season (June 20 to September 1, 70 days) chinch bug infestation cut length and per acre gain to 129 pound gain per acre and were priced at $ 17.00 per hundred weight.	$21.93	****	
Net Receipts, 1957			$ 9.13

The foregoing pages substantiate the theory that marginal land is economically more profitable to the farmer and rancher when used as a tamegrass or temporary pasture than when it is cash cropped. Another economic advantage, which was not brought out on the preceding pages is the reduction in amount of farm machinery needed when utilizing pastures instead of cash crops.

All expense and receipt figures shown on the preceding pages were secured from the following publication, company, or organization.[35]

Asterisks shown below correspond to the number found parallel to the figures on the preceding pages.

35

* Machinery Costs - "1957 Machinery Custom Rates," Doane Agricultural Digest, March 1957, pp. 371, 372.

** Fertilizer, Seed and Grain Prices, Rice-House Feed Company Cedar Vale, Kansas.

*** Bermuda Sprigger Rental, Chautauqua County Soil Conservation District, Sedan, Kansas.

**** Local livestock market prices, Cedar Vale Sales Company, Cedar Vale, Kansas.

12. A Suggested Calendar for a Year-Round Pasture Program

A. Using the information on the previous pages of this chapter, the author offers the calendar shown below. It should be understood that this calendar does not represent all the possible pasture crops that may be adapted to this area, nor can a fool-proof year-round program be built from it by all the farmers included in this study. The calendar should, however, serve as a guide toward a definite year-round pasture program for any farmer or rancher in the Cedar Vale service area.

TABLE XIX

A YEAR-ROUND PASTURE CALENDAR

Type Pasture	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Native												
* Year-long Pasture	X	X	X	X	X	X	X	X	X	X	X	X
Summer Pasture					X	X	X	X	X	X		
Winter Pasture	X	X	X	X							X	X
Tame												
Bermuda-Rye-Barley-Vetch-Lespedeza				X	X	X	X	X				
Bermuda-Lespedeza						X	X	X	X	X		
Caucasian Bluestem					X	X	X	X	X	X		
Brome-Alfalfa				X	X	X	X	X	X	X		
Temporary												
Small Grains (Wheat)	X	X	X								X	X
** Small Grains				X	X							
Sudangrass							X	X	X	X		

* These pastures should be rested once every five years through a growing season.

** These pastures are lost to grain production, but provide needed forage in early spring.

13. A Suggested Guide for Teaching the Solutions to Various Problems in Pasture Management.

TABLE XX

A TEACHING GUIDE FOR PASTURE MANAGEMENT

Problem Number	Problem	Recommended Age Groups to Receive Instruction				
		Ag I	Ag II	Ag III	Ag IV	Adults
1	Introduction of Subject	X	X			X
2	Identification of Some of the Major Indicator Plant Species	X	X	X		X
3	Determining Range Sites			X		X
4	Determining Condition Classes			X		X
5.	Determining Proper Stocking Rates			X		X
6	Revegetation of Depleted Pastures			X	X	X
7	Protection of Pastures From Burning		X			X
8	Economic Importance of Native Grass Management			X	X	X
9	Recognizing the Value of Tame grass pastures				X	X
10	Recognizing the Value of Temporary and Supplementary Pastures				X	X
11	Economic Importance of Tame grass and Temporary Pastures				X	X
12	A Suggested Calendar for a Year-Round Pasture Program				X	X

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