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ECONOMIC CONSIDERATIONS AFFECTING PERMIT DISTRIBUTION POLICY ON PUBLIC RANGE LANDS YAMPA RIVER DRAINAGE, COLORADO

III The Agricultural Situation - An Economic Survey

By

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Submitted to U. S. Forest Service

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cooperating with
Division of Farm Management and Costs
Bureau of Agricultural Economics
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Nature of this Study

In 1935 the U. S. Forest Service began a study in the Yampa River drainage area of Colorado, which had as its objective the formulation of policies and regulations for the distribution of grazing permits on the Routt and White River National Forests. The need for such a study was found in the widespread demand for grazing privileges by people who had been refused permits. The Department of Economics and Sociology of the Colorado Experiment Station was asked to assist in the study, by analyzing the economic situation of the area. In 1936, the Division of Farm Management and Costs of the Bureau of Agricultural Economics, U. S. Department of Agriculture, was asked to cooperate in the economic phase of the study. The results of the economic study are given in the following pages.

Historical changes in the agriculture of the area

In order to properly understand the present economic structure of the agriculture of the Yampa River drainage area, it is necessary to review briefly the changes which have taken place since earliest settlement. Until 1866, there were only a very few cattle in the entire area, and they were kept to produce meat for nearby mining camps. Beginning in 1867 and continuing until approximately 1889, cattle were driven into northwestern Colorado each year from the South to be fattened on the good grass available, and then shipped to eastern markets. At first this method of operation was very profitable. Grass was plentiful and large numbers of cattle were brought in. Very soon, due to lack of regulation, the country was

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overgrazed and the grass was much less plentiful. Some cattle were kept over the winter, and at first this was satisfactory, but hard winters and lowered forage production combined to cause very heavy losses, and finally the abandonment of these methods.

Beginning about 1890, ranchers started to acquire land and raise hay for winter cattle feeding. Most of the range was still open for use by anyone having cattle and able to use it. Gradually, range lands were homesteaded and fenced, the best lands being taken first in each locality. Sheep were excluded from the best cattle ranges, but were found on the desert winter ranges of western Moffat County and, after the Moffat railroad was built, in the highest mountain areas of eastern Routt County. Beginning about 1916, or perhaps earlier, the better range lands passed into private ownership quite rapidly, largely as a result of the Stock-raising Act of 1916, which permitted filing on 640-acre stock raising ranches. Dry land grain production, while introduced earlier, spread rapidly during this same period, encouraged by good rainfall and high prices.

Until 1920, the Yampa River area had been predominately a range cattle area; the post-war depression forced many cattle outfits into bankruptcy and sheep replaced cattle on much of the range, both public and private. The lower numbers of cattle lessened the demand for hay for winter feeding of the breeding herd, placing the hay producer in an unfavorable position and lowering the value of hay lands. Dry years have made grain farming unfeasible in many localities, and the depression which began in 1930 has raised many problems for all types of producers.

Present economic organization of agriculture

Size and type of farms found.- Two sources of data are available to show the size and type of farms in the Yampa River drainage area, - the county assessors' records for 1935, and the census for 1930. According to the former, one-half of the farms in the area are crop farms, keeping but few livestock (Table 1).

More than half of the crop farms, or more than one fourth of all farms, had less than 50 acres of crop land. Less than 10 percent of the crop farms had as much as 90 acres of crop land. About two fifths of all farms were essentially cattle ranches, but these were also small. These ranches raised hay and grain to feed to livestock. About 10 percent of the total number of farms had sheep, and a third of these were only farm flocks. Only 31 operators had three or more bands of sheep. (See appendix, Tables 1 and 2).

Table 1.- Number of farm units of important sizes and types, Yampa River drainage, Colorado, 1935.

Size and type of farm	Farm units		Portion of All farm units
	Number		Percent
1. Crop farms (less than 10 cattle, few sheep)		1041	50.6
a. small - less than 50 acres crop land	602		29.3
b. moderate size 50 to 89 " " "	255		12.4
c. large size 90 or more " " "	184		8.9
2. Livestock (chiefly cattle) farms and ranches		813	39.5
a. small - less than 50 acres crop land	340		16.5
b. moderate size 50 to 89 " " "	183		8.9
c. large size 90 or more " " "	290		14.1
3. Sheep outfits (few cattle, with or without crop land)		204	9.9
a. farm flocks, less than 300 head	66		3.2
b. range outfits, 300 to 800 head	49		2.4
c. one and two band range outfits, 800 to 3000 head	58		2.8
d. range outfits, 3 or more bands, over 3000 head	31		1.5
Total all farms ----------		2058	100.0

Based on data taken from county assessors' records, by U. S. Forest Service.

The 1930 census reports contain data on the number of farms reporting various amounts of gross incomes in 1929. In that year, 42 percent of the farms in Routt and Moffat Counties had less than $1000 gross income, and 74 percent of all farms were below $2500 in gross income. However, the 26 percent of the farms each reporting $2500 or more gross income produced more than 70 percent of the total income of the area. When it is recalled that prices of agricultural products were relatively high in 1929, it is apparent that the incomes of many farmers in this area have been very low since 1929.

These two sources of data agree in revealing that there are many small farms in this area, and only comparatively few large ones, though some of the latter are very large. On two thirds of the farms, the farmer and his family were not fully employed if we may judge from the small areas of crops grown, and the normal labor required to handle crops. Some of the operators of these small farms secured work for pay away from the farm, but the opportunities in this regard do not offer employment to all the available labor.

Crop yields.- Yields of important crops vary considerably within the Yampa River drainage area, due to variations in precipitation and in soils. In the eastern part, near Elk River, Steamboat Springs, and Yampa, yields are fairly high and consistent from year to year. On the western edge of the farming area, near Great Divide and Craig, yields average low, and vary widely from year to year. Between these two extremes, yields gradually decrease as one goes westward, although there are small areas which vary considerably from the average surrounding lands. (See appendix, Table 4).

Average yields, which must be interpreted in light of the variation which exists between localities, are fairly high (Table 2). These yields are somewhat above the 10-year average yields reported by the Bureau of Agricultural Economics, U. S. D. A., for Moffat and Routt Counties (Table 3). This difference is undoubtedly due to the fact that the farmers who were interviewed tended to report the yields they would get in a good crop year, without making sufficient allowance for crop failures, and their reported yields are therefore too high. The farmers interviewed may have been better-than-average farmers, also. It should be noted that wheat, barley, and oats yield approximately the same total weight per acre, according to each source of data. These grains are chiefly used for livestock feed, and the adaptability of a particular soil for one or the other is often the deciding factor in determining which crop to grow.

Table 2.- Normal acre yields of important crops, Yampa River drainage, Colorado.1/

Crop	Farms reporting	Normal yield per acre		
		Unit	on irrig. land	on dry land
Wild hay	18	ton	1.3	
Timothy and clover hay	64	ton	2.0	
Alfalfa hay - irrigated	37	ton	1.9	
- dry	54	ton		1.2
Wheat - irrigated	8	cwt.	24.4	
- dry	51	cwt.		12.8
Barley - irrigated	8	cwt.	19.3	
- dry	25	cwt.		15.5
Oats - irrigated	16	cwt.	21.2	
- dry	47	cwt.		13.1
Potatoes - irrigated	5	cwt.	77	
- dry	22	cwt.		54

1/ As reported by farmers interviewed in 1936.

Table 3.- Average acre yields of wheat, oats, and barley on irrigated and dry land in Routt and Moffat Counties, Colorado, 1924-1933.

Crop	Unit	Routt County		Moffat County	
		Irrigated land	Dry land	Irrigated land	Dry land
Wheat	cwt.	16.7	9.7	15.4	8.0
Oats	"	14.6	8.0	12.5	6.6
Barley	"	18.1	10.6	17.6	9.3

Division of Crop and Livestock Estimates, Bureau of Agricultural Economics.

Crop Sales.- Records of crop production for 111 farms secured in 1936 show that the percentage of normal crop production sold was as follows: timothy and clover, 11.9; alfalfa, 52; wheat, 72; barley, 28.6; oats, 34.4; and potatoes, 64.3. There was considerable variation within the entire area. For example, at Baggs 87.8 percent of the barley was sold, while no barley was sold in the Yampa, Williams Fork, Fortification, Great Divide and Maybell subareas. Wheat was sold rather uniformly throughout the area studied except at Great Divide and Maybell where little was sold.

Range forage production.- The most common measure of forage production on range lands is the number of livestock fed on these lands. More stock can be run on a given area for a short time, than the annual forage production will support; but, in the end, the number of stock is limited by the forage produced. The smaller the area of range land required to support an animal unit (mature cow or equivalent) for one month, the greater the forage produced per acre. The amount of forage produced per acre of range land varies in the same way as do crop yields, being highest in the eastern part of the area and lowest in the western part. The average range land for all ranches included in this survey was stocked with one animal unit month on 3.14 acres. This is the equivalent of .78 acre per ewe (and lamb) per month in the summer, or .52 acre per ewe (without lamb) per month in winter. (Table 5)

The average season of use of private range lands extends from April 15 to November 15, the exact date of beginning and ending varying with the location and character of the range. The eastern part of the Yampa area cannot ordinarily be used through a long season, but does have a higher carrying capacity during the proper season. Because of the relatively high precipitation, these ranges in eastern Routt County recover quickly from over-use. The range areas in western Moffat County can be used over a longer season but have a distinctly lower carrying capacity. Such ranges are more susceptible to serious injury from overgrazing, and recover slowly from such injury.

The averages shown in Table 5 are in every instance less than the number of acres per mature cow recommended by the National Forest Service for lands near the Routt and White River Forests, and by the grazing administration for lands in western Moffat County.

This indicates the need for a careful study of actual grazing use over a period of years to determine the effect upon forage.

Table 4.- Average grazing period.

Type of grazing	Sheep				Cattle			
	No. records	Date on	Date off	Av. day	No. records	Date on	Date off	Av. day
Spring range	6	4/25	6/22	58	7	4/26	6/3	38
Summer range	18	5/3	10/19	169	33	5/1	10/12	164
Fall range	5	9/25	11/10	46	2	10/17	11/18	22
Irrigated pasture	3	5/11	10/21	163	18	5/14	10/11	150
Aftermath - spring	2	4/14	5/8	24	12	5/12	6/11	30
- fall	7	10/3	11/11	39	33	10/8	11/23	46
National Forest	19	6/23	9/30	99	14	6/6	10/20	136
Public Domain	16	11/4	4/11	158	4	8/2	1/4	145
Winter feed	14	12/16	4/14	119	42	11/18	4/26	159

This analysis is confined to those records with complete data on grazing dates. Note that 18 sheep outfits had their private summer range while 19 were on the National Forest; while with cattle 33 herds used private summer range while 14 were on the National Forest.

No attempt was made to select ranches to be visited. Apparently a larger proportion of sheepmen use the National Forest, while a smaller proportion of cattlemen use the National Forest. This is in line with general opinion in the area.

Table 5.- Rate of stocking irrigated pastures, spring-summer-fall ranges, and crop land after harvest, Yampa River drainage, Colorado.

Community or location	Irrigated pasture		Owned and leased: spring-summer-fall ranges		Aftermath on crop land	
	Farms reporting	Rate of Stocking	Farms reporting	Rate of Stocking	Farms reporting	Rate of Stocking
	number	acres per a.u. month	number	acres per a.u. month	number	acres per a.u. month
Yampa	1	.24	13	2.87	8	1.01
Steamboat	13	.29	22	2.02	18	2.79
Elk River	6	.33	8	2.84	8	2.36
Craig and Hayden	5	.27	14	3.34	10	2.92
Williams Fork	2	.71	13	3.60	9	1.61
Fortification Creek			5	2.90	1	1.09
Baggs	2	.25	7	2.37	4	2.83
Maybell) Danforth Hills)	2	1.5	5	4.90	3	4.8
Great Divide			8	5.79	2	7.91
Winter public domain			3	11.43 1/		
Entire area	31	.31	95	3.14	63	2.55

1/ Not included in average of all records.

The men interviewed claimed little or no "overgrazing" on their own lands. It was apparent that there were wide variations in carrying capacity on lands lying in the same community. For this reason in all the budgets prepared from these data the only grazing figure used was the average of all ranches. The variations shown in Table 5 are suggestive, but possibly not significant.

Those interested should study the forage cover map shown in the Forest Service section of this study.

Irrigated pastures have a relatively constant rate of use throughout the entire area, at about .3 acre per animal unit month, or 3-1/3 months grazing per acre for one mature cow. The amount of use of hay meadows and stubble fields varies greatly in different localities. Most of such use is in the fall after crops are harvested, but where spring range is short, hay meadows may be pastured in the spring as well. Many ranchers use hay meadows less for pasture than they might, usually because they have ample spring-fall range.

Soil Erosion.- The report on soils and soil erosion prepared by J. B. Hammon of the Soil Conservation Service, as part of the complete study of the area, indicates that some shifts should be made in the use of some crop and range lands. The effect of these shifts has not been taken into account in Tables 2 and 5, but presumably the result would be to increase yields per acre and decrease the total acreage of certain crops, through the elimination of the poorer areas.

Prevailing practices in livestock production.- Sheep and cattle are the predominant kinds of livestock found in the Yampa River drainage area. The latter are kept chiefly for beef production, though some cows are milked and the milk or cream sold. Hogs are kept on some farms, but are generally not a major enterprise. Poultry is kept chiefly to produce for home needs.

Set-up of average cattle ranch in Yampa River drainage, Colorado

(Based on 49 reports of ranches with 10 or more cows)

The normal breeding herd, on the average ranch, consisted of 153 head of cattle of all ages, of which 92 head were cows and two-year-old heifers. Of these latter, 8 head were classed as dairy cows, and were milked during the year. Of the remaining cattle 26 each were yearling heifers and steers, with 5 older steers and 4 bulls. Most calves are born during the spring, so that by winter they are weaned, and considered as yearlings. On the average, 60 head of calves were branded each year, in addition to a few that died before branding time. This is an average calf crop of 64.5 calves per 100 cows and two-year-old heifers. The total yearly death loss for all ranches was 5.2 head of all ages, or 3.4 percent of all cattle (excluding unweaned calves) on hand.

The most common sales practice, as shown by this study, was to market long yearling steers, some long yearling heifers, and fat cows. A few long two-year-old steers were sold by an occasional operator, and then not every year, such sales being confined to the lighter yearlings held over for more growth. A few calves were occasionally sold as well. The majority of these cattle were sold as feeders. The total yearly sales were 54.4 head per ranch. Sale weights per head were estimated, by the ranchers, to be as follows: cull cows, 888 pounds; fat cows, 1064 pounds; two-year-old heifers, 796 pounds; yearling heifers, 622 pounds; two-year-old steers, 889 pounds; yearling steers, 702 pounds; steer calves, 355 pounds; and heifer calves, 338 pounds.

The total weight of beef (live) sold on the average ranch was 40,500 pounds. On the basis of the cattle in the breeding herd (excluding unweaned calves), this was an average of 264 pounds per head. That is, for each head in the breeding herd (excluding unweaned calves), the average rancher sold .355 head or 264 pounds each year. This compares with 284 pounds of beef per head for North Park for the years 1929-1931, and 254 pounds reported by Vass for Wyoming in Wyo. Bul. 197. Range conditions in much of the Yampa River drainage area do not favor high calf crops. The range is rough and broken, and brushy in many places; water is often available at short distances and in numerous places. All of these conditions contribute to the separation of the breeding herd into small bunches, and the separation of cows and bulls. The ranchers interviewed estimated that the calf crop was highest from cattle running on irrigated pasture; about 7 percent lower from cattle running

on good private range; about 10 percent lower than this from cattle running on National Forests, but possibly slightly higher from cattle running on public domain. There is thus a variation of nearly 10 percent above and below the average calf crop of 65 percent, depending on the type of range used.

Beef production per head is affected by the type of range used for grazing, by calf crops, and by general management practices.

Too few cattle records were secured to justify a separate classification for each of these variables. However, there were 34 cattle records east of Craig. These ranches had 70.5 percent calf crops and cattle sales of 286 pounds per head the first of the year. There were 15 cattle ranches west of Craig. These ranches had 54.1 percent calf crops and cattle sales of 220 pounds per head the first of the year.

No cattle records were secured west of Maybell, but there are some indications that cattle sales in western Moffat County are less than 200 pounds per head the first of the year. These variations, if they continue, will have an important effect upon the possibilities of profit from cattle production in various locations within the area.

Cattle death loss was 3.8 percent for the 34 ranches, and 2.6 percent for the 15 ranches. The increase in the east being associated with the rougher range and presence of more larkspur.

Operation of Sheep Outfits

Although some farmers in the Yampa River drainage have farm flocks of sheep or feed hay in the winter, by far the greater part of the total number of sheep are run the year around on the range. These outfits vary in size from one-band outfits, possibly comprised of sheep owned by several men, to large outfits operating several bands. The larger outfits which run their sheep on the range throughout the year, use supplemental feed when necessary. Some of the smaller outfits follow this practice, but many of them feed hay to their sheep on the farm in the winter. The long winters and heavy snowfall of parts of the Yampa River drainage introduce special problems in feeding sheep. Where the snow is deep, sheep may not get sufficient exercise, resulting in dietary troubles and heavy losses when sheep are placed on the range in the spring. The wet, mucky feed corrals found on some ranches, when the snow is melting in the spring, may result in foot-rot among the sheep, unless control measures are adopted. Winter feeding of sheep is easier in the lower valleys, from Hayden west on the Yampa

River and from Slater west on the Little Snake River, than it is farther to the east where the snowfall is greater. But some ranchers have fed successfully even on the Elk River, where snow is quite deep.

Some sheep outfits raise their own ewes for replacement, others buy them. There are advantages both ways, the deciding factor often being the price that must be paid for ewes. When replacement ewes are raised, the ewe lambs saved in the fall are not bred until the next fall, resulting in a lower number of producing ewes in the flock. These ewe lambs do gain in weight during the year, however. Buying replacement ewes results in a somewhat higher cost per head, but also in a higher gross income per head. Some outfits keep old ewes in the flock until they die, others sell some each year. The latter method results in some income from these old ewes, but necessitates higher costs for replacement ewes.

Table 6.- Comparison of results from different methods of handling sheep, Yampa area, Colorado.

Item	Unit	Range flocks		Farm flock
		Winter feeding	Winter grazing	
Number records	No.	11	17	13
Average number sheep	No.	1331	6094	134
Percent lamb crop	Pct.	92	82	104
Sales per head first of year	Lb.	60	52	72
Wool clip per head	Lb.	7.9	9.2	8.2
Percent lambs sold as fat	Pct.	83	84	99
Percent lambs sold as feeder	Pct.	17	16	1
Average sale weight fat lambs	Lb.	80	78	80
Average sale weight feeder lambs	Lb.	66	66	35
Amount feed per head:				
Hay	Lb.	425	23	585
Grain	Lb.	9	2	2
Cottonseed cake	Lb.	2	9	1

Table 6 summarizes the results reported for three methods of handling sheep, i.e., winter feeding, winter grazing on the public domain, and small farm flocks.

If these 41 sheep records are divided into those with their headquarters east or west of Craig, the number west is too few to justify too much emphasis upon the differences, but the nine "western" records do show lower lamb crops, less pounds of sales per head of sheep, and greater death loss. This is in agreement with local opinion and reflects the sparse vegetation and overgrazing which are prevalent as one goes farther west in the areas.

The data in Table 6 will be used later in this report in preparing sheep budgets.

Farm tax delinquency.- Part of the present economic situation of agriculture in the Yampa River area is shown by the record of tax delinquency. Tax delinquency in Moffat County was quite high prior to the depression and naturally increased from 1930 to 1932 (Table 7). Data are lacking for Routt County, but delinquency is known to be lower than in Moffat County. Tax delinquency in 1928 cannot be attributed to either drouth or depression, but was due primarily to tax charges on lands in excess of their ability to pay. Considerable areas of range land had been broken up for crop land. The small size of these new farms, and a lack of capital to equip them, resulted in their being unable to produce enough to earn the operator a reasonable return for his labor or to pay taxes.

One immediate result of this widespread tax delinquency has been a tremendous increase in the acreage of land held by the county, or for which the county might secure a tax deed. Some of this land has been sold to stockmen for range, and some to others for farm land, but recently there has been a tendency for the county to hold such land and lease it for range. The existence of such widespread delinquency prior to the depression is ample evidence of mistakes that have been made in land settlement and of the need of far-reaching changes in the agriculture of the area, and in the methods of assessing land. Assessment of land as grazing land, and payment of taxes on that basis, contribute more to county revenues than assessment as crop land and widespread tax delinquency.

Table 7.- Tax delinquency in Moffat County, Colorado, 1928 to 1932.

Year taxes were levied	Area of agricultural land delinquent for taxes		Assessed valuation of real estate (land and bldgs.)	
	Acres	Percent of total	Amount delinquent	Percent of total
1928	457,937	48.7	1,922,387	47.1
1929	485,208	50.5	1,986,604	49.2
1930	512,464	52.2	2,129,935	54.2
1931	720,948	72.1	2,320,165	74.0
1932	761,087	75.0	2,195,570	72.7

Source: Preliminary report on Farm Tax Delinquency in Colorado, 1928 to 1933, by G. S. Klemmedson. Colorado Agricultural Experiment Station and Bureau of Agricultural Economics, U.S.D.A.

Comparison of Returns from Cattle and Sheep Range Production

Some of the range land of the Yampa River drainage area is better suited for use by sheep than by cattle. The desert winter range area, for example, is used almost exclusively by sheep, since water is available only in the form of snow in winter, under which condition sheep fare better than cattle. The type of forage found, such as weeds and brush, is also better suited to sheep. This winter range is overgrazed under present rainfall and forage conditions. There is general agreement on the necessity for a 50 percent cut in the number of sheep on this type of grazing. Some of the high summer range, because of its broken topography and the presence of brush, poisonous plants and flies, is better adapted to sheep than cattle. Sheep can be herded to utilize rough or brush areas much more successfully than can cattle. Larkspur, the most common poison affecting cattle, is seldom the cause of death loss of sheep, nor are they affected by flies to the same degree as are cattle. There are some mountain grassy parks where cattle may utilize forage better than sheep. The real determining factor for most of the range is the relative return from cattle or sheep.

What have been the returns from range cattle and sheep production during the past 25 years? It must be recognized that conditions have changed during that period. Twenty years or more ago much of the range outside the National Forest was in much better condition than today. This is particularly true of the winter range. The winter feeding of cottonseed cake or other supplements has increased during this period. Accurate data on the changes in costs and returns, during the past 25 years, are lacking, but prices are available.

Table 8 has been prepared to show the possibilities of gross income from cattle and sheep. As shown earlier the average beef production was 264 pounds per head. The average sheep production was 53 pounds plus 8.6 pounds of wool. To make direct comparison easier each has been adjusted to an animal unit, which may be defined as the equivalent of a mature cow. The number of cattle the first of the year times 0.83 gives animal units, and the number of sheep times 0.2 gives animal units. This results in 318 pounds of beef per animal unit, compared to 265 pounds of mutton plus 43 pounds of wool.

Column 4 in Table 8 shows the gross value per animal unit of cattle for the 25 years, 1910 to 1934, based upon Colorado September 15 prices. Column 7 shows a similar calculation for sheep. Column 8 shows the sheep gross income as a percentage of the cattle gross income. In the years 1910 to 1914 sheep gross income was 122 percent of the cattle gross. For the entire 25 years it was 166 percent.

The above comparisons have all been on the basis of gross returns from cattle and sheep, with no allowance for the costs of operation. From the budgets presented later it can be calculated that the expenses of operation (not including interest), per animal unit, for sheep and for cattle are between $14 and $15 per animal unit. These costs are all estimated but are in close agreement with actual ranch records.

If cattle prices were 6¢ per pound, the 318 pounds average production per animal unit would bring in $19.08. In order for the 265 pounds of mutton and 43 pounds of wool per animal unit of sheep to bring a gross total of $19.08 average lamb and sheep prices could be 5¢ per pound and wool prices 13⅓¢ per pound.

If sheep prices were 8¢ and wool 22¢ (as used in the budgets discussed later in this report) the gross income from an animal unit of sheep would be $30.66. The 318 pounds of cattle would require an average sale price of approximately $9.65 to bring $30.66.

The number of times that cattle sell for $9.65 per hundredweight on the range when sheep bring $8.00, or cattle bring $6.00 when sheep sell for $5.00 are few in recorded history. These comparisons explain the shift from cattle to sheep which has been taking place in the area.

Table 8.- Comparative gross income per animal unit, cattle and sheep, with Yampa River production and Colorado September 15 prices paid to farmers.

Period	Prices secured: Beef cattle per 100 lbs (Av. price all classes Colo. Sept. 15)	Prices secured: Sheep, all ages, per 100 lbs. 1/ (Av. price for Colo. Sept. 15)	Prices secured: Wool per lb. (Weighted av. annual price. Colo. taken as 95% U.S. price)	Gross income per animal unit from - Cattle: 1 head = 264 lbs. or = 318 lbs. beef per a.u. 1 head = .83 a.u.	Gross income per animal unit from - Sheep: 1 head = 53 lbs. mutton & 8.6 lbs. wool or 265 lbs. mutton & 43 lbs. wool per a.u. 5 head = 1 a.u.			Total sheep as a percent of cattle
					Mutton	Wool	Total Sheep	
Column	1	2	3	4	5	6	7	8
1910-1934	$6.54	$ 8.61	27.2¢	$20.80	$22.82	$11.70	$34.52	166
1910-1914 Pre war	5.56	5.40	17	17.68	14.31	7.31	21.62	122
1915-1919 War	7.96	11.49	39.6	25.31	30.45	17.03	47.48	188
1920-1924 Post war	6.14	9.34	30.9	19.52	24.75	13.29	38.04	195
1925-1929 Prosperity	8.10	11.61	32.3	25.76	30.77	13.89	44.66	173
1930-1934 Depression	4.92	5.19	16.1	15.64	13.75	6.92	20.67	132

1/ Calculated from the lamb prices by assuming one eighth of total sales as old ewes at a price one half of lamb price.

To partly offset this advantage, cattlemen can use irrigated pasture. The number of records secured were too few to justify absolute confidence in the results, but these records indicated that beef production per head on irrigated pasture was 20 percent better than the average for all records. This increase will put cattle on an equal basis with sheep, i.e., each can sell for approximately the same price per hundredweight as long as wool prices keep their relative level. (This ignores the fact that sheepmen can also increase their production above the average of 53 pounds per head.)

Winter Feed vs. Public Domain for Sheep

There are wide differences of opinion in this area as to the results from winter feeding of sheep. The data summarized in Table 6 show some of the differences in lamb crop, weight of lambs, and amounts of feed as shown from this study.

Budgets shown in some detail in Table 5 in the Appendix illustrate the possibilities from handling sheep by each method. The one-band budgets for winter feeding result in $991 more return for use of investment as compared to the one-band budget on the public domain. This exact figure may not be significant as it is due to the sale prices and expense rates used uniformly on all budgets. But the fact that winter hay feeding, on the basis of the information given by men who have fed sheep in the winter, is more profitable than winter grazing is highly significant.

It shows that one solution for the present overgrazed winter range is to feed hay on private lands. Many sheepmen will find it necessary to learn how to feed. The fact that others have learned, should be a challenge to those who doubt. The opportunity to increase income by so doing should be a further inducement to try feeding.

Value of Different Types of Range

The problem of land values is important. It affects the community in many ways. This study resulted in data that can be of some assistance in estimating land values.

Table 9 has been prepared based upon the average results from all cattle and sheep records secured. It uses the average pounds of production per animal unit as discussed in Table 8, and the average acres of various kinds of range land required per animal unit per month as shown in Table 5. The prices used are the same as in the budgets, which will be discussed on following pages.

Table 9.- Land values based on average results all records, Yampa River area.

	Line	Cattle	Sheep
Average weight sales per animal unit livestock	1	318 lbs.	265 lbs.
" " wool	2		43 lbs.
Assumed prices, livestock, cwt.	3	$6.75	$8.00
" " wool, lb.	4		.22
Value per animal unit	5	$21.46	$30.66
Ranch expense other than interest (including operator's labor) per animal unit	6	14.00	14.00
Difference per animal unit	7	7.46	16.66
5 percent on value per animal unit ($50)	8	2.50	2.50
Net available to pay for use of land	9	4.96	14.16
Net per month	10	.41	1.16
Average amount range land to carry animal unit 1 month (Table 5)	11	3.14	3.14
Earnings per acre of range (line 10 divided by line 11)	12	.130	.37
Equivalent land value (capitalizing at 5%)	13	2.60	7.40
Average amount irrigated pasture to carry animal unit 1 month (Table 5)	14	.31	.31
Earnings per acre irrigated pasture (line 10 divided by 14)	15	1.32	3.74
Equivalent land value (capitalizing at 5%)	16	$26.40	$74.80
Acres public domain to carry animal unit 1 month (Table 5)	17	11.43	11.43
Earnings per acre	18	.036	.101
Equivalent land value capitalized at 5%	19	.72	2.02
Five months earnings (the average time that animals used feed or aftermath)	20	$2.05	$5.30
Equivalent value 1 acre irr. crop land	21	$41.00	$116.00
Dryland (one third)	22	$13.66	$38.66
Seven months earnings	23	$2.87	$8.12
Equivalent value, 1 acre	24	$57.40	$162.40
Dryland (one third)	25	$19.13	$54.13
Earnings per animal unit (line 9)	26	$4.96	$14.16
Equivalent earnings per head	27	$4.12	$2.83
Equivalent earnings per head per month	28	.34	.23

Line 5, Table 9, shows that the gross income per animal unit will be $21.46 for cattle and $30.66 for sheep. Line 6 assumes a uniform charge of $14 per animal unit for all ranch costs other than interest on investment. Line 8 assumes a uniform charge of 5 percent on $50 per animal unit valuation of livestock. (This would be the equivalent of $50 per cow in the breeding herd and $10 per ewe in the flock.)

Line 9 shows $4.96 per animal unit of cattle and $14.16 per animal unit of sheep as available to pay for the use of investment in real estate and improvements. Line 10 shows this as net (earnings) per month.

From this point on calculations have been made to show the value of various kinds of land. In all cases a 5 percent rate was used in estimating valuations. Also it should be emphasized that the resulting valuation is for real estate per acre, including all improvements.

For example, cattle earn 5 percent on $2.60 grazing land (line 13) while sheep can support a $7.40 valuation for similar lands.

In the case of irrigated pasture (line 16) cattle can support a $26.40 valuation and sheep a $74.80 valuation.

In the case of public domain used for winter grazing (line 19) cattle can support a valuation of 72 cents per acre, sheep $2.02.

In lines 20 to 22 it was assumed that one acre of irrigated hay and crop land would furnish hay, grain and aftermath grazing for 5 months per animal unit. Under these conditions cattle could support $41 hay land and sheep $116. Assessed valuations in the area were approximately one third as high for dry crop land as for irrigated. Line 22 indicates $13.66 and $38.66 as the respective dry land values which are one third of the irrigated rates.

Lines 23 to 25 are similarly prepared on the basis of 7 months furnished by one acre.

The earnings per month (line 10) are on the basis of animal units. Reducing this to a head basis would result in cattle earning 34 cents per head of all cattle on hand the first of the year, and sheep earning 23 cents per head on hand the first of the year (line 28). In other words, one sheep earned two-thirds as much as one head of cattle under the price and production rates used in this analysis.

The earnings per acre (lines 12, 15 and 18) are significant as an indication of the rent per acre which might be paid for such lands. For example, cattle earn 13 cents per acre on range land (line 12). This of course is upon the assumption that cattle prices are $6.75 per hundredweight and that 3.14 acres of grazing are required per mature cow (animal unit) per month. If the calf crop, sale weights, death loss, sale prices, or production of forage differed from these averages, the net earnings per acre would obviously change.

For example, if all other conditions remain unchanged and cattle prices are $6.00 per hundredweight rather than $6.75, then the 13-cent earnings per acre drop to 6.7 cents per acre, or 21 cents per month. This is practically the National Forest base fee for present grazing, and would seem to be close to actual values. However, there is one further point to consider. In the budgets which will be discussed later, all grazing lands were allowed a uniform tax of 8 cents per acre. This tax is included in the $14 per animal unit ranch expense (line 6, Table 9). Consequently, all range land earnings are above the 8 cent tax charge. The 13 cents would be 21 cents per acre before deducting the tax. The 6.7 cents would be 14.7 cents before deducting the tax. Taxes go on irrespective of market fluctuations in cattle prices. It would seem desirable to either reduce real estate tax rates, and replace them by an income tax or frankly tie assessments on real estate to earnings, if the community is to avoid a tax situation where it is possible for taxes to absorb 8/14.7 of the income (i.e., 54 percent in this case), and with lower cattle prices (below $6.00 per cwt.) actually take all of the earnings.

The calculations in Table 9 are offered as a suggestion as one way to estimate earnings per acre, and amounts which can be paid per acre for different kinds of land. The individual, by substituting his own experience as to production, prices, acres per mature cow, etc., can calculate the amounts which he can pay for grazing land. 1/

Earnings as a Basis for Grazing Fees

They also indicate that under average conditions present National Forest cattle fees are very close to their actual value. Sheep fees are far below their ability to pay. For example, the 37 cents per acre (line 12) indicates that sheepmen with 8 cent lambs, can pay three times as much per acre for grazing land, when compared to cattle at $6.75 per

1/ See Appendix for a blank form to be used in calculating individual production in relation to land value.

hundredweight. If sheep average prices drop to 7 cents this 37-cents would drop to 30 cents, and at 6 cents for lambs it would be 16½ cents per acre of grazing. All of these are earnings above the flat tax charge of 8 cents per acre, the same as for the cattle calculations.

The comparable fees per head of sheep per month would be (line 10, $116 divided by 5), 23 cents for the 8 cent lambs, 18.9 cents for 7 cent lambs, 10 cents for 6 cent lambs, and 4 cents for 5 cent lambs.

The base fees for sheep in the Routt National Forest is 5¼ cents per head per month. This fee might be raised to 12 or 15 cents per head in order to place it on a comparable basis with the 21 cent cattle base fee.

The calculations in Table 9 are on the year basis. In other words earnings per animal unit of cattle or sheep are assumed to be uniformly distributed throughout the 12-month period. Consequently, fees for winter grazing can be on the same basis of rate per head per month as the fees for National Forest summer grazing.

Line 18 indicates that if 11.43 acres of public domain winter grazing were used per animal unit per month (equivalent to approximately 2 acres per head of sheep) then these public domain lands earned 3.6 cents per acre from cattle and 10.1 cents per acre from sheep. (This is above the arbitrary charge of 8 cents per acre tax.) Since no tax is paid on public domain, but merely included here for convenience of comparison, the correct earnings on public domain would be 11.6 cents per acre for cattle and 18.1 cents for sheep.

This again assumes the use of the average conditions found on all ranches. Actually the production of beef is seldom feasible on public domain, due to lack of water and absence of proper vegetation. Also the production of sheep on the public domain is below the average for all ranches studied, so that the public domain cannot show earnings per acre or per head which are as high as the average used, Table 9. The budgets in the following pages will make allowance for these conditions.

Budgets for Typical Farms

In order to compare farms of different types, under the same conditions of prices, costs, and yields, farm budgets were set up for 29 possible farms. A farm budget is simply a plan for the operation of the farm, based on past experience as a guide to future production. All farm budgets were made with average crop yields per acre, although it was

realized that some farms in each group secure high yields, and others low. Likewise, in other respects, some farms and some farmers are better than average, and others worse. (See Table 6 in Appendix for data used in preparing the budgets.)

Livestock prices.- In the preparation of these budgets it was necessary to select some price as a basis of comparison. Prices paid to farmers in Colorado for livestock are available by months since 1910. The average of all years, 1910 to 1934 inclusive, for the month of September was used as a base. This period was favorable to sheep. In order to reduce this price advantage, the 25-year average price for all sheep and lambs ($8.61 from Table 8) was reduced to $8.00 in making the budgets. The 25-year average price for all beef cattle ($6.54) was increased to $6.75.

Some of the more important data used in arriving at the final answer - the amount of money the farm earned above expenses - are found in the Appendix, Table 5, and a summary of this information is in Table 10. The first five farms each had 40 acres of crop land; one farm kept dairy cattle, milking 20 cows and selling cream or milk; two others raised grain, one on irrigated land and one on dry land; while the other two raised potatoes as well as grain, on irrigated and dry land. Some farmers have done well with potatoes. The Yampa River area produces some potatoes for seed for winter potato areas in Texas, and some for home consumption. In most places where soil and other conditions are favorable, frost is a bad hazard. Potato production is rather risky, and can be carried on successfully only by a few farms, with specially favorable locations.

Only two of the six 40-acre farms were able to pay the operator $50 a month for his wages. The 40-acre dry land grain farm did the poorest of all, returning only $183 as wages for the farm operator (line 4). There are many 40-acre dry land farms in the Yampa River area, and many of them are located where yields are below average. Such farms offer little opportunity even in years of good rainfall and good prices. Forty-acre farms producing irrigated grain, dry land potatoes, and dry land grain, failed to earn going wages for the operator. Farms which cannot earn wages for the operator have no surplus with which to pay interest or debts. No matter how low the land is valued, such a farm cannot pay interest on that amount, unless the operator is willing to work for less than going wages, and to sacrifice his family for the privilege of owning such a farm. These 40-acre farms, while not paying wages in crop production, were valuable range lands before they were broken up.

Table 10.- Summary comparison of budgets for farms of various sizes and types based on long time averages secured from 1936 study of Yampa River area, Colorado.1/

Type of Farm (Acreage of crops only)	Line	Net Receipts	Operator's Labor Value	Net available for return on investment	Net returns on real estate	Estimating Land Values, capitalizing at 5 percent: Irrigated Land	Dry Crop Land	Grazing spring-summer-fall
Column	1	2	3	4	5	6	7	8
1. a) Irrigated grain, 40 acres	1	$ 494	$ 494					
b) Irrigated potatoes, 40 acres	2	693	600	$ 93	$ 68	$ 29	$ 10	$ 2.58
c) Irrigated dairy, 40 acres, 25 head	3	1,017	600	417	325	69	23	6.17
2. a) Dry grain, 40 acres	4	183	183					
b) Dry potatoes, 40 acres	5	379	379					
3. a) Irrigated grain, 80 acres	6	1,029	600	429	394	86	29	7.66
b) Irrigated hay, 80 acres	7	524	524					
c) Irrigated potatoes, 80 acres	8	1,545	600	945	870	191	64	17
4. a) Dry grain, 80 acres	9	479	479					
b) Dry hay, 80 acres	10	213	213					
c) Dry potatoes, 80 acres	11	904	600	304	269		48	12.64
5. a) Small beef, 80 acres, 56 head 2/	12	635	600	35				
b) Small sheep, 80 acres, 474 head 2/	13	2,276	600	1,676	1,428	98	53	
6. a) Dry grain, 200 acres	14	1,151	600	551	451		35	9.20
b) Irrigated hay, 200 acres	15	1,252	600	652	562	51	17	4.52
7. a) Cattle, 356 acres, 300 head	16	2,159	600	1,559	659	16	5	1.44
b) Cattle, 582 acres, 500 head	17	3,749	600	3,149	1,699	28	9	2.45
8. a) Sheep fed, 95 acres, 615 head	18	2,768	600	2,168	1,868	96	32	8.49
b) " " 167 acres, 1230 head	19	5,384	900	4,484	3,884	102	34	9.07
c) Sheep, range, 615 head	20	2,078	600	1,478	1,203			7.38
d) " " 1230 head	21	4,393	900	3,493	2,943			9.04
e) Sheep, range & owned, 1230 head	22	3,646	900	2,746	2,196			2.39
f) Sheep, range, 4920 head	23	16,672	1,800	14,872	12,672			9.75
9. a) Sheep, fed, 80% lamb crop	24	4,533	900	3,633	3,033	81	27	7.21
b) " " 70% " "	25	3,802	900	2,902	2,302	62	21	5.48
c) " " 60% " "	26	3,057	900	2,157	1,557	42	14	3.70
10. a) Cattle, fed, 70% calf crop	27	2,327	600	1,727	827	20	7	1.81
b) " " 60% " "	28	1,825	600	1,225	325	8	3	.72
c) " " 50% " "	29	1,173	600	573				

1/ See Table 5 in Appendix for more detail concerning thesebudgets. 2/Cattle on grazing, sheep on irr. pasture.

While the average 40-acre farm cannot return wages to its operator, there are exceptions. The irrigated farms growing potatoes and keeping dairy cattle are illustrations of this. Where good irrigated hay land and irrigated pastures or high quality range is available, dairy herds producing milk for sale will do very well. The operator of such a farm must work a good deal more and harder throughout the year than the operator of a 40-acre dry land grain farm. One farmer from whom a record was secured made a good living, sufficient to send the boys to college, from 35 acres of dry land grain and potatoes. An exceptionally favorable location was responsible for potato yields more than twice average, and potatoes provided the major part of the income. Only in special circumstances can the farm with 40 acres of crop land make an adequate living for a family.

Six farm budgets were prepared for farms with 80 acres of crop land (lines 6 to 11 inclusive). Three of these earned more than the operator's wages. Dry land potato production, irrigated potato production, and irrigated grain production produced much larger incomes per farm than irrigated hay production. The latter type showed up the worst. As with the smaller farms, it was only the exceptional 80-acre crop farm that earned returns above wages. The statements made above about potato production apply here also. Irrigated grain production is carried on only on well drained soils, and the yields reported are those which can be secured only from the best grain lands. Irrigated hay and dry land grain production on 80 acres of crop land, two rather common types of farms, earned the operator less than $50 per month, with no allowance for any interest for the land or equipment used. Such farms operated in this way have little value, though of course they can be combined into larger units.

In Table 1 it was shown that over 40 percent of all the farms in the Yampa River drainage area were crop farms with less than 90 acres crop land. These budgets indicate very clearly that with average prices it is only the exceptional farm of this type which can earn the operator $50 a month, even with no allowance for interest on land or equipment. This conclusion squares with common knowledge, based on observation. One sheepman said he saved the lives of 32 dry farmers by buying their places during the recent drouth. One dry land grain farm of this type, in Great Divide, had had no threshing bill for five years, for the simple reason that he had not raised enough grain to thresh.

Two budgets are given for farms with 80 acres of crop land, producing hay and grain and feeding it all to cattle or to sheep (lines 12 and 13). This acreage of land is

sufficient to provide winter feed for 56 cattle [1] or 474 sheep. The strictly beef cattle outfit of this size just paid the operator's wages, with only $35 allowance for interest on investment (line 12). A farm flock of sheep, running on irrigated pasture in summer and being fed hay in winter, can be made to earn a very satisfactory return (line 13). Few farmers keep a farm flock as large as 464 head, but many keep smaller flocks of 200 or 300 head. Considerable variation was found among the farm flocks studied - some did very well, but some did poorly. It seems logical that farm flocks, running on irrigated pastures, should produce better than range flocks, but in fact the production was about the same.

Budgets are also presented (lines 14 and 15) for 300 and 500-head cattle outfits, running cattle on range in summer and feeding in winter. Such outfits require the full time of two men throughout the year, and additional help as well. Cattle outfits of this size can pay all expenses, pay the operator $50 a month, and still have something left to pay interest on land and other investment. However, the acreage of land required is comparatively large, so that the value per acre is low - $16 to $26 per acre for irrigated crop land, and approximately $1 to $2 per acre for range land. This represents a fair average of what good cattle outfits can do. [2]

Budgets were also worked out for six sheep outfits, two with 615 sheep, three with 1230 sheep, and one with 4920 sheep. Each of these outfits was more than able to pay the operator full wages. The outfits which fed secured a somewhat larger net return than did the outfits running on the range in winter. However, they owned a much larger area of land, particularly crop land, so that the amount of investment per acre of grazing land which could be supported was about the same.

Budget 8-e was for 1230 sheep run on privately owned winter range. The value of $2.39 per acre was for all range, both summer and winter. Actually the sheep were on spring,

1/ If 1.4 ton of hay per head of cattle is used in place of the 2 T. used in all budgets, then 80 cattle can be kept and the net income will be increased approximately $400.

2/ If cattle are fed 1.4 T. in place of 2 T. hay per head, the net income would be increased approximately $350 for the 300 head, and $590 for the 500 head outfit. Less acreage would be required for the ranch.

summer and fall range for 7 months, and on winter range 5 months. If the net earnings ($2196) are divided in this ratio and set against the acreage of each, it would result in a valuation of $3.86 on summer range, and $1.56 per acre on winter range.

Some economies of operation can be made by larger outfits, in the use of labor. These are most marked as the outfit increased from a one-half-band unit to a one-band unit, but are still in evidence until a two-band unit is operated. Further increases in size bring much smaller proportional increases in efficiency, and at the same time bring increased risks. The owner can keep a one-band outfit under close personal supervision, a two-band outfit less so, and a four-band outfit less. Unless the operator is able to pick and retain competent, trustworthy men, he is running a risk of having losses correspondingly larger.

Not only do the larger outfits return the operator full wages and leave a sum to pay interest on land, but they hire considerable amounts of labor, most of which is local. The larger outfits, particularly the sheep outfits, because they earn more money, are able to pay more for grazing land than the small man can afford to pay.

Budgets 9-a, b and c, are for a one-band sheep outfit, winter fed, and with 80, 70 and 60 percent lamb crops, this being the only change between the three budgets, introduced to show its effect upon land value. The 60 percent lamb crop can support land values approximately one half those for an 80 percent lamb crop.

Budgets 10-a, b and c, are for 296 head of cattle with 70, 60 and 50 percent calf crops. The 50 percent calf crop could not support any land values.

All the farm and ranch budgets were calculated on the basis of ownership of all spring-summer-fall range used. Many ranches have Forest permits and a few operate on public domain. Forest permit grazing fees are lower than the cost of running cattle or sheep on owned land. Frequently land can be leased at a lower cost than its ownership entails, if allowance is made for interest on the money invested in land. The rancher, who runs cattle or sheep on National Forests or leased ranges at a lower cost than his neighbor who owns his range, has a larger net income which can be used for family living expenses or for payment of interest and debts. If half of the necessary range land is owned, this greater income can be used to pay interest on a much higher value per acre, since fewer acres are involved than when all the range is owned. Thus, a rancher who owns only half of his range, and runs on the Forest with the rest of his stock, can afford to pay considerably more for his range than can the rancher who must own all his range.

Columns 6, 7 and 8, Table 10, show the value per acre for irrigated land, dry crop land, and private grazing lands upon which 5 percent can be earned with the budget as shown.

These values were secured as follows: The assessed valuations in the area were approximately one third as high for dry crop land as for irrigated crop land. In estimating taxes, values of $30 per acre irrigated, and $10 per acre dry were used. Private range land was valued at $2.66 per acre.

Budget 3-a, for example, has $394 available to pay return on land investment. This budget has 80 acres irrigated land, 9 acres farmstead valued as dry land, and 91 acres of grazing, or a total of 180 acres. Each of these areas were multiplied by the corresponding assessed value, i.e., 80 x 30; 9 x 10; and 91 x 2.66, giving a total of $2,732. The $394 is 5 percent of $7,880 which is 288 percent of the assessed values. Each of these values was increased, (i.e., 30 x 288; 10 x 288; and 2.66 x 288), resulting in land values of $86 per acre for irrigated land, $29 for dry land, and $7.65 for grazing. This method differs from that discussed in connection with Table 9, and is offered as another method by which one may estimate land values.

How satisfactory are farm incomes?

The budgets given in Table 10 show what farm incomes may reasonably be expected from farms of different sizes and types. Some farmers can do better than this, but at least as many will not do as well. Are these incomes sufficient for a satisfactory standard of living, and should we be satisfied with them? The answer to this question is largely a matter of what we consider a "satisfactory standard of living." The man who has a ranch which produces enough to give the family $2,000 a year for living expenses in addition to a home to live in and farm produce to eat, probably thinks that a cash income for family living of $400 or less would be inadequate. But some farmers have lived for many years on small farms which have not averaged over $400 a year, available for family living. These farmers could not afford an auto in most cases, or many other things that seem desirable. Yet the fact that they have continued to live on such farms indicates that these farm incomes were moderately satisfactory, at least to these particular farmers or those who could find nothing better to do.

In considering the adequacy of a given income, recognition must be given to the possible income for these same people under other conditions. Prior to 1930, opportunity

for employment was generally available in towns and cities; since 1930, these opportunities have been much less common. Small farms, which cannot produce more than $400 net income over a series of years, may provide a better opportunity than can any other location or industry for that farmer.

The authors hesitate to say that certain farm incomes are unsatisfactory, but everyone is interested in having as large an income as possible. With the going rate of wages for farm labor equal to about $50 a month without board, it seems that farms which produce less than this are definitely too small. Some farms which produce more, in order to enable the operator to pay interest for the land on the same basis as a larger rancher might, will have little left for the family living. In the last analysis, the satisfactoriness of a given farm income must be judged by the family which receives it. We can point out about how large that income will be over a series of years, and how dependable. Society as a whole, or the government, may assist people to get larger incomes, but it cannot set up a fixed amount below which incomes are too low to be adequate.

Economic Problems of the Yampa River Area

This section of Colorado has been handicapped in the past by slow and costly transportation. There have been marked improvements in transportation in recent years.

For several years it was badly crippled by the failure of banks in this area. New banks and new credit agencies have been a big help. Better livestock prices have helped restore credit. The trend toward more sheep, more milk, more cash crops such as potato and alfalfa seed have increased the community income and improved the credit standing of the farmers.

Adjustments are slow. There are far too many farms of a size which makes it practically impossible to earn a comfortable living. There are too many sheep grazed on the winter range, and a general tendency to overgraze all classes of lands due to the shortage of rainfall in recent years.

Tax charges on grazing land and on some recently plowed and untried "dry crop lands" are out of line with the productive capacity of these lands. The community should give careful attention to its tax problem and work out a more equitable distribution of the tax load.

Lease rates for private range are very close to the long-time value of such lands (20 to 25 cents per acre is a common rate for the better range land) but fees for public lands, either forest or public domain, need adjustment to bring them in line with costs for the use of other lands.

Social problems.- The most apparent need is for increased incomes, to permit a greater diversity in living standards. Too many people in the area have been forced to skimp and save in order to keep in the game. The writers made no special study of this situation. If the recommendations within this report can be put into effect we believe that incomes will improve. It is a healthy sign when a community recognizes the problems which face it and begin to take community action toward improvement.

Conclusions from the Economic Survey

Yampa area

The data analyzed in the preceding pages were secured in 1936. Records from earlier years were used to check upon the 1936 study.

No information is included here as to actual income on the farms studied. Each farmer was asked to report on his customary or usual cropping system, crop production, livestock production and sales. This would give a better picture of conditions than would result from records for one year's actual business. The writers have seldom worked on a problem where men gave so freely of their time and were so serious in their endeavor to assist in furnishing the desired information. Consequently we believe that the data in this report present a very accurate summary of actual conditions within the area.

This is a good agricultural area. It has suffered from drouth and low prices, but its cattle and sheep production compare favorably with most western range country. The people are agreed upon the need for some changes. They fear arbitrary action. They are ready to sit around the table and help work out their common problems. Data were secured and summarized herein with that object in view.

The writers believe that the community should unite to aid in bringing some improvements into the area, such as a shift from small unsuccessful farms to larger sized livestock farms; an increase in milk production for the cheese factory; a concentration of population in the fertile valleys and a reduction in the cost of maintaining scattered roads and schoolhouses on the higher, rougher grazing lands; a reduction in the present rate of stocking winter range, and an

increase in the use of hay for winter feeding of sheep; an increase in the use of irrigated pasture for beef production; and more uniform rules for the administration and use of public lands. 1/

To assist in these latter suggestions the writers take the liberty of adding to this report some discussion as to present and possible use of the various grazing lands.

Use of Range by Farms of Different Types

The presence of unappropriated public lands is a disturbing element in any community. Everybody claims an equal right to its use; no one assumes any responsibility for its care. Few stop to consider whether its use is of direct benefit, or consider the effect of their actions upon the welfare of their neighbors.

It is not the purpose of this report to decide how, or by whom, public lands shall be used. It is our purpose to point out certain relationships and effects that have a vital bearing upon the welfare of those who use public lands, and of those who live in the community.

Some farms or ranches are of a size and type that they can make efficient and profitable use of range lands, and others are not. Production of hay for winter feeding of livestock is a primary requirement for being able to effectively use summer range, unless stock is wintered on suitable winter range. Location of the farm or ranch, with reference to the range, is also a factor. Possibly the most important consideration is the farmer or rancher--has he had the experience, and does he have the ability, to operate a range livestock outfit successfully? Considerable capital is required to own the necessary livestock, hay lands, and private ranges. In the Yampa River area, the location of the ranch is important, since a given area of farm or range land will produce more feed and forage in the eastern than in the western part of the area.

Dry land crop farms do not have a large production of hay, and could therefore feed only a few head of livestock through the winter. Many dry farmers do not own many livestock now, and do not have capital with which to purchase more stock. Many dry farmers lack experience with range

1/ One point should be stressed in connection with the budgets discussed above. They are based upon feeding rates and expense items listed in Table 6 in the Appendix. Change these rates and values and different results would be obtained. The hay per head of cattle was used as 2 T. In much of the area less than this can be used satisfactorily, which would increase the comparative cattle earnings.

livestock production, also, and would have to go through a period of acquiring experience, during which they might not operate as effectively as the average established rancher. A considerable portion of the dry farmers, especially in Moffat County, were raised elsewhere and migrated to the Yampa River area since maturity. The average dry farm, particularly the smaller ones which are so common, has a low income and is badly in need of additional income, from any possible source. However, the addition of a small number of range livestock to such farms might not increase their incomes materially, and it would mean depriving some other farmer or rancher of this range. Few dry farms have had the resources to acquire private range land. As a class, dry land crop farms are not at present in a position to use public range lands effectively, though there are exceptions.

Small livestock farms can use range lands very effectively, up to the limit of their ability to raise hay for winter feed. Range cattle can be operated on a small scale more effectively than can sheep. Sheep must be herded, and it is uneconomical to herd less than approximately a full band. Two or more ranchers with small flocks of sheep may combine, to place a full band on the range. If sheep are fed, these bands can be split up in the fall and the sheep fed on the farm of their owner. Such arrangements are entirely feasible, but the key to their success lies in the ability of small sheepmen to agree and work together. With careful management, the small ranch can pay a fairly high fee or price for range and still enable the operator to live with a moderately satisfactory standard of living.

The livestock farm which cannot buy or lease private range or get a permit on public range can do very well by using some of its hay lands for irrigated pasture. Farm flocks of sheep on irrigated pasture will do well, if the pasture is not too wet, and cattle will produce more than on range, as has been shown. Cattle run on irrigated pasture for a 6-month season require 1.5 acres per head of pasture and 1 acre of hay land. Thus a ranch which had hay land enough to feed 250 cattle through the winter, would have hay and pasture land enough for only 100 head, if it should cease to use or should lose its summer range. This reduction in number of cattle run, when a ranch changes from range to irrigated pasture cattle production, is the chief obstacle to irrigated pasture cattle production. Where the area of hay and pasture land is large enough, irrigated pasture cattle production is quite satisfactory.

Large livestock farms

(a) Cattle.- Formerly cattle were grazed on the public domain in northwestern Colorado. In later years with shortage of forage, and drouth, few have made satisfactory gains, and many cattle have been removed from the "free" lands.

(b) Sheep have continued to use the public domain after it was unprofitable for cattle. Sheep can do this because of their ability to exist upon weeds and brush that cattle do not relish. They can also use snow for water. Many operators have built up a sheep business based upon winter grazing on public lands, and summer grazing on the National forests, with owned or leased land for spring and fall grazing. The competition offered by these operators has been a serious handicap to the existence of the cattle men.

The writers hold no brief for either cattle or sheep, but the data shown earlier in this report are ample reason for the trend toward more sheep and less cattle in the area. Sheep producers bring more money into the country. The chief complaint against sheepmen centers around the "drifters"--men who have no permanent home and take no active part in the community life. It is apparent that some regulations as to movement of livestock will remove much of this criticism. Local people, and representatives of the grazing service and of the National Forest should arrange to hear all sides, and work out a mutually acceptable program which will retain the good features of a profitable industry and eliminate the questionable features.

Some criticism is directed toward the "large sheep operator." The authors were interested in the data secured in this study. The data indicated quite clearly that many "large operators" had men working for them who had been with them for 15 to 30 years. Frequently the wage paid to these men exceeded, by several hundred dollars per year, the normal expectation as to income from the independent operation of a privately owned "small livestock ranch," and this without the need for any investment or risk of loss.

Since this is the case, it would seem to be an advantage to have in a community two ways to make a living - one by individual ownership and operation of a ranch, the other by working for a competent large scale operator.

Desirable Policies for Public Range Use.- This economic survey has furnished information which should be helpful in formulating future policies. What constitutes a desirable

goal or policy depends to a large extent on the kind of things each person values most highly. One person feels that those policies should be adopted which will result in the maximum population for an area, another wants satisfactory incomes for everyone living in the area, another is primarily concerned with the protection and preservation of the natural resources, and so on. Within the Yampa River area there are conflicting interests and desires on the part of various people, and it would be impossible to formulate any program which would fully satisfy everyone.

Some of the problems are highly controversial. Many require, for their solution, data and experiences which cannot be secured within the limited time allotted to this study. The writers wish to emphasize the economic sides of those problems. If due consideration is given to economic factors as well as to custom and tradition, it is our hope and belief that a satisfactory answer can be found for practically all these problems. Government officials are bound by law or regulations handed down from superior officers. The general public must recognize this and be patient, while men learn and correct the mistakes made through one cause or another. A few quotations may help toward a better understanding. The National Forest Manual, page 3G, states: "Every effort will be made to distribute the stock on the range satisfactorily in order to secure greater harmony among the users of the forest, to reduce waste of forage through unnecessary movements of stock, and to obtain a more permanent, judicious, and profitable use of the range." "There is no law which gives an individual or corporation the right to graze stock upon National forest lands. The grazing of such lands may be allowed by the Secretary of Agriculture only as a personal privilege."

"The primary obligation of government (is) to require the conservative use of national resources," as stated in a letter dated May 13, 1936, written by Mr. C. M. Granger, acting chief of the Forest Service.

The Taylor Grazing Act as amended July 26, 1936 states the purpose of the act: "To stop injury to the public grazing lands by preventing overgrazing and soil deterioriation, to provide for their orderly use, improvement, and development, to stabilize the livestock industry dependent upon the public range, and for other purposes."

These quotations give one a clear picture of the responsibility laid upon the shoulders of administrative officials. With these in mind let us consider some policies and briefly outline their economic and practical phases.

The basis for awarding permits:- In the National Forest this has been upon properly qualified persons. In the Grazing Administration it has been based upon properly qualified lands. Some quotations from page 18G of the National Forest Manual will serve as an indicator of National Forest policy: "For the purpose of contributing to the stability of the livestock industry---- the Forests shall provide for the recognition of preference in the use of National Forest ranges and the renewing of permits to an extent consistent with the prevention of monopoly and with the principle of a reasonable distribution of grazing privileges." Page 19G, "A preference may be acquired in the allotment of grazing privileges, but no legal right will accrue to the National Forest range."-----"Preferences may be acquired in the following ways (a) by prior use and occupancy of lands included within a National Forest, (b) by local residence and ownership of commensurate ranch property dependent upon the range." (Four other methods are listed such as inheritance, purchase of stock or ranches, regular use, and renewal to co-partners.) Page 21G, "A permittee with a preference may change his residence to a point more remote from the forest without affecting the status of his preference, provided he maintains his other interests"----"a permittee----may dispose of such property, but unless he secures equally dependent and commensurate ranch property within a reasonable time his preference may be revoked."

It is significant that the National Forest gives permits to individuals, but does so only upon the basis of lands owned.

The chief arguments in favor of giving the permit on the basis of land, and, once given, kept for that specific tract of land, are briefly as follows:

1. It introduces stability into the grazing program.

2. It opens a way for future adjustments, i.e., when such lands are acquired, the use of National Forest grazing goes with them.

3. It permits lease of the land and use of the grazing privileges by the tenant.

4. It removes a continual pressure from new applicants for consideration for new permits.

5. New applicants will be new owners of old lands, hence a new applicant will replace an old permittee, not crowd him out.

6. It gives somewhat the same impersonal standing to a grazing permit that now attaches to a water priority for irrigation.

7. These tend toward a condition of greater security, and a feeling of confidence. They would help to remove the frequent hard feeling, misunderstanding, and jealousies now present.

The chief arguments in favor of giving the permit on the basis of persons may be summarized as follows:

1. It recognizes that individuals are the actual users of permits.

2. It is easier to keep a check upon the individual, and to control his permit.

3. It prevents the tendency to look upon a permit as a "right", which is superior to any policy of the government.

4. It recognizes that the demand for grazing is in excess of the available supply - therefore a selection must be made.

5. It recognizes that the dependent ranches are in excess of the available supply of grazing.

6. It allows for a selection of individuals rather than of units of land.

7. These all tend toward greater elasticity and freedom for adjustment in selecting permittees.

8. It gives greater elasticity in administering public lands and in providing for other uses which may be higher than grazing.

A comparison of these opposing arguments and their relative merits should be made with due regard for the overlying policy "of the greatest good to the community," and "the greatest stability of the livestock industry."

It is not the purpose of this economic study to decide National Forest policies, but merely to secure data upon which such policies may be based. Field work on this specific problem has been done two years, 1935 and 1936. The Colorado State College has made a study of selected cattle and sheep ranches in this area for the years 1926 to 1934 inclusive.

Possibly this experience justifies a comment as to which policy would benefit the area economically. If proper safeguards as to qualifications of individuals could be blended with choice of ranches within dependent territory, it seems to the writers that a selection of permittees could be made which would meet with the critical test of fairness to all concerned. Then if proper regulations could be drawn looking to the future, the community would have a recognized accepted policy, upon which all could agree, which would permit the normal changes of ownership and of movement of population to continue. Where men were unadapted to handling livestock, their lands would not be qualified for permits. In other words, a "rule of reason" could create a blend of land and person as the basis of permits, with benefit to both sides.

Specific tracts of public range:- The tendency among National Forest officials and grazing administration officials is toward giving a permit for a specific tract of public lands. All arguments seem to point toward this as a desirable goal. Proper regulations to cover future changes in carrying capacity, or public needs for other uses such as for recreation, reservoir sites, or game refuges, should be worked out.

In actual practice, the Forest Service is following and has been for some time a policy very similar to this, as regards allotment of specific tracts of range. But we feel this policy should be made more definite and of wider application and that it should be the recognized, announced policy, not just one that has grown up through administrative policy.

Protection of range vs. distribution:- The National Forest Manual, page 23G, states: "Reductions on grazing preferences are made for two purposes - protection and distribution"---"Distribution may be defined as the granting of preferences to qualified New Class A applicants and increasing preferences to qualified Class A permittees below the protective or exemption limit."

Cuts for protection when needed are sound and meet with universal approval.

Cuts for distribution arose from fear that monopoly would control the range. Where the range is fully used it means that some new man is given a chance at the expense of someone who is now established. 1/ Giving one man a permit at the expense of another does not add to community welfare. It merely keeps everyone in a state of uncertainty. It prevents a permittee from taking an interest in his allotment. He will hesitate to cooperate in building up the range if there is no security in its use.

It would be a sound policy to issue a permit to a new applicant when he comes bearing a record of purchase of land, or livestock, or both, from a former permittee. Obviously, consideration should be given to the proper use of National Forest or public domain lands which had been used by a permittee who drops out and no one comes qualified to replace him with livestock.

Commensurability 2/ seems to be a reasonable basis for selecting permittees. This study indicates that (a) only those lands should be accepted as commensurate property, which are definitely useful to the ranch in its year's operations. In the past, the Forest Service has "accepted" (which really means "required") property as commensurate which was of little use to the rancher. A sheepman who runs on winter range should not be required to own hay lands, which produce hay for winter feeding, except for supplemental feeding. Due

1/ The old government policy of settlement also accounts in part for these distribution cuts. The present trend of government policy is toward stabilizing existing settlers and retiring submarginal operations, i.e., resettlement activities.

2/ Defined by the National Forest as follows: The term "commensurate property" means property of the kind and amount necessary to furnish feed or forage for the class of stock in accordance with the custom of the locality during the portion of the year when it is not grazed upon the national forest.

regard should be given to the seasonal adaptability of commensurate property-ownership of summer range does not constitute commensurability for more summer range, etc. A deficiency of spring-fall range is not offset by surplus hay production for winter feeding.

(b) Lands submitted as commensurate property should be properly used, as far as seasonal use, rate of stocking, etc., are concerned. One federal agency should not permit or encourage mis-use of private lands, while at the same time other federal agencies (soil conservation service) are paying ranchers and farmers to properly use their lands. The rating attached to each type of land should be such as to permit its proper use--if certain ranges will be injured by spring use, they should not be accepted for commensurability as spring range, for instance. Commensurability ratings in the past have pretty well, but not entirely, achieved this objective.

(c) Lands which are submitted for commensurability in a certain way, and accepted in that way, should be used as submitted. For instance, a tract of spring-fall range submitted as commensurate property should not be used as summer range. In the past, property has often been submitted as commensurability in one way, and used in quite another way. A common situation has been for a man to offset a shortage of spring-fall range by producing more hay, and then proceed to use the limited spring-fall range for all his stock all season, and sell the hay. If commensurability standards are properly set in the first place, there is no reason why a permittee should be allowed to use commensurate property in some other way. Mis-use of commensurate land should be sufficient ground for rejection of property for commensurability.

These limitations and interpretations seem necessary if commensurability is to be a workable method of determining eligibility for the use of public lands.

It does not answer the question as to choice between equally worthy applicants, when there is not enough grazing for all those who wish to use it. This is a problem which is local, and should be settled on the basis of a minimum of disturbance of established operators, and for the best interests of the community as a whole.

The application of commensurability will mean that many operators will be faced by several alternatives. They will find it necessary to reduce their livestock numbers, or buy additional grazing lands, or increase the use of supplemental feed, chiefly during the winter grazing of public domain.

Selection of permittees:- The writers have listened to many arguments as to who should, or should not, be given a permit for the use of public lands. From this discussion, two classes of applicants emerge as most dissatisfied, or as targets of criticism.

(a) Small operators.- This phrase is used advisedly. Every man has a private definition of "small." Careful study of the budgets shown earlier in this report, will indicate the limitations of income when a rancher has less than 50 head of cattle or less than 200 head of sheep. It is not for the best interests of a community to encourage a scale of living, or size of business that merely allows the operator to subsist. Every effort should be directed toward aiding men toward a more profitable business.

A grazing permit, for a number of livestock so small the operator has little or no chance of making a good living, is a questionable asset. There are, at present, some permittees whose operations are below the minimum point at which a reasonable living can be obtained. Such permits should not be disturbed during the continued activity of the present holder. No new permits should be granted that are below "family-size." Just how large the minimum unit should be, is hard to say: there is a temptation to set it too high, where the family income would be fairly good, but where many people could not reach it. A farm with about 20 head of cattle, the cows being all milked, or one with about 65 head of beef cattle, or one with about 200 sheep, under the long time average prices assumed in the budgets will pay the operator going wages for farm labor, with little left to pay interest on investment in land or livestock. Certainly new permits should not be granted to farms smaller than these. How much larger should the farm be before a permit is given? Farms twice this size would still not be very large, and might be held up as a reasonable goal.

An economic unit:- At the outset of this study, one of the facts sought was, what is the proper size of an economic unit? It should be fairly obvious that there are as many sizes of "economic units" as there are individuals who are in business after a period of years. In other words, each man has his own idea as to what is required. Some, it is true, hang on in hopes of better days, and would prefer a larger business. But it would be absurd to set up a mythical farm and say, "Here is an ideal, economic unit, if you fail to measure up to this standard, you will receive scant consideration when government favors are dispensed."

It would be far better to face the facts of limitation of income which are indicated for some of the smaller farms summarized in budget form on earlier pages of this report, and

join in community endorsement of every policy which will tend to reduce the number of such farms, and increase the number of other farms which do offer a long time opportunity for better income.

(b) Large Operators:- These men, under the present system of paying fees, have definite advantages. In the past the National Forest has used a "maximum limit" as an arbitrary attempt to avoid the development of monopoly in use of grazing.

If the suggestion made later, that fees be increased up to their full value should be put into effect, the advantages of size will largely disappear. There will be little tendency to develop monopoly. Under these proposed conditions the writers see no economic argument for placing an arbitrary limit upon the size of ranches.

But if fees less than their full value are retained, then a maximum limit to size of permit is highly desirable. There should be some limit to the amount of low cost range which is allotted to any one person. How large this limit should be is not an easy point to settle. Many conditions need to be studied. Possibly it would differ for different kind of public lands. But once it is agreed upon it should be fairly administered, and a period of years should be allowed, within which the operator above this limit should be given time to make the needed adjustments without being forced to sell livestock with no chance to pick a favorable time.

(c) Residence of applicant has been advanced as a basis for selecting permittees. A careful study of the geography of any western lands adjacent to National forests, or public domain, will convince the impartial student that political boundary lines are not a sound guide to the selection of those who are most dependent upon any specific area of public lands for their balanced year round operation.

It is much more important that fees be put upon a fair basis, and that national administrative agencies pay their fair share of such fees to local governmental units in lieu of taxes. When this is done, and permittees selected upon a uniform basis, little objection will be raised as to the residence of the permittee.

Stability of permits:- There should be "one best way" of allotting permits on public lands. Once that way is found, agreed upon, and used, it should reduce the uncertainties, and make a permit relatively permanent, subject to proper restrictions to prevent a feeling or belief that permits are rights rather than privileges.

In the absence of any such "one best way" in the past, there has been a feeling on the part of those who do not have permits, that they were unfairly discriminated against, and a resultant continued pressure to force supervisors of public range to reallot the use of range. This has never worked to the satisfaction of many. It should be abandoned and permanency of permits recognized as a desirable goal.

It bears repetition that range resources are limited - when fully used, and a new man is given a chance, it can be done only at the expense of someone who is already established.

Stability of permits will give permanence to communities; it will improve the security of loans for operation of ranches; it will give the operator a chance to plan ahead and work out a long time policy for the best use of his lands and resources.

Elimination of inequalities:- If permits are given an added degree of stability, care must be taken that it does not add to, rather than eliminate inequalities.

The previous analysis has shown that fees on the National Forest and public domain are not high enough to pay for the value of the forage secured. The rancher with a permit is in a favorable position. If he is protected in the permit, it will tend to give permanence to his economic advantage. With these low fees, he can outbid non-users of public lands, when each desires to buy or lease private lands.

In view of these facts, the authors see only one way in which permittees, as a class, and non-permittees, as a class, can be put on an equal basis--raise the fees on public ranges to the full value of the forage, on the basis of long-time average prices of livestock and on the basis of the portion of the year the livestock are on a particular kind of land, or to the cost of private lands of the same character, whichever is the lower. If the fees for use of each tract of land are placed at just what the forage on that land is worth, there is no longer any need to get worried over the financial advantage one type of operator has over another, or to require unnecessary commensurability standards to offset the advantage of low fees. The man who does not have a permit can afford to bid for private land in competition with the man who does.

There are many problems in determining the value of forage on a particular range, and it is probably impossible to value each tract at its exact value. But the essential point is to value Forest and public domain lands as a whole on a par with private range lands, as a whole. Fees should certainly vary according to the location and accessibility

of the range, its carrying capacity, the production of beef, lamb, or wool per head, and the costs of operating on that range. All of these items need a careful determination of facts. Fees might also vary from year to year, according to the price of livestock. If this is desired, they should bear some definite ratio to some well-known and quoted price, so that there could be no room for dispute or debate over the amount of the fees.

In working out such fees, the problem of cattle vs. sheep will come to the front. In parts of the eleven western states cattle are more productive than sheep; in other areas, sheep are more profitable. As shown earlier, the Yampa River basin in Colorado is apparently more profitable for sheep production. If this relationship continues, the shift from cattle to sheep, which has been taking place since the World War, will continue. Either that or cattlemen will increase their production of beef per head through better methods of handling cattle, or increase the milking of cows. The growth of the cheese industry in the valley suggests that this adjustment is already under way. It will add to the community income and should be encouraged.

Some may object to the conclusion that sheep pay better than cattle and ask, What of the future? The writers concluded from this study, and the analysis of cattle and sheep prices over the past 45 years, that sheep can make a better showing. We can see nothing to change that situation in the future. True, there will be individual years when cattle prices will be favorable, but they will not offset the years when sheep are more profitable. Furthermore, the outcome of farm planning and soil conservation in the Middle West will undoubtedly result in an increase in the number of cattle pastured and raised in the Mississippi Valley. Sheep in that valley have serious limitations due to insect pests. It seems reasonable to anticipate a trend toward more favorable sheep production for the western range, rather than more favorable cattle production.

Crossing permits:- The National Forest Manual, page 14G, states: "This regulation (of crossing permits) is for the purpose of allowing a reasonable movement of stock across National Forest lands for any legitimate purpose, but under controlled conditions that will insure that the crossing privilege is not abused and does not result in damage to forest lands or other related interests."

The March 2, 1936 issue of Rules for Administration of Grazing Districts, page 9, states: "Crossing licensees shall follow the route prescribed in the crossing license, at a rate of not less than five (5) miles per day for sheep or goats, and ten (10) miles per day for cattle and horses."

This study disclosed the need for strict enforcement of driveway regulations and for some method for controlling the driving of livestock over private lands, to reduce the present controversy over methods of settlement for use of grazing enroute.

Time of Issuing Permits

The National Forest Manual, page 23G, states: "Protection reductions may be made at the close of any grazing season---" This statement would suggest that the Forest Service favored making changes in permits in the fall of the year. In practice most permits are issued in the spring.

The tendency to issue permits in the spring puts the permittees at a disadvantage if a reduction is made in the number of livestock. If reductions are made in the fall months, the rancher has several months within which to make needed adjustments to meet the reduction in his permit. When the reduction is deferred until spring, he must act quickly, and may be forced to sell at a disadvantage.

The writers suggest that administrative officials announce reductions in the fall, or else make some allowance for time to meet the reduction when cuts are made in the spring.

Land Use and Social Welfare

The Forest Service has used "Dependency Zones" as one means of limiting the number of applicants for grazing permits. These zones tended to encourage the settlement of foothill and high elevation homesteads by those who wished to use the National Forest. Many of these homesteads were unable to support a family at anything but a subsistence scale of living. At the same time they made extra demands upon the community to furnish roads, schools and other improvements, either through taxation or by private investment.

The majority of these homesteads were on lands well adapted to grazing and poorly adapted to crops. Many of them have reverted to the counties through tax delinquency. Many have been purchased as grazing land.

The community should recognize the benefit of having its population distributed along the valley floors where roads, schools, electricity, telephones, and other improvements can be secured for the least expense. This will leave the rough, inaccessible and higher lands for grazing and will require a minimum of expense in furnishing roads or other improvements.

Conclusion as to Public Lands:- The suggestions made above, if put into effect, would result in considerable change in the present use of range lands. Time should be given for needed adjustments, and careful hearing should be given to all sides of the question. No one should be forced to make sudden changes in the set-up of his ranch. No new applicants should be admitted until present permittees have been given time either to qualify or to adjust their operations.

In making these adjustments an opportunity should be given for everyone to present his case, and to criticize the whole program and the claims made by all applicants. Something resembling the public meetings of the livestock associations should be held before Forest permits are changed or reallocated. There should be ample opportunity for everyone to learn all the facts about each situation, and to express his views on it.

Both the Forest Service and the Division of Grazing have provision for the review of the action of the local administrative agency, by a higher authority within the same Service. This arrangement should certainly be continued. Before any change in policy with respect to game and wildlife was adopted, local hearings should be held and approval obtained as far as possible from all interested agencies.

Policy for State and County Range Lands

This study has concerned itself chiefly with Federal range lands. The State of Colorado owns a considerable area of range land, part of the grant made by the Federal government to assist in providing education within the State. Routt and Moffat counties have taken title to some tax delinquent range land, and can take title to more land. These range lands should be used in conformity with principles similar to those laid down for Federal lands. County and State lands could be more effectively administered if they could be consolidated, by exchange with Federal or private lands.

State and County lands might well be leased on long-term leases. The present system of competitive bidding on State lands is certainly not conducive to protection and preservation of the forage on the lands, nor to their most effective use, and it is questionable if higher incomes are secured than might be obtained from longer term leases. State lands might be leased at a price to equal or exceed the appraised value of the forage produced. State and County lands on long-term leases should be accepted in part as commensurate property for permits on Federal range lands. Counties should develop some constructive policy for the handling of their range lands.

Counties and local governmental units can assist private land owners in bringing about best use of land. No good is accomplished by assessing range land at more than it is worth, and having it tax delinquent half of the time; and a great deal of harm may be done, through the efforts of the owner to get taxes out of it through drastic over-grazing. Taxes should be adjusted to some share of what the land earns.

APPENDIX

Table 1. Number of farms in Moffat and parts of Rio Blanco counties (Yampa River drainage) Colorado by acreage and type of crop land, and by numbers and kind of livestock, 1935.

Crop acreage and numbers of livestock	Dry-farm crop land	Irrigated crop land	Irrigated and dry farm crop land	Total
1. Farms with less than 50 acres crop land	196	59	21	276
a. with less than 10 cattle	154	31	12	197
b. " 10 or more "	37	21	7	65
c. " sheep	5	7	2	14
2. Farms with 50-89 acres crop land	136	30	42	208
a. with less than 10 cattle	80	10	18	108
b. " 10 or more "	55	10	20	85
c. " sheep	1	10	4	15
3. Farms with 90-129 acres crop land	40	15	24	79
a. with less than 10 cattle	20	6	9	35
b. " 10 or more cattle	18	8	14	40
c. " sheep	2	1	1	4
4. Farms with 130 or more acres crop land	44	46	48	138
a. with less than 10 cattle	12	3	14	29
b. " 10 or more "	32	27	28	87
c. " sheep	0	16	6	22
5. Farms with grazing land only				129
a. with less than 10 cattle				74
b. " 10 or more "				33
c. " sheep				20
6. Farms reporting no land				148
a. with less than 10 cattle				60
b. " 10 or more "				43
c. " sheep				45
Total	416	150	135	976

Based on County Assessor's records.

Appendix

Table 2. Number of farms in Routt County, Colorado, by acreage and type of crop land, and by number and kind of livestock, 1935.

Crop acreage and numbers of livestock	Dry-farm crop land	Irrigated crop land	Irrigated & dry farm crop land	All farms
1. Farms with less than 50 acres crop land	380	72	64	516
a. with less than 10 cattle	310	57	38	405
b. " 10 or more "	59	13	20	92
c. " sheep	11	2	6	19
2. Farms with 50-89 acres crop land	138	27	94	259
a. with less than 10 cattle	91	12	44	147
b. " 10 or more cattle	43	12	43	98
c. " sheep	4	3	7	14
3. Farms with 90-129 acres crop land	37	23	62	122
a. with less than 10 cattle	18	16	20	54
b. " 10 or more "	19	3	39	61
c. " sheep	0	4	3	7
4. Farms with 130 or more acres crop land	28	27	133	188
a. with less than 10 cattle	11	16	39	66
b. " 10 or more "	13	11	78	102
c. " sheep	4	0	16	20
5. Farms with grazing land only				26
a. with less than 10 cattle				11
b. " 10 or more "				11
c. " sheep				4
6. Farms reporting no land				169
a. with less than 10 cattle				53
b. " 10 or more "				96
c. " sheep				20
Total	583	149	353	1280

Based on County Assessor's records.

Appendix

Table 3. Number of farms in Yampa River drainage, Colorado, by acreage and type of crop land, and by number and kind of livestock, 1935

Crop acreage and numbers of livestock	Moffat & RioBlanco Counties	Routt County	Total
1. Farms with less than 50 acres crop land	276	516	792
a. with less than 10 cattle	197	405	602
b. " 10 or more "	65	92	157
c. " sheep	14	19	33
2. Farms with 50-89 acres crop land	208	259	467
a. with less than 10 cattle	108	147	255
b. " 10 or more "	85	98	183
c. " sheep	15	14	29
3. Farms with 90-129 acres crop land	79	122	201
a. with less than 10 cattle	35	54	89
b. " 10 or more "	40	61	101
c. " sheep	4	7	11
4. Farms with 130 or more acres crop land	138	188	326
a. with less than 10 cattle	29	66	95
b. with 10 or more "	87	102	189
c. " sheep	22	20	42
5. Farms with grazing land only	127	26	153
a. with less than 10 cattle	74	11	85
b. " 10 or more "	33	11	44
c. " sheep	20	4	24
6. Farms reporting no land	148	169	317
a. with less than 10 cattle	60	53	113
b. " 10 or more "	43	96	139
c. " sheep	45	20	65
Total	976	1280	2256

Based on County assessor's records.

Appendix Table 4. Normal acre yields of crops by communities, Yampa River drainage, Colorado

Community or location	Timothy & Clover Hay		Alfalfa Hay				Wheat - dry		Oats - dry		Potatoes - dry	
			Irrigated		Dry							
	Farms reporting	Yield	Farms reporting	Yield	Farms reporting	Yield	Farms reporting	Yield	Farms reporting	Yield	Farms reporting	Yield
		tons		tons		tons		cwt.		cwt.		cwt.
Yampa	10	1.9										
Elk River	9	2.3			5	1.2						
Steamboat	18	2.0	4	2.0	12	1.6	12	13.3	19	14.2	8	68
Williams Fork	10	1.7	6	2.4	13	1.2	11	12.8	8	10.7		
Craig & Hayden	6	2.0	7	1.7	9	.7	14	13.1	6	12.2	4	48
Fortification Cr.			6	1.4	5	1.2	5	13.4	6	19.6		
Baggs	8	1.9	5	2.0								
Great Divide					6	.8	3	8.9			5	26
Entire area	64	2.0	37	1.9	54	1.2	51	12.8	47	13.1	22	54

Only those communities included which had sufficient number of reports to give a roliable avorage.

Appendix Table 5.- Comparative budgets for farms of various sizes and types, Yampa River drainage, Colorado

Item	40-acre crop farm: Irrigated: Chiefly grain	40-acre crop farm: Irrigated: Some potatoes	40-acre crop farm: Dry land: Chiefly grain	40-acre crop farm: Dry land: Some potatoes	40-acre farm, cattle: Irrigated crop land
Acreage grown of: grain	30	20	30	20	10
hay	10	10	10	10	30
potatoes		10		10	
Acreage owned of: irrig. pasture					43
private range	54	54	54	54	89
Average number of: cattle	1	1	1	1	25
sheep					
Quantity sold: grain, cwt.	614	348	284	162	28
hay, tons	14	14	6	6	6
potatoes, cwt.		536		384	
beef, cwt.					36
lamb, cwt.					
butterfat, lbs.					4000
wool, lbs.					
Cash income from: crops sold	684	954	314	576	58
livestock sold	28	28	28	28	121
" products sold					1120
Total	712	982	342	604	1299
Expenses for: feed purchased					4
hired labor	20	115	20	95	20
shearing, etc.					
threshing	73	49	38	29	23
taxes on land & l.s.	45	45	21	21	105
breeding stock purch.					50
miscl. cash costs	80	80	80	80	80
Grazing costs & fees					
Total	218	289	159	225	282
Receipts less expenses	494	693	193	379	1017
Operator's wages	494	600	183	379	600
Return on investment		93			417
Months labor employed (assuming operator employed 12 mo.)	12 1/3	14	12 1/3	13 2/3	12 1/3

Appendix Table 5.- Comparative budgets for farms of various sizes and types, Yampa River drainage, Colorado

Item	80-acre crop farm					
	Irrigated			Dry land		
	Chief-ly grain	Chief-ly hay	Some pota-toes	Chief-ly grain	Chief-ly hay	Some pota-toes
Acreage grown of: grain	70	20	40	70	20	40
hay	10	60	20	10	60	20
potatoes	-	-	20	-	-	20
Acreage owned of: irrig. pasture	-	-	-	-	-	-
private range	91	91	91	91	91	91
Average number of: cattle	1	1	1	1	1	1
sheep	-	-	-	-	-	-
Quantity sold: grain, cwt.	1460	345	797	796	161	410
hay, tons	10	109	30	2	62	14
potatoes, cwt.	-	-	1088	-	-	784
beef, cwt.	-	-	-	-	-	-
lamb, cwt.	-	-	-	-	-	-
butterfat, lbs.	-	-	-	-	-	-
wool, lbs	-	-	-	-	-	-
Cash income from: crops sold	1510	890	2035	806	471	1264
livestock sold	28	28	28	28	28	28
" products sold	-	-	-	-	-	-
Total	1538	918	2063	834	499	1292
Expenses for: feed purchased	-	-	-	-	-	-
hired labor	95	100	175	60	60	135
shearing, etc.	-	-	-	-	-	-
threshing	167	47	96	96	27	54
taxes on land & live-stock	87	87	87	39	39	39
breeding stock purch.	-	-	-	-	-	-
misc. cash costs	160	160	160	160	160	160
grazing costs and fees	-	-	-	-	-	-
Total	509	394	518	355	286	388
Receipts less expenses	1029	524	1545	479	213	904
Operator's wages	600	524	600	479	213	600
Return on investment	429	-	945	-	-	304
Months of labor employed (assuming operator employed 12 mo.)	13 2/3	13 2/3	15	13	13	14 1/3

Appendix Table 5 (Cont'd).-Comparative budgets for farms of various sizes and types, Yampa River drainage, Colorado.

Item	80-acre L.S. farm: Irrig. and dry: beef cattle	80-acre L.S. farm: Irrig. and dry: sheep	Cattle ranch: 300 head	Cattle ranch: 500 head
Acreage grown of: grain	20	20	40	60
hay	60	60	316	522
potatoes	-	-	-	-
Acreage owned of: irrig. pasture	-	222	29	41
private range	877	-	4999	8244
Average number of: cattle	56	1	300	500
sheep	-	474	-	-
Quantity sold: grain, cwt.	145	144	81	121
hay, tons	-	9	-	-
potatoes, cwt.	-	-	-	-
beef, cwt.	148	-	792	1320
lamb, cwt.	-	284	-	-
butterfat, lbs.	-	-	-	-
wool, lbs.	-	3745	-	-
Cash income from: crops sold	145	189	81	121
livestock sold	1027	2300	5374	8938
"products sold	-	824	-	-
Total	1172	3313	5455	9059
Expenses for: feed purchased	8	38	41	68
hired labor	120	230	860	1290
shearing, etc.	-	95	-	-
threshing	32	32	62	93
taxes on land & livestock	117	350	971	1595
breeding stock purchased	100	132	650	1100
misc. cash costs	160	160	712	1164
grazing costs and fees	-	-	-	-
Total	537	1037	3296	5310
Receipts less expenses	635	2276	2159	3749
Operator's wages	600	600	600	600
Return on investment	35	1676	1559	3149
Months of labor employed	14	16	27 1/3	30

Appendix Table 5 (Cont'd).- Comparative budgets for farms of various sizes and types, Yampa River drainage, Colorado

Item	200-acre crop farm: dryland grain	200-acre crop farm: Irrig. hay	Sheep fed in winter: ½ band outfit	Sheep fed in winter: 1 band outfit
Acreage grown of: grain	180	40	20	20
hay	20	160	75	147
potatoes	-	-	-	-
Acreage owned of: irrig. pasture	-	-	9	14
private range	204	204	3308	6585
Average number of: cattle	1	1	1	1
sheep	-	-	615	1230
Quantity sold: grain, cwt.	2124	722	121	49
hay, tons	2	298	9	17
potatoes, cwt.	-	-	-	-
beef, cwt.	-	-	-	-
lamb, cwt.	-	-	369	738
butterfat, lbs.	-	-	-	-
wool, lbs.	-	-	4858	9717
Cash income from: crops sold	2134	2212	166	134
livestock sold	28	28	2980	5932
"products sold	-	-	1069	2138
Total	2162	2240	4215	8204
Expenses for: feed purchased	-	-	44	87
hired labor	285	285	455	925
shearing, etc.	-	-	123	246
threshing	237	94	32	32
taxes on land & livestock	89	209	449	877
breeding stock purchased	-	-	154	319
misc. cash costs	400	400	190	334
grazing costs and fees	-	-	-	-
Total	1011	988	1447	2820
Receipts less expenses	1151	1252	2768	5384
Operator's wages	600	600	600	900
Return on investment	551	652	2168	4484
Months of labor employed	17	17	19	26 1/3

Appendix Table 5 (Cont'd).- Comparative budgets for farms of various sizes and types, Yampa River drainage, Colorado.

Item	Sheep ranged in winter			
	½ band outfit	1 band outfit	1 band outfit on all owned land	4 band outfit
Acreage grown of: grain	-	-	-	-
hay	-	-	-	-
potatoes	-	-	-	-
Acreage owned of: irrig. pasture	-	-	-	-
private range	3240	6481	18,311	25,924
Average number of: cattle	-	-	-	-
sheep	615	1230	1230	4920
Quantity sold: grain, cwt.	-	-	-	-
hay, tons	-	-	-	-
potatoes, cwt.	-	-	-	-
beef, cwt.	-	-	-	-
lamb, cwt.	320	640	640	2558
butterfat, lbs.	-	-	-	-
wool, lbs.	5658	11,316	11,316	45,264
Cash income from: crops sold	-	-	-	-
livestock	2560	5120	5120	20,464
"products sold	1245	2490	2490	9958
Total	3805	7610	7610	30,422
Expenses for: feed purchased	215	426	426	1711
hired labor	560	895	895	4460
shearing, etc.	123	246	246	904
threshing	-	-	-	-
taxes on land & livestock	354	707	1654	2825
breeding stock purch.	154	319	319	1276
misc. cash costs	190	362	362	1448
grazing costs and fees	131	262	62	1046
Total	1727	3217	3964	13,750
Receipts less expenses	2078	4393	3646	16,672
Operator's wages	600	900	900	1,800
Return on investment	1478	3493	2746	14,872
Months of labor employed	20	25	25	80

Appendix Table 5 (Cont'd).- Comparative budgets for farms of various sizes and types, Yampa River drainage, Colorado

Item	Sheep ranch - 1 band		
	using 80% lamb crop	using 70% lamb crop	using 60% lamb crop
Acreage grown of: grain	20	20	20
hay	147	147	147
potatoes	-	-	-
Acreage owned of: irrig. pasture	14	14	14
private range	6437	6437	6437
Average number of: cattle	1	1	1
sheep	1230	1230	1230
Quantity sold: grain, cwt.	49	49	49
hay, tons	17	17	17
potatoes, cwt.	-	-	-
beef, cwt.	-	-	-
lamb, cwt.	632	559	445
butterfat, lbs.	-	-	-
wool, lbs.	9717	9717	9717
Cash income from: crops sold	134	134	134
livestock sold	5068	4337	3592
" products sold	2138	2138	2138
Total	7340	6609	5864
Expenses for: feed purchased	87	87	87
hired labor	925	925	925
shearing, etc.	250	250	250
threshing	32	32	32
taxes on land & livestock	860	860	860
breeding stock purchased	319	319	319
misc. cash costs	334	334	334
grazing costs and fees	-	-	-
Total	2807	2807	2807
Receipts less expenses	4533	3802	3057
Operator's wages	900	900	900
Return on investment	3633	2902	2157
Months of labor employed	28 1/3	28 1/3	28 1/3

Appendix Table 5 (Cont'd).- Comparative budgets for farms of various sizes and types, Yampa River drainage, Colorado.

Item	Cattle ranch - 296 head		
	using 70% calf crop	using 60% calf crop	using 50% calf crop
Acreage grown of: grain	40	40	40
hay	316	316	316
potatoes	-	-	-
Acreage owned of: irrig. pasture	29	29	29
private range	4999	4999	4999
Average number of: cattle	296	296	296
sheep	-	-	-
Quantity sold: grain, cwt.	85	85	85
hay, tons	8	8	8
potatoes, cwt.	-	-	-
beef, cwt.	810	736	639
lamb, cwt.	-	-	-
butterfat, lbs.	-	-	-
wool, lbs.	-	-	-
Cash income from: crops sold	125	125	125
livestock	5495	4993	4341
" products sold	-	-	-
Total	5620	5118	4466
Expenses for: feed purchased	41	41	41
hired labor	860	860	860
shearing, etc.	-	-	-
threshing	62	62	62
taxes on land & livestock	968	968	968
breeding stock purch.	650	650	650
misc. cash costs	712	712	712
grazing costs & fees	-	-	-
Total	3293	3293	3293
Receipts less expenses	2327	1825	1173
Operator's wages	600	600	600
Return on investment	1727	1225	573
Months of labor employed	27 1/3	27 1/3	27 1/3

Table 6.- Production and expense rates used in computing farm and ranch budgets, Yampa River drainage, Colorado.

1. Crop yields per acre:

	Irrigated	Dry land	
Wild hay	1.3		tons
Timothy and clover	2.0		"
Alfalfa	1.9	1.2	"
Wheat	24.4	12.8	cwt.
Barley	19.8	15.5	"
Oats	21.2	13.1	"
Potatoes	77	54	"

Pasture .3 acre per animal unit month (irrigated)
Grazing land 3.14 acres per animal unit month (dry)

2. Livestock production per head:

Beef cattle	36% turnoff 264 lbs. beef
Dairy	[illegible] lbs. butterfat 80% calf crop sell ½ veals at $1.00 cull cows at $3.00 @ 900 lbs.
Sheep on hay	78% turnoff 60 lbs. lamb and mutton 7.9 lbs. wool
Sheep on range	68% turnoff 52 lbs. lamb and mutton 9.2 lbs. wool
Work horses	Work on 20 acres of crops

3. Feeding rates for livestock, per head:

	Hay	Grain	Cottonseed cake
Horses & dairy cows	2 tons	.3 T	
Cattle (all ages)	2 "	.05T	
Hogs		750 lbs.	
Poultry		60 "	
Sheep on range	22.7 lbs.	25 "	8.8 lbs.
" on hay	425 "	8.9 "	2 "

Salt: cattle 18 lbs. per head
sheep 4¼ lbs. per head

4. Seeding rates per acre:

	Irrigated	Dry land
Barley	100 lbs.	50 lbs.
Oats	100 "	50 "
Wheat	100 "	40 "
Potatoes	800 "	400 "

5. Sale and purchase prices, per unit:

	Sale price	Purchase price
Lambs (incl. old ewes)	$8.00 cwt.	
Beef	6.75 "	
Hogs	7.00 "	
Butterfat	.28 lb.	
Wool	.22 "	
Hay, all kinds	5.00 ton	$6.00 ton
Grain, all kinds	1.00 cwt.	1.50 cwt.
Potatoes	1.00 "	
Cottonseed cake		40.00 ton
Salt		15.00 "

6. Miscellaneous cost factors:

Wages - month men $55 mo., day men $2 day, herders $70 mo. (all prices include allowance for board).
Threshing - oats 12¢ cwt., barley 10¢ cwt., wheat 10¢ cwt.

Shearing sheep, including sacks, twine, paint, etc., 20¢ per head, all sheep.
Misc. cash costs - $2 per crop acre.

Taxes - irrigated crop and pasture land $30 valuation, .03¢ rate, $.90 tax; dry crop land $10 valuation, 30¢ rate; grazing land $2.06 valuation, .03 rate, $.08 tax per acre.

Horses	tax per head,	$1.00
Cattle	"	"	"	.75
Sheep	"	"	"	.15

Bulls - 22 cows per bull, 2½ years service per bull, $125 cost, or $50 per year for 22 cows.
Bucks - 40 ewes (and yearling ewes) per buck, 2 years service per buck, $22 cost per buck, or $11 per year for 40 ewes.

7.

7. Household consumption:
Entire production 1 cow, 50 chickens, and garden; 3 hogs weighing 200 lbs. live each, 20 cwt. potatoes, sell 80 percent potatoes above seed and home.

8. Operator's labor excluding board $50 per month, or $600 per year, except on the more profitable farms, where $900 or $1800 was used.

Methods used in calculating farm and ranch budgets, Yampa River drainage, Colorado

1. Average yields per acre for entire area were used, and also average rates of production for livestock, although it was recognized that considerable variations in rates of production existed.

2. It was assumed that the farm raised its own seed and breeding stock; where these were purchased, sales would be increased by a like quantity, though possibly not by the same value.

3. Each farm, but not sheep range outfits, was set up with a family cow and 50 chickens, to produce for home use, and one sow was kept, and 5 hogs raised, 3 of which were consumed at home and 2 sold.

4. Crops and livestock sold were valued at long-time average prices, as these have prevailed in the past.

5. Wages, threshing charges and shearing costs were determined by the survey made in 1936. Feeds per head were partly estimated from experience in other areas.

6. Tax charges were taken as an approximate average of recent years.

7. Miscellaneous cash costs were taken at $2.00 per crop acre, and include machinery and building cost, auto or truck cost, telephone, insurance, and miscellaneous expenses. These did not provide for autos or trucks on small farms, nor for tractors on any farms.

8. Receipts less expense is difference between value of products sold and operating costs. This is the sum which is available for family living, for paying interest and debts, and for saving. In addition, the farm family has a dwelling and some farm raised food, to add to their living.

9. Operator's wages were set at going prices (approximately) for farm labor, except that where a smaller sum than this was available to pay wages, the operator got the entire balance. In such cases, nothing was available with which to pay interest, and the property was considered to have no value.

10. Out of the return on investment, enough money was deducted to pay 5 percent interest on an estimated investment in livestock, machinery, and other capital, except land and buildings. The remainder was capitalized at 5 percent interest, to determine the total value of land and buildings on which 5 percent return could be earned. This was apportioned to different classes of land on the basis of assessed valuation of each class of land. This total value was divided by the number of acres, to get a value per acre for each class of land.

11. All livestock outfits were calculated on the basis of ownership of all spring-summer-fall grazing land. If Forest permit is available, this will lower costs somewhat, and allow the income for land to be applied to a smaller number of acres. Winter range was largely on public domain, but it was assumed two sections of school lands were leased for each band of sheep operated, at an annual total cost of $200, and that sheep grazing fees of 1 cent per head per month were paid.

Table 7.- Form to be used in calculating values of ranch lands based upon production of sheep or cattle

	Line	Cattle	Sheep
Number of head first of year	1		
Number of head sold	2		
Total pounds of sales	3		
Net receipts from sales	4		
Total ranch expenses, including value of operator's labor, and depreciation, but excluding interest.	5		
Differences or net ranch earnings	6		
Investment in cattle, sheep, horses and farm equipment	7		
Interest at 5 percent on this investment	8		
Net earnings available for return on real estate (line 6 less line 8)1/	9		
Ranch earnings per head first of year (line 9 divided by line 1)	10		
Ranch earnings per head per month (1/12 of line 7)	11		
Acres grazing land per head per month	12		
Ranch earnings per acre grazing land (line 11 divided by line 12)	13		
Equivalent value per acre (line 13 divided by 5 then multiplied by 100)1/	14		
Repeat calculations of lines 12 to 14 incl. separately for each class of grazing land	15 16 17		

1/ Having made this analysis, one should ask himself the question, is this a normal or an exceptional value? A similar record over a period of years would be best.