Stocking Strategies and Net Cattle Sales on Semidesert Range

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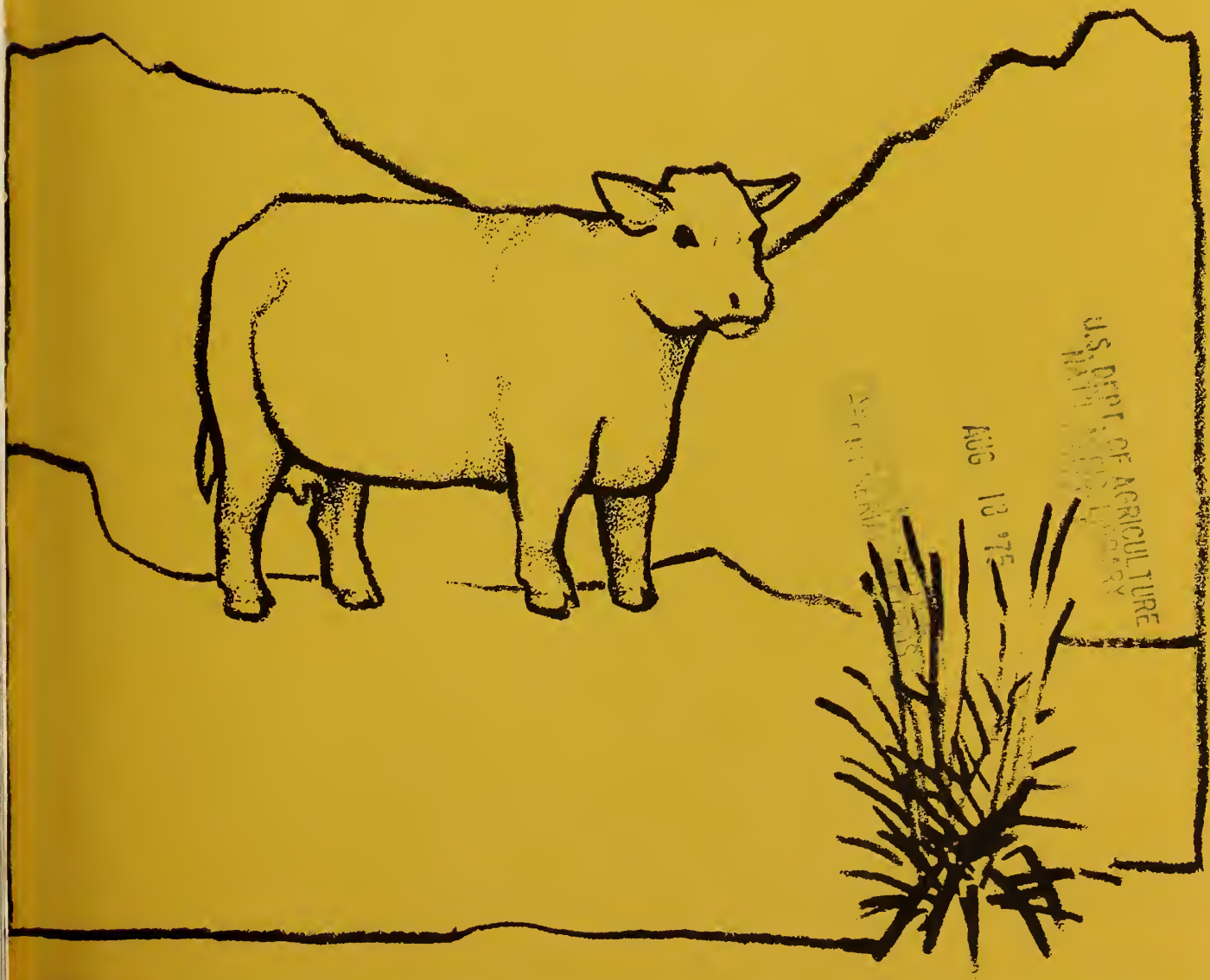

Abstract

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The impact of variable forage yields on income from semidesert range was simulated over a 29-year period for several stocking strategies. Stocking factors evaluated were cull age for cows, age of cows at first calf, number of cows per 100 animal units total stocking, several levels of constant stocking, and two plans of flexible stocking. Results indicate that the cow herd should be maximized, that cows should be bred to calve at age 2 and culled at age 8, and that constant stocking at 90 percent of average proper stocking produces relatively high income as well as relatively low risk of overstocking.

Keywords: Range management, semidesert ranges, ranch income.

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Contents

Research Summary

- The impact of variable forage yields on average ranch income was simulated under several stocking strategies for a southern Arizona range over a 29-year period. Stocking factors evaluated included cull age for cows, age of cows at first calf, number of cows per 100 animal units total stocking, several levels of constant stocking, and two plans of flexible stocking.

- Culling at age 8 is recommended, because pregnant 8-year-old cows can be held over and substituted for replacement heifers that should be culled, or for other cows that have failed to conceive. Average net sales were about the same if cows were culled at age 8 as at age 10.

- There is real merit in calving at age 2 if it can be done successfully. Average net sales for herds calving at age 2 exceeded those of herds calving at age 3 by from $223 to $765. The relative advantage increased as the number of cows increased. Yearling heifers should be bred to bulls of a small-boned breed, and first-calf heifers should be pregnancy tested in the fall. Heifers not with calf should be sold.

- The cow herd should be maximized. Net sales per 100 animal units total stocking increased as the number of cows increased under all stocking plans. Net sales for 70-cow herds were about $1,000 greater than for 40-cow herds. If yearlings are rated at 0.6 animal unit, the maximum number of cows per 100 animal units total stocking would be 87, with 4 bulls and 15 replacement yearling heifers. Under price conditions of the study, income from cow-calf production would exceed that of cow-yearling production unless calf crops dropped to 60 percent. At the same price per pound, yearlings would have to weigh 550 pounds to equal their value as 400-pound calves.

- A general shift from cow-calf to cow-yearling operations would reduce the amount of grain fed to cattle and could improve prices by reducing beef production and cattle inventories.

- Flexible stocking (60 to 140 percent of average) is difficult to administer, and the hazards of overgrazing that it imposes are too great to justify its use. Flexible stocking produces relatively high average net sales, but income varies greatly from year to year. Net sales are greatest in poor forage years when animal numbers are reduced, and are lowest in good years when extra animals must be purchased.

- Constant stocking at the average stocking level is impractical, if not impossible, because it results in overstocking about half the time. Overstocking becomes increasingly severe if one dry year follows another, with mounting feed bills, declining range condition, and lowered animal productivity.

- Limited flexible stocking, within the range of 70 to 110 percent of average, is a good system if properly executed. It produced about the same income as constant stocking at 90 percent of average capacity, and with only moderate hazard of overstocking. To maintain animal quality, however, a fixed number of replacement heifers should be retained each year and cows should be culled normally at age 8.

- Grazing damage during drought probably will be less with limited flexible stocking than with constant stocking at 90 percent of the average proper stocking level if the range is grazed yearlong. If a rest rotation system is followed forage plants may come through drought better under constant stocking.

- Constant stocking at 90 percent of average carrying capacity is recommended. This plan resulted in moderate overstocking about 1 year in 3, with severe overstocking only 1 year in 15. The 90 percent level of proper stocking leaves about half of the perennial grass plants ungrazed at the end of an average grazing year.

Stocking Strategies and Net Cattle Sales on Semidesert Range

S. Clark Martin

Introduction

A major problem in making efficient use of forage is that production varies unpredictably from one year to the next. Grass yield may be as low as 60 or as high as 160 percent of the average. How can a southwestern rancher maintain a stable ranching business in the face of such variations in forage yield? How can the fluctuating crop be used so that average income and range condition are both acceptable? What practical compromises can be made between the immediate and long-term needs of the forage plants, the site, the cow, and the rancher?

With planning and effort, the rancher can adjust the distribution, intensity, timing, and frequency of grazing to meet the needs of forage plants. He can also adjust numbers and kinds of livestock carried and sold to meet his need for income. This Paper makes recommendations based on an evaluation of several stocking strategies.

Methods of Study

The objective of this study was to determine how several strategies for coping with year-to-year changes in forage production would affect ranch income. Each strategy was simulated over a 29-year period (July 1, 1941 through June 30, 1970) using records of forage production, animal weights, and prices received for cattle during that period on the Santa Rita Experimental Range, near Tucson, Arizona. Strategies included variations in: the number of bred cows per 100 animal units, age of cow at first calf, cull age for cows, several plans of flexible stocking, and several levels of constant stocking.

Income

The measure of income used to test the various stocking strategies was "net sales," which is defined as the value of animals sold minus the value of weaner calves bought. For most of the comparisons, prices and weights for the classes of animals sold from the range each year were used to compute net sales of livestock for that year. Average net sales for the 29-year period were then calculated from the yearly figures. Additional evaluations were made, using average cattle prices for the 29-year period.

Costs

This study deals only with livestock income and some of the factors that affect it. Ranch costs and expenses for southern Arizona desert ranchers reportedly range from $3,600 to $8,300 per 100 animal units.[2] Because of these extreme differences in ranching expenses, no attempt was made to determine the costs associated with the various stocking plans. Each rancher is his own best authority on costs.

[2]*Dickerman, Alan F., and William E. Martin. 1967. Organization, costs and returns for Arizona cattle ranches. File Rep. 67-6, Dep. Agric. Econ., Univ. Ariz., Tucson.*

The Study Area

The 25,500-acre study area includes eight study pastures and several service pastures or traps. The area ranges in elevation from 3,200 to 4,500 feet above sea level. Annual rainfall is about 12 inches at the lowest elevation, and increases with elevation to over 16 inches at the highest (fig. 1). Grass

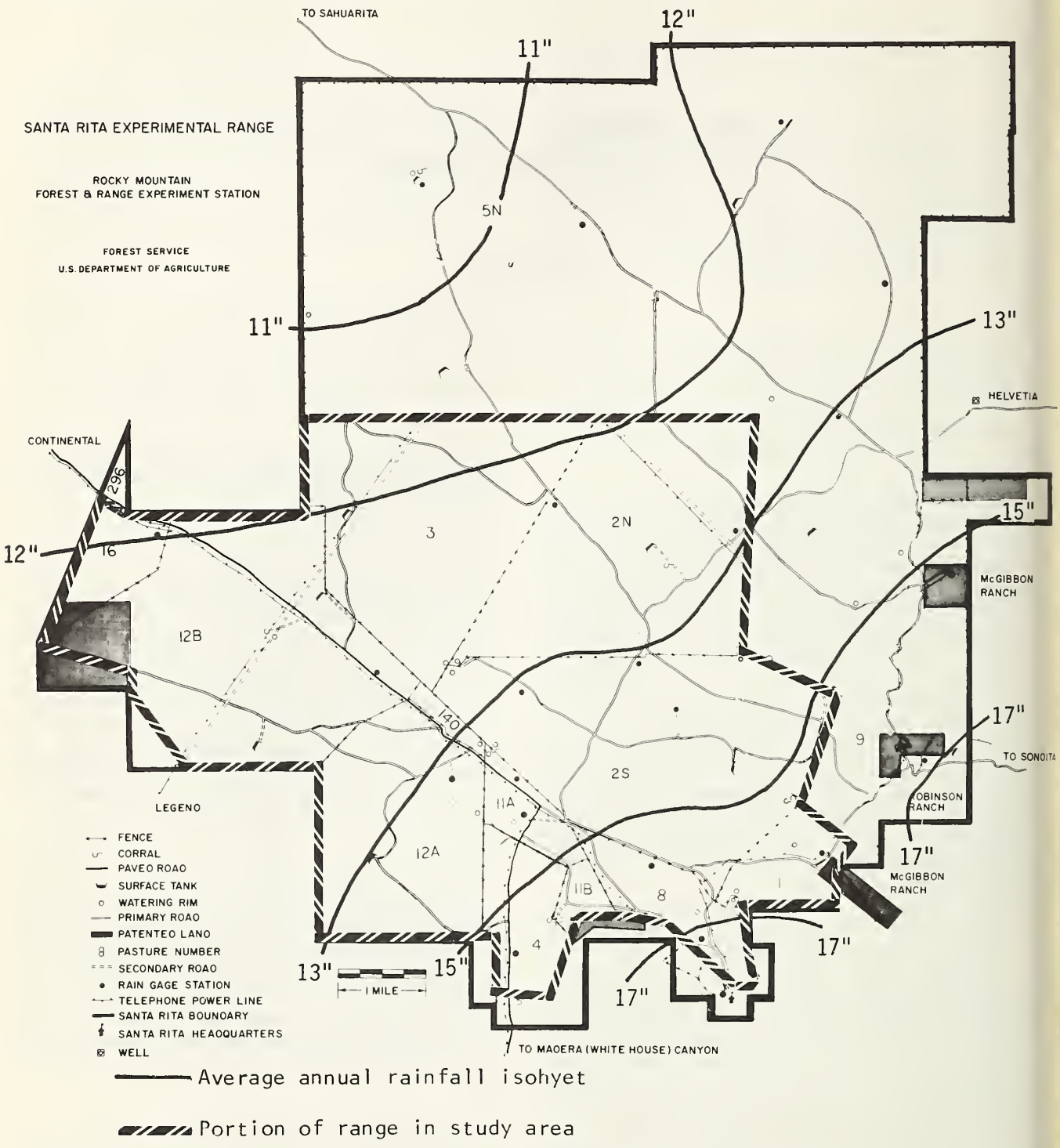

Figure 1.—Map of study area with approximate rainfall isohyets. Major pastures on which stocking is based are 1, 2N, 2S, 3, 4, 8, 12A, and 12B.

production from 1954 to 1967 averaged 82 pounds per acre in the lowest yielding pasture, and 643 pounds per acre in the highest. Total stocking for the eight pastures averaged 283 animal units yearlong, and varied from a low of 220 animal units yearlong in 1965-66 to a high of 400 in 1959-60. An animal unit was considered to be a cow and calf (from date of birth to November 1), or a bull. Calves weaned November 1 were rated as yearlings at 0.6 animal unit. Calculated stocking for 40 percent use of the perennial grass forage for the same period ranged from 159 animal units yearlong in 1965-66 to 368 in 1959-60, and averaged 226.

Stocking Rates

Records of utilization and stocking for the eight pastures were used to compute the estimated proper stocking for the entire range each year from 1941 through 1969. Proper stocking for a pasture was computed as follows:

$$\text{Proper stocking} = \begin{matrix}\text{Average}\\ \text{yearlong}\\ \text{stocking}\end{matrix} \times \frac{40}{\begin{matrix}\text{Actual use (\%) on}\\ \text{perennial grasses}\end{matrix}}$$

Proper stocking for the range was the sum of the eight pasture values. Yearly proper stocking levels were expressed as percentages of the average proper stocking for the 29-year period. These relative ratings were rounded to the nearest 10 percent with a maximum value of 140 (fig. 2). These computed yearly stocking levels were used to determine the effect of each stocking strategy on "net sales."

Herd Composition

All calculations were based on a 100-animal-unit herd. Variables tested were: numbers of bred cows, age at first calf, and age to cull cows. The first evaluations were for 40-, 50-, 60-, and 70-cow herds. Additional comparisons for selected strategies were then made for 72-, 78-, and 87-cow herds. Calving was assumed to occur in late winter or early spring (December-March) with heifers bred to calve either at age 2 or age 3. Cows were culled for age around November 1 as they approached their 8th or 10th birthday. Herd composition was computed as of November 1, after fall roundup and sale (table 1). Computations assumed calf crops of 90 percent, no death losses, and no second culling or replacement heifers.

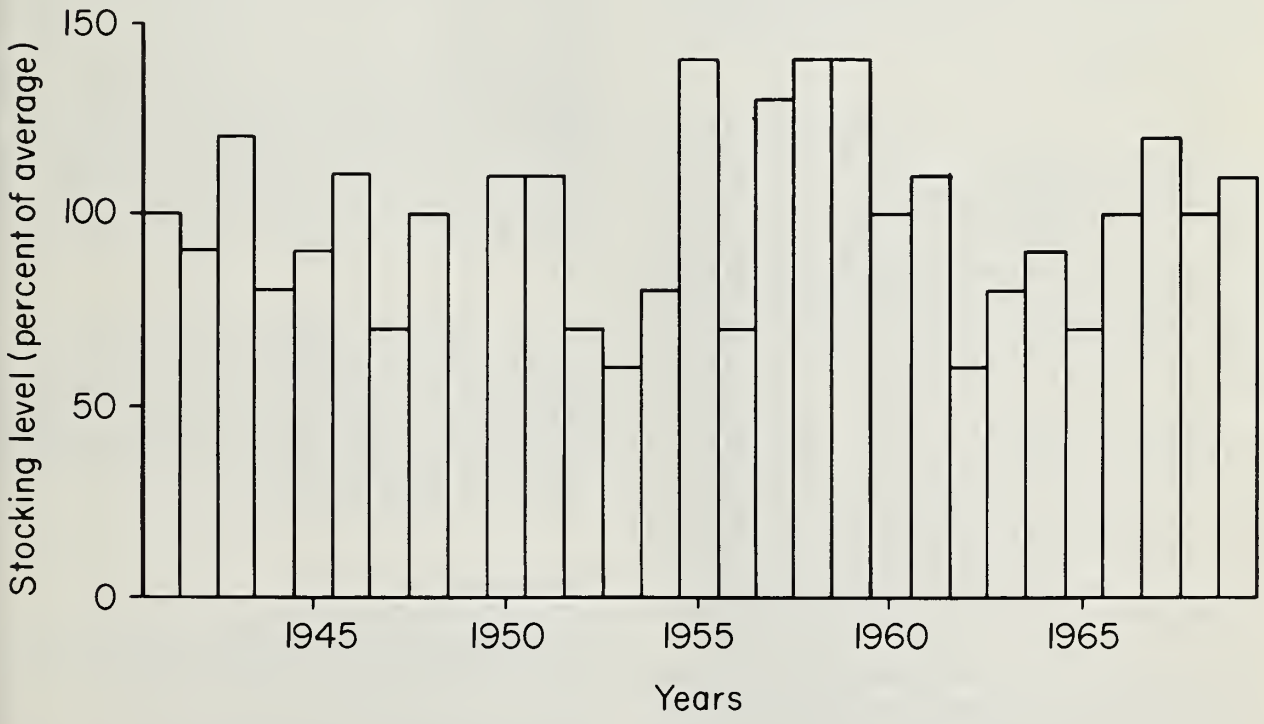

Figure 2.—Stocking level that would have made proper use of the current forage each year during the study, expressed as a percentage of the average stocking level.

Table 1.--Average number of animals of each class per 100 animal units of cattle, with different sizes of breeding herd, calving ages, and culling ages for cows

Stocking plan and animal class	Bred cows per 100 animal units			
	40	50	60	70
CALVE AT AGE 3:				
Cull at age 8 (after 5th calf)--				
Bulls	2	2	3	3
2-year heifers	8	10	12	14
Weaner heifers	8	10	12	14
Holdover weaners	28	35	30	8
Purchased weaners	47	18	0	0
Total number animals	133	125	117	109
Cull at age 10 (after 7th calf)--				
Bulls	2	2	3	3
2-year heifers	6	7	9	10
Weaner heifers	6	7	9	10
Holdover weaners	30	38	38	18
Purchased weaners	51	23	0	0
Total number animals	135	127	119	111
CALVE AT AGE 2:				
Cull at age 8 (after 6th calf)--				
Bulls	2	2	3	3
Weaner heifers	7	8	10	12
Holdover weaners	29	37	44	33
Purchased weaners	61	35	8	0
Total number animals	139	132	125	118
Cull at age 10 (after 8th calf)--				
Bulls	2	2	3	3
Weaner heifers	5	6	8	9
Holdover weaners	31	39	46	36
Purchased weaners	61	35	8	0
Total number animals	139	132	125	118

Stocking Strategies

Three levels of constant stocking were compared with "flexible" and "limited flexible" stocking. The levels of constant stocking were: average, 90 percent of average, and 80 percent of the average proper stocking rate. "Flexible" stocking allowed the number of animal units to fluctuate from 60 to 140 percent of the average proper stocking level, strictly in accordance with the forage crop. "Limited flexible" stocking restricted the stocking range to from 70 to 110 percent of average:

Forage crop	Flexible stocking	Limited flexible stocking
	(*percent of average*)	
60 or less	60	70
70	70	80
80	80	90
90	90	90
100	100	90
110	110	100
120	120	100
130	130	110
140 or more	140	110

Two plans were tested for culling in years when forage production was less than the year before. In the first plan the priorities were: (1) sell weaner calves normally held for sale as yearlings, (2) sell replacement weaner heifer calves, (3) sell replacement heifers (coming 2-year-olds), (4) sell cows from the breeding herd (oldest cows first). In the second plan, old cows were always sold first and replacement heifers last in order to maintain the replacement herd.

Priorities for increasing stocking in years when forage production was greater than the year before were: (1) if the number of bred cows under 8 years of age is less than the number needed to meet the stocking plan for an average year, hold cows that would normally be culled for age;[3] (2) hold calves normally sold as weaners; (3) buy weaner calves.

Effects of Strategies on Net Sales

For herds with 40 to 70 cows, average annual net sales per 100 animal units ranged from $4,621 to $6,988 (table 2). The two factors that influenced average net sales most were calving age and number of cows per 100 animal units.

Calving Age

Average net sales for herds calving at age 2 exceeded those of herds calving at age 3 by from

[3] *The maximum number of bred cows held was the number required for an average year and the option of holding cows beyond normal culling age was not considered to be available if cows normally were culled at age 10.*

Table 2.--Average annual net sales per 100 animal units under selected stocking strategies

Stocking plan and animal class	Bred cows per 100 animal units			
	40	50	60	70
CALVE AT AGE 3:				
Cull at age 8--				
Flexible	$5282	$5460	$5804	$5869
Limited flexible	5096	5329	5564	5887
Constant at average	5559	5792	6007	6240
Constant at 90%	5076	5309	5552	--
Constant at 80%	4621	4854	--	--
Cull at age 10--				
Flexible	5468	5725	5743	5850
Limited flexible	5270	5576	5735	5797
Constant at average	5716	6054	6243	6490
Constant at 90%	5234	5572	5789	6006
Constant at 80%	4775	5090	5328	--
CALVE AT AGE 2:				
Cull at age 8--				
Flexible	5705	6058	6327	6599
Limited flexible	5512	5864	6156	6489
Constant at average	5975	6327	6601	6953
Constant at 90%	5489	5839	6146	6496
Constant at 80%	5038	5394	5663	--
Cull at age 10--				
Flexible	5691	6103	6381	6615
Limited flexible	5503	5924	6208	6516
Constant at average	5966	6387	6687	6988
Constant at 90%	5483	5906	6200	6531
Constant at 80%	5028	5451	5716	6076

$223 to $765. The advantage of calving at age 2 was greatest for the 70-cow herds, for which net sales were $500 to $700 greater than for herds calving at age 3. Thus, the advantage of earlier calving increased as the number of bred cows per 100 animal units increased from 40 to 70 cows.

Number of Cows

Net sales also increased consistently as the size of cow herd increased (table 2). Within the range from 40 to 70 cows, increases varied from as little as $12.75 per cow to as much as $34.94. Increases in net sales per unit of cow increase were greater for herds calving at age 2 than for those calving at age 3. Net sales for 70-cow herds averaged as much as $1,000 greater than for 40-cow herds.

Age to Cull

Cull age had no consistent effect on average net sales if cows were bred to calve at age 2. Culling at age 10 increased net sales slightly if cows were bred to calve at age 3, and the advantage was consistently greater for 40- to 50-cow herds than for herds of 60 to 70 cows. These results include no adjustments for changes in productivity of cows with age.

Culling Plan

Simulated net sales were about the same for the two culling plans used in flexible stocking. In practice, however, there would be a real advantage in maintaining the breeding herd if cow numbers were high. If emphasis was on maintaining the cow herd, and if cows were bred to calve at age 2 and were culled at age 8, the number of replacement heifers required each year for a 42-cow herd was always seven. The top seven heifer calves therefore could be selected each year to go into the breeding herd. For a 72-cow herd with a normal replacement of 12 heifers, however, there were years when no heifers were kept, and in others the entire crop of heifer calves was needed for replacement, leaving no opportunity to cull. This problem was avoided if a fixed number of replacement heifers was kept each year, and reductions in time of drought were made by selling the older cows.

Constant Stocking

Net sales under constant stocking were reduced about $470 for each 10 percent reduction in the level of stocking. And, for a given stocking level, changes in calf prices accounted for up to 96 percent of the year-to-year change in net sales. The effect of forage production on net sales was negligible (fig. 3). In real life this is not strictly true, of course, because calf weights and calf crops are affected by forage conditions.

The highest simulated average net sales resulted from constant stocking at the average level of proper stocking. This strategy is not realistic, however, because there were too many years when the range was overstocked. High feed bills and other emergency costs in the poor years can easily outweigh the apparent advantage in net sales.

Since constant stocking at average capacity often results in high feed bills and range deterioration, constant stocking at 90 percent of average capacity is almost certain to be more profitable in the long run. But, how do you know when you are stocked at 90 percent of average capacity? Utilization is one clue. In the average year, about half of the perennial grass

plants should be ungrazed at the end of the grazing season. The percentage of ungrazed plants may vary from as low as 10 percent in dry years to 70 to 75 percent in years of high production, but the average over a period of years should be close to 50.

Flexible Stocking

Net sales under all flexible stocking plans were affected only slightly by changes in cattle prices, but were related strongly and negatively to changes from the previous year in forage production. High net sales came when livestock numbers were reduced because forage was scarce. Conversely, net sales were low when the forage crop improved.

Net sales under flexible stocking (60 to 140 percent of average) were second only to constant stocking at the average proper level. Yearly changes in income were extreme, however, with high income when a poor forage year followed a high production year, and low or negative net sales if a good year followed a poor one (fig. 4). Changes in forage conditions accounted for 70 percent of the year-to-year change in net sales, and changes in cattle prices only for 14 percent. Net sales under flexible stocking were lower than for constant stocking mainly due to the cost of buying stocker calves in years of high forage production. Flexible stocking, like constant stocking at average capacity, can result in high feed bills or other expensive emergency measures when a poor year follows an extremely good one.

Limited flexible stocking, in which stocking ranged from 70 to 110 percent of the average proper stocking level, produced average net sales $50 to $200 less than for flexible stocking—about the same as for constant stocking at 90 percent of average capacity. This system eliminated the need to buy stocker calves, and net sales were always positive.

Flexible stocking, by forcing the rancher to sell extra animals in poor forage years, and buy cattle in good years, may cause him to sell on a depressed cattle market and to buy on one that is inflated. Our results show, however, that the average impact of this marketing disadvantage was not great. For example, if current prices were applied to each year's sales and purchases, average net sales under flexible stocking (a 72-cow herd with cows bred to calve at age 2 and culled at age 8) were $6,659. For the same strategy and herd composition, average cattle prices

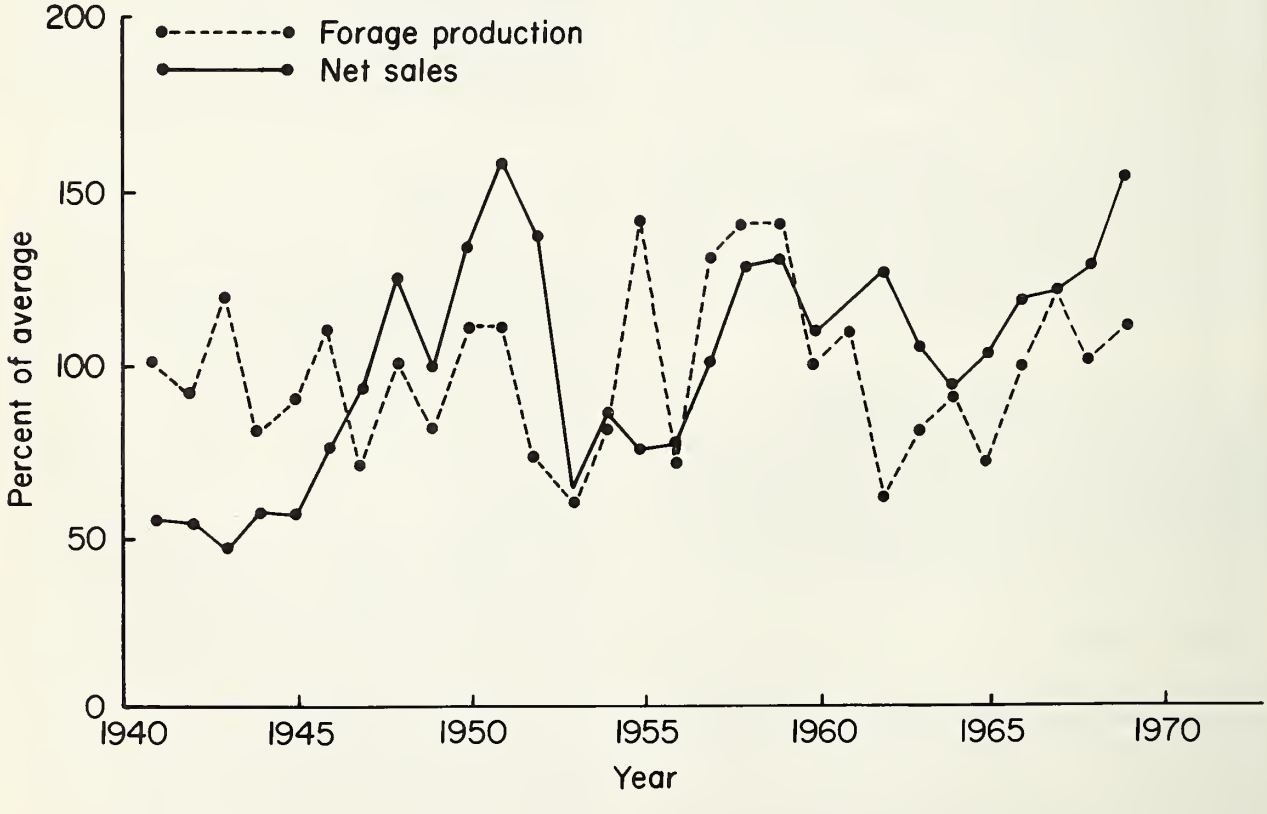

Figure 3.—Relation between relative values for forage production, and net sales under constant stocking at 90 percent of average proper stocking.

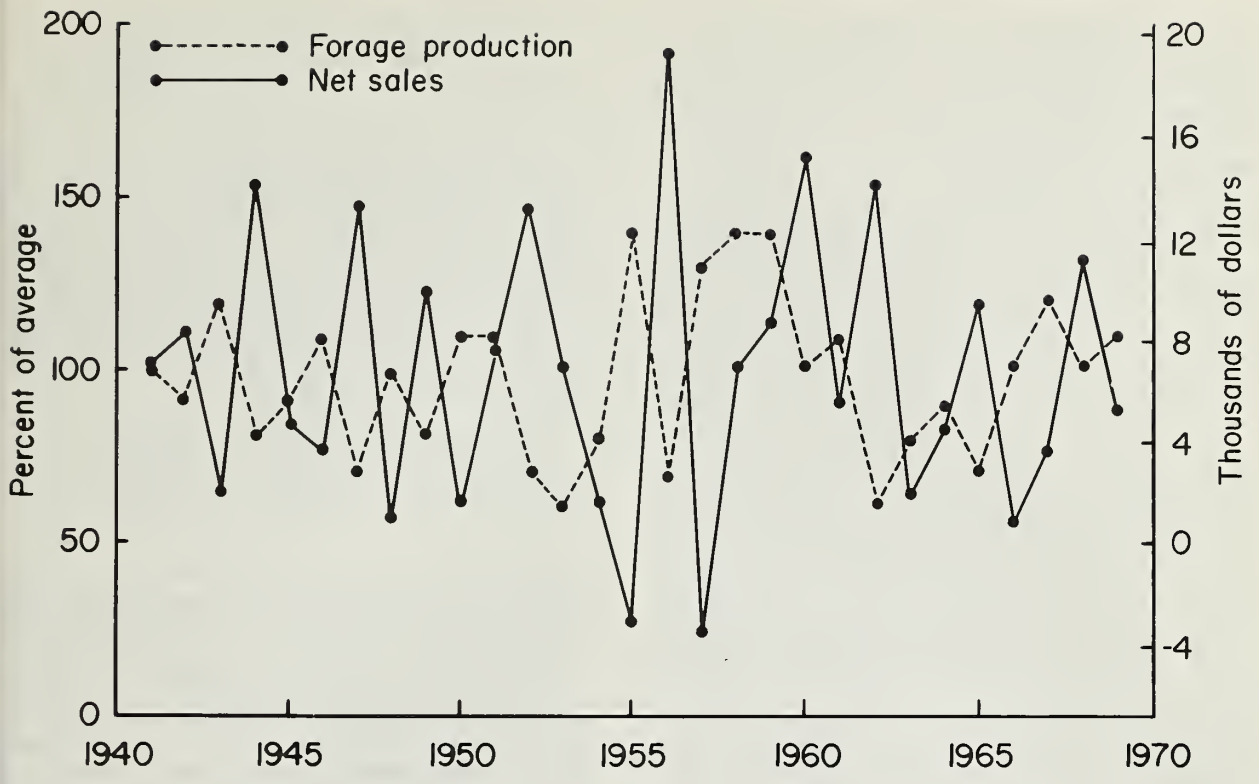

Figure 4.—Relation between forage production and value of net sales under flexible stocking at constant livestock prices. Data are for a 72-cow herd bred to calve at age 2 and culled at age 8, using average prices for the 29-year period.

for the 29-year period would have generated $6,750 in net sales. Thus, the average annual loss per 100 animal units due to selling or buying at current prices was only $91.

Risk of Overstocking

Net sales should not be the only consideration in deciding on a plan of stocking. The hazards and high costs of overstocking in the dry years must also be considered. The apparent risks of overstocking for several of the stocking plans are indicated by the number of years during the 29-year study period when actual stocking would have exceeded the forage supply by given percentages (table 3).

Constant stocking at average capacity and flexible stocking would result in overstocking almost half the time, with 1 year in 5 or 6 being high by over 40 percent. Such overstocking would occur during the summer growing season in dry years when the perennial grasses are most susceptible to damage from repeated close grazing. The costs of such frequent overstocking in damage to the range and high feed bills during drought rule out these systems for both economic and conservation reasons. Main-

Table 3.--Numbers of years in the study period when stocking during the summer growing season under different stocking plans would have exceeded production by given percentage

Stocking plan and range in stocking (Animal units)	Stocking exceeded forage production by--					
	0	1-20%	21-40%	41-60%	61-80%	81+%
	Number of years					
Flexible (60-140 AU)	18	3	3	3	0	2
Limited flexible (70-110 AU)	20	2	3	3	1	0
Constant (Average capacity) 100 AU-100)	16	3	4	4	2	0
Constant (90% of average) 90 AU-90)	19	4	4	2	0	0
Constant (80% of average) 80 AU-80)	23	4	2	0	0	0

taining average stocking is particularly harmful when two or more dry years occur together, because the degrees of overstocking increases each year as forage production declines. The impact of flexible stocking is worst when a high production year is followed by a summer of extreme drought.

The hazards of overstocking with constant stocking at 90 percent of average capacity and with limited flexible stocking were about equal in some respects, but there were differences. Both would result in overstocking during the summer growing season about 1 year in 3 with an excess of more than 40 percent about 1 year in 15 for constant stocking and 2 years in 15 for the flexible plan. Both systems would meet the needs of forage and livestock in most years, although some feeding might be necessary in the poorest years. Limited flexible stocking resulted in 2 consecutive years of overstocking only once, 1952 and 1953. Constant stocking at 90 percent of average proper stocking resulted in 3 consecutive years of overstocking once (1952-53-54) and in 2 consecutive years once (1962-63). The degree of overstocking in a 1-year drought or during the first year of a prolonged drought was almost always higher for the limited flexible plan than for constant stocking. But if the drought lasted more than 1 year, overgrazing during subsequent drought years was lower under the limited flexible plan.

Grazing damage during drought also depends on the grazing system. In a prolonged drought, with constant stocking the degree of overgrazing increases each year under yearlong grazing. Appropriate rest-rotation grazing systems normally prevent heavy use of the same area in 2 years in a row. Under flexible stocking, however, overgrazing in the first drought year can be more severe under rotation grazing than under yearlong grazing because the rate of stocking during the summer growing season is much greater.

Cows or Yearlings

Do breeding cows or yearlings make more efficient use of the forage crop? The answer hinges primarily on the relative differences in prices of calves and yearlings, on the relative amount of forage consumed by each class, and on the percentage of calf crops. During the 29-year study period the average sale prices of cattle were: cull cows $107.76, calves $91.88, and yearlings $120.33. For maximum calf production, a breeding herd composed of 87 cows, 4 bulls, and 15 replacement weaner heifers is assumed, with average sales of 63 calves and 14.5 cull cows per 100 units with constant stocking, 90 percent calf crop, and no death losses. If cows calve first at age 2 and are culled at age 8, expected net sales per 100 animal units of stocking then would be:

63 calves at $91.88	=	$5,788.44
14.5 cows at $107.76	=	1,562.52
		$7,350.96

or $73.51 per animal unit grazed.

How do these values compare with income per animal unit of yearlings? A herd composed of 63 cows, 3 bulls, and 11 replacement weaner heifers plus 46 carryover weaner calves also constitutes 100 animal units, with all calves held over a full year and sold as long yearlings or finally as cull cows. The income from such a herd with cows calving at age 2 and culled at age 8 would be:

46 yearlings at $120.33	=	$5,535.18
10.5 cull cows at $107.76	=	1,131.48
		$6,666.66

or $66.67 per animal unit grazed. Thus, raised yearlings would return about $7 less per animal unit of grazing than would calves marketed in the fall.

If yearlings are bought, the return per animal unit of yearlings is the difference between the calf and yearling price adjusted for forage consumption. This turns out to be $47.72. Net sales for cows and calves and for raised yearlings decline with the calf crop (table 4). Livestock prices during the study were such that cows and calves always provided a higher return than yearlings. Only if calf crops dropped to 60 percent would return from purchased yearlings approach that of cows and calves.

Table 4.--Effect of calf crop on net sales from cow-calf and cow-yearling operations

Calf crop (%)	Value of net sales per animal unit stocking		
	Calf-cull cows	Raised yearlings	Purchased yearlings
90	$73.51	$66.66	$47.42
80	66.15	58.24	47.42
70	57.89	51.02	47.42
60	47.78	46.21	47.42
50	42.47	36.58	47.42

The relative economic advantage of cows and calves over yearlings depends mainly on differences in weight and price per pound between calves and yearlings. We calculated the price that must be received for yearlings of different weights in order to bring as much money as would be obtained by selling calves in the fall. We assumed that 1.67 carryover yearlings were the equivalent of a cow and calf, that net sales from cull cows would be worth 25 percent of the value of calves or yearlings sold, and added 6 percent interest to the value of the calf. We

considered yearling weights ranging from 350 to 950 pounds, and calf prices of 25 to 65 cents per pound.

The calculations show that if calves and yearlings sell for the same price per pound, yearlings must weight about 550 pounds to bring in as much money as cows and calves (table 5). Yearlings weighing 500 pounds or less must sell at a premium price to be equivalent in value. On the other hand, the break-even price for 650-pound yearlings was from 4 to 10 cents less per pound than for calves. What these figures mean for southern Arizona is that, if calves are held over until the fall of their second year, and if they weigh at least 650 pounds, they stand a good chance of returning net sales superior to those of cows and calves. On the other hand, if calves are held only until late May, they probably will have gained less than 150 pounds and usually will produce less income than if they had been sold in the fall.

Table 5.--Break-even price for yearlings, compared to that for 400-pound calves sold in the fall

Weight of yearling (pounds)	Comparative price per pound for calves sold in fall				
	$0.25	$0.35	$0.45	$0.55	$0.65
	Break-even price for yearlings				
350	$0.40	$0.56	$0.71	$0.87	$1.03
450	.31	.43	.56	.68	.80
550	.25	.35	.45	.56	.66
650	.21	.30	.38	.47	.56
750	.18	.26	.33	.41	.48
850	.16	.23	.29	.36	.42
950	.15	.20	.26	.32	.38

Discussion

The results of this study do not fully support such popular beliefs as: (1) cow herds should not exceed 60 percent of the total stocking, (2) cow-yearling operations produce more income than cow-calf operations, (3) heifers should be bred to calve first at age 3, and (4) stocking must be flexible. Rather, the results indicate that (1) the breeding herd should be maximized by calving at age 2 and carrying a minimum number of replacement heifers, and (2) stocking should be relatively constant, but at a level somewhat below the average "proper" stocking level.

Our results show no advantage in keeping the cow herd to 60 percent of total stocking. Regardless of other conditions, net sales increased as the size of the breeding herd increased. It was apparent, however, that high cow numbers could seriously upset the breeding program if culling practices under flexible stocking emphasized maintaining the cow herd. The reason is that, in years of high production following a drought, the entire heifer crop must be held for replacement and none can be culled. This problem can be overcome by holding a fixed number of replacement heifers each year and culling older cows in drought. Average differences in net sales between the two culling practices were negligible. And, for both systems, average net sales increased as the percentage of breeding cows increased. This suggests that a reduced breeding herd can be recommended only if it is more profitable to market yearlings than calves.

At average prices during the study, cow-calf units would produce more income per animal unit of stocking than cow-yearlings units, so long as the calf crop was 60 percent or better. And, at equal prices per pound, yearlings would have to weigh 550 pounds to produce as much income as 400-pound calves. In southern Arizona, yearlings held over a full year and sold in the fall might easily weigh enough to justify keeping them, but if they are held only until the following May they probably will not. This introduces another consideration. If yearling numbers are increased in the fall in a year of high forage production, they should be sold, or at least removed from the range, the following May or June to avoid possible severe overgrazing during the summer growing season.

The relative merits of marketing range animals as calves or yearlings also depend on economic conditions. Abundant, cheap feed grains make light weight cattle a good buy for the feeders and favor cow-calf production. Expensive feed shifts the advantage toward the cow-yearling production. Cattle prices also have an impact. Sustained periods of high calf prices tend to increase cow numbers as well as the number of animals marketed. Recent developments suggest that a general shift from cow-calf to cow-yearling operation may be in order. High feed prices in 1974 and 1975 and lower prices for slaughter beef caused calf prices to drop sharply, slowed the flow of animals to market and resulted in high cattle numbers. A shift to cow-yearling operation could reduce the number of animals marketed by about 27 percent. This could relieve the apparent oversupply of beef as well as reduce cattle inventories. Cow-yearling production would greatly reduce the amount of grain fed to beef cattle because animals would enter the feed lot 200 to 400 pounds heavier and because about 27 percent few animals would be fed.

Calving at age 2 consistently resulted in higher net sales than did calving at age 3. The reason, of course, is that the younger calving provides more bred cows per 100 animal units. Successful calving at

age 2 may require special effort, however. Breeding heifers to bulls of a small-boned breed may reduce calving problems. Also, first-calf heifers should always be pregnancy tested. Any heifer not with calf should be sold. Her place in the herd can be filled by holding a good pregnant cow that would otherwise be culled for age. This points up the value of culling at age 8 rather than at 10. Many of these 8-year-old cows can be held an additional year or two if they are needed to replace younger cows that are culled because they are not with calf or for other reasons.

One appeal of flexible stocking is that it allows more complete use of the forage in high production years. This is commonly believed to increase ranch income, thereby offsetting low income and high expense in years of low production. The results of this study show, however, that net sales per 100 animal units obtained by increasing stocking to 120, 130, or 140 percent of average in the best years were only $100 to $200 greater than for constant stocking at the 90 percent level or for limited flexible stocking. In practice, this small monetary advantage would probably be offset by the apparent disadvantages of the flexible system. These include the sheer difficulty of estimating forage crops and adjusting animals accordingly, possible serious damage to the range in years of low forage production when stocking is high due to high production the year before, the administrative costs of buying extra animals to stock the range in good years, the possibility of introducing parasites or disease with cattle from off the range, and the natural reluctance to cull as heavily as necessary for the good of the range in years when forage production is low.

An easier plan to administer is constant stocking at a conservative rate, say 90 percent of average carrying capacity. Under this system, a fixed number of replacement heifers are held each year and the number of calves and older cows sold each year is relatively constant. The rancher who follows a constant stocking plan still needs to make sure, however, that he is not overestimating the average capacity of his range. Constant stocking at 90 percent of average capacity will have a much different longtime effect on the range than will stocking at average. It is almost certain that stocking at 90 percent of average will be more profitable in the long run, because production of the moderately grazed range will be maintained or improved, while that of heavily grazed range will almost surely decline. Constant stocking at 90 percent of average proper stocking, with some stocking reductions in prolonged severe drought, appears to offer stability of operation, relatively high income, and moderate to low risk of damage to the range or financial crisis during drought.

Martin S. Clark.
1975. Stocking strategies and net cattle sales on semidesert range. USDA For. Serv. Res. Pap. RM-146, 10 p. Rocky Mt. For. and Range Exp. Stn., Fort Collins, Colo. 80521

The impact of variable forage yields on income from semidesert range was simulated over a 29-year period for several stocking strategies. Stocking factors evaluated were cull age for cows, age of cows at first calf, number of cows per 100 animal units total stocking, several levels of constant stocking, and two plans of flexible stocking. Results indicate that the cow herd should be maximized, that cows should be bred to calf at age 2 and culled at age 8, and that constant stocking at 90 percent of average proper stocking produces relatively high income as well as relatively low risk of overstocking.

Keywords: Range management, semidesert ranges, ranch income.

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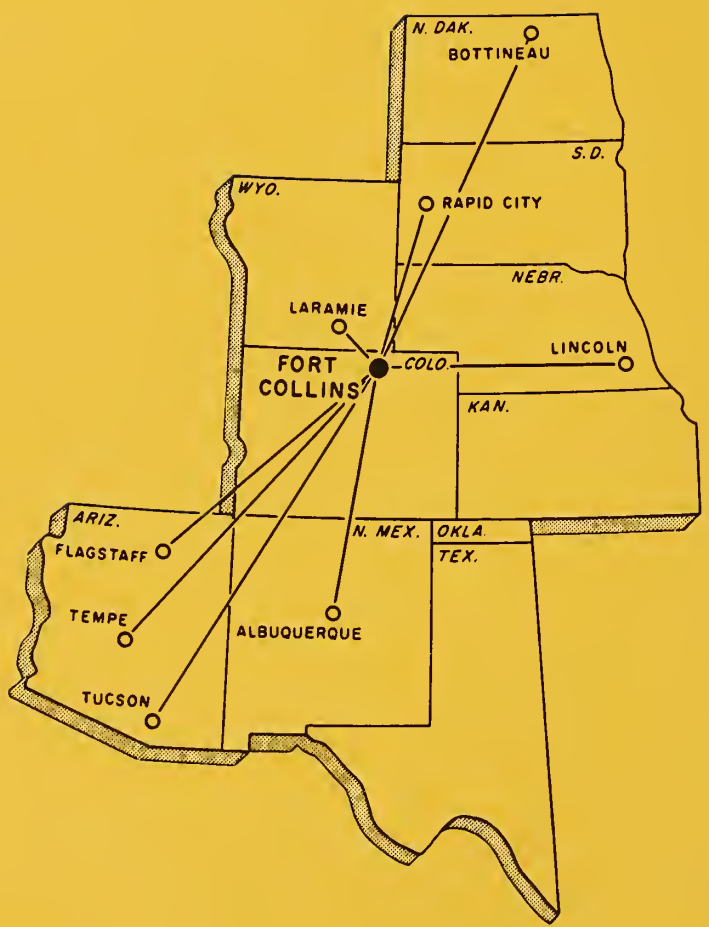
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