Profitability and Flexibility of Two Range Cattle Systems in the Rolling Plains of Texas

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Highlight

Adjusting cattle inventories to changes in range forage supply is a major problem in ranching. A costs and income analysis of a cow-calf system and of a cow-yearling system over a 10-year period of changing prices and range forage supplies revealed little difference in relative profitability between the two systems when additional replacements were purchased in response to increases in range forage supply. When additional replacements were raised, the cow-yearling system proved to be more profitable and more flexible than the cow-calf system. In shifting to a cow-yearling system, breeding cow numbers must be reduced in proportion to the increase in yearlings if overgrazing is to be avoided.

Livestock ranching occurs in an environment of low and highly variable rainfall, heterogenous soils, topography and vegetation, and low per-acre production of forage. The two main sources of uncertainty that affect the likelihood of earning profits in ranching are weather variations, and the subsequent effects on range forage production, and fluctuations of livestock prices.

Considering that information about future range forage supply and livestock prices is uncertain, ranchmen often prefer situations which permit them to readjust to improved information that comes with the passage of time. Such situations are flexible, and the ability to readjust is referred to as flexibility (Bradford and Johnson, 1953). The length of the livestock production period and the difficulty of buying or raising replacements on short notice result in a high degree of inflexibility that frequently hinders ranchmen in attempting to adjust their operations quickly in response to changing range forage supply. Holding livestock too long waiting for rains to increase range forage supply may result in overgrazing that eventually would lower future forage production. Increasing livestock inventories to utilize increases in range forage supply is difficult, for replacements and stocker animals of the desired quality and quantity are sometimes unavailable to buy, and they require considerable time to raise.

The purpose of this paper is to compare the profitability and flexibility over the 10-year period 1955 through 1964 of two range cattle systems on the same ranch located in the Rolling Plains Land Resource Area of Texas. One is a cow-calf system; the other is a cow-yearling system. Each system is given 2 options; number 1 is to buy replacements as range forage supply increases; number 2 is to grow the additional replacements needed to utilize increased forage supplies. Both systems include the selling of additional cattle as range forage supply declines.

Procedures

The ranch used in this analysis was synthesized from data obtained during a 1964 ranch economic survey in the Rolling Plains; the assumptions and procedures followed in constructing the ranch budgets follow closely those of Cooperative Regional Project W-79, "Economic Analysis of Range and Ranch Management Deci-

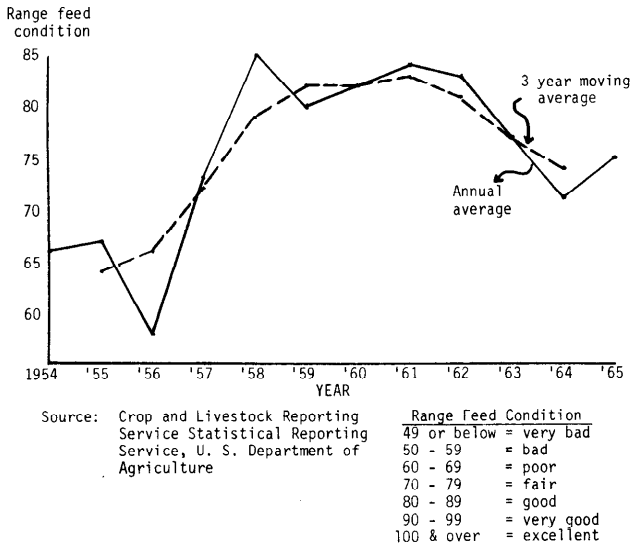

FIG. 1. Range feed condition, Rolling Plains Land Resource Area of Texas, 1955-1964.

sions on Western Livestock Ranches." The ranch is 8,380 acres in size, all rangeland. The operator owns 6,788 acres and leases 1,592 acres. Although the stocking rate varies from year to year, the estimated average safe stocking rate for the 10-year period, based on the range site and condition classification used by the Soil Conservation Service, is 19.72 acres/animal unit yearlong. Average ranch size therefore is 425 animal units, yearlong. Mature cows constitute 73.5% of the average animal units for the cow-calf system, and only 45.9% for the cow-yearling system. At 1964 prices, total investment amounts to $512,925 for the cow-calf system or $1,207/animal unit, and $508,740 for the cow-yearling system, or $1,197/animal unit. Land, valued at $60/acre, constitutes more than 80% of the total investment.

The average annual range feed condition index as compiled by the Crop and Livestock Estimates Division of the Statistical Reporting Service, U.S. Department of Agriculture was used as a measure of range forage supply to which grazing pressure was adjusted. This index, based upon observations by reporters in the field, is not comparable to the term "range condition," which is used by range management specialists to describe the present productivity capacity of the range in relation of its long-term productivity (Clawson, 1948).

As illustrated in Fig. 1, the average annual range feed condition varied from a low of 58 or bad condition, during the drought year of 1956 to a high of 85, or good condition during the post-drought year of 1958, for an average of 76, or fair condition for the 10-year period. Also, forage production was highly variable, making it almost impossible, except under a buy-sell stocker system, to keep cattle numbers and grazing pressure in accord with changes in range feed condition. Therefore, a 3-year moving average of range feed condition was calculated to represent the norm to which animal unit months of grazing were adjusted. The problem with either the cow-calf system or the cow-yearling system was to adjust cattle inventories as rapidly as possible to utilize an increase in range forage supply, and to sell cattle to avoid overgrazing during a period of reduced range forage supply. Such adjustments were made in proportion to annual changes in range feed condition, with total animal units in each cattle system varying from a low of 354 in 1955 to a high of 459 in 1961. For the years when the 3-year moving average range feed condition was higher than the annual average range feed condition, such as in 1956, less supplemental feed was fed. When the 3-year moving average was lower than the annual average, such as in 1958, more supplemental feed was fed.

Decisions with either range cattle system, and for either of the 2 options, were made with full knowledge of what the range condition was during the 10-year period. No adjustments were made in livestock inventories or production practices on the basis of price.

Under the cow-calf system of production, the cows were bred in the summer to calve in the early spring, and to wean calves in the fall. Sales of calves occurred in November. In the cow-yearling system the same breeding program was followed, except that all the calves were held over until the following November, at which time all the yearlings were sold except for those heifers necessary to replace cull cows and death losses.

For purposes of this analysis, management levels as reflected through calf crop percentages, death losses, replacement rates, feeding rates, labor use, and other factors were considered to be the same for each cattle system and for each year. The calf crop was 85.1%; death loss of mature cattle, 1.5%; and replacement rate, 13.2%. Similarly, weights of cattle sold remained constant. Cows were sold at 1,000 lb, steer calves at 500 lb, heifer calves at 485 lb, yearling steers at 804 lb, and yearling heifers at 782 lb. Under option 2, selling weights of yearlings were adjusted downward when they were sold early to reduce grazing pressure on a reduced range forage supply.

Results

Under option 1 of the cow-calf system, where additional cows were purchased as range feed condition improved, the index of sales of pounds of cattle and calves per year more closely followed

the 3-year moving average range feed condition index than did the cow-calf system, option 2 (Fig. 2). Over the 10-year period, an average of 10 cows/year were purchased in response to improved range feed condition, while an average of 5 cows/year were sold as range feed condition declined (Table 1). Purchases of cows were required from 1956 through 1959 as the drought of the 1950's ended, and again in 1961 as range feed condition hit a peak. Additional sales of cows were necessary from 1962 through 1964 as range feed condition declined.

Adjustment of livestock numbers and cattle sales in response to increases in range feed condition was much slower for the cow-calf system under option 2, where additional replacements were held over from the current year's calf crop. There was a lag of more than one year before the heifer calves reached breeding age, and a lag of another year before these heifers produced a calf. As a result the index of cattle sales at first decreased as the range feed condition index increased. As range feed condition decreased, sales of cattle and calves at first increased, and then decreased.

Such a sales lag was not as marked in either of the options for the cow-yearling system. In option 1, additional breeding cows were purchased in response to improved range feed conditions; consequently adjustments were much more rapid than when heifer yearlings were held over to increase the size of the breeding herd. In both options only a few breeding cows were sold in response to the decline of range feed condition. Instead, grazing pressure was reduced as range feed condition declined by selling yearlings in the spring months rather than in the fall. An average of only 2 cows were purchased per year. These purchases occurred during 1958 and 1959 following the drought, and again in 1961. Sales of an average of only 1 additional cow/year occurred above the normal sales of culls. These additional sales occurred only in 1962 during a sharp decline in range feed condition (Fig. 3).

Sales of cattle and calves were valued by prices quoted at the Ft. Worth Livestock Market for the weight and grade of the animals sold, and month in which sales occurred. Prices varied considerably from 1955 through 1964. An index of prices received for steer calves and feeder steers are compared with an index of range feed condition in Fig. 4, using 1955-1964=100 as a base, to illustrate the price levels and range forage supply for each year in which the two cattle systems were analyzed. Input prices of 1964 were adjusted by the Index of Prices Paid By Farmers to reflect the

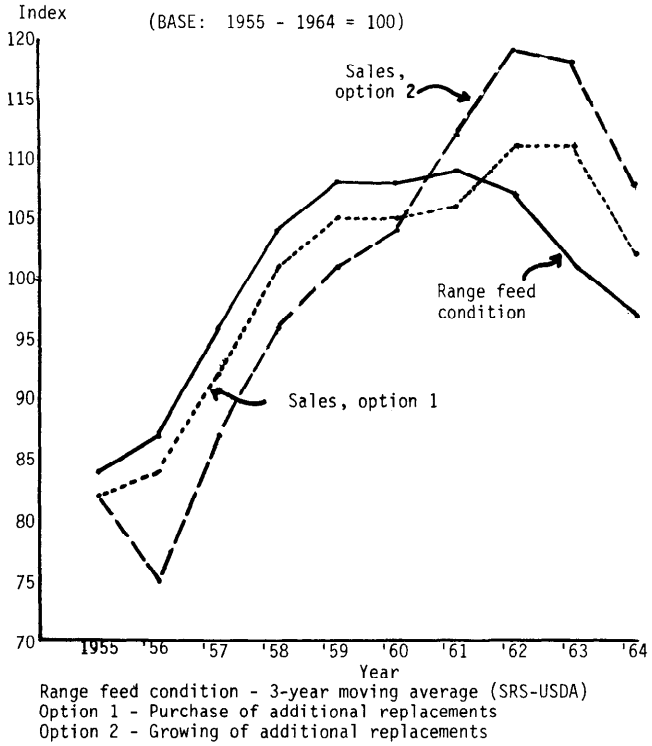

FIG. 2. Index of pounds of cattle and calves sold, and index of range feed condition, cow-calf system, 1955-1964. (Base: 1955-64=100)

Table 1. Average number of cattle and calves sold and cows purchased, 425 animal unit cow-calf and cow-yearling systems, 1955-1964.

Item	Cow-calf system Option		Cow-yearling system Option	
	1	2	1	2
No. cows in herd	373	373	259	259
No. animal units[1]	425	425	425	425
A. Number cattle sold:				
1. Cows, culls	44	44	30	30
2. Cows, drought-induced sales	5	5	1	1
3. Calves, total	230	212		
4. Yearlings, total			186	184
B. No. cattle purchased				
1. Cows[2]	10	0	2	0

[1] Dry cow=1.00 A.U., cow with calf=1.30 A.U., heifer or steer yearling=.67 A.U., calf=.50 A.U., mature bull=1.40 A.U., and horse =1.25 A.U.

[2] Option 1—Additional replacement cows are purchased in adjusting to range feed condition.

Option 2—No replacement cows are purchased in adjusting to range feed condition. Necessary additional replacements are carried over from weaned heifer calves.

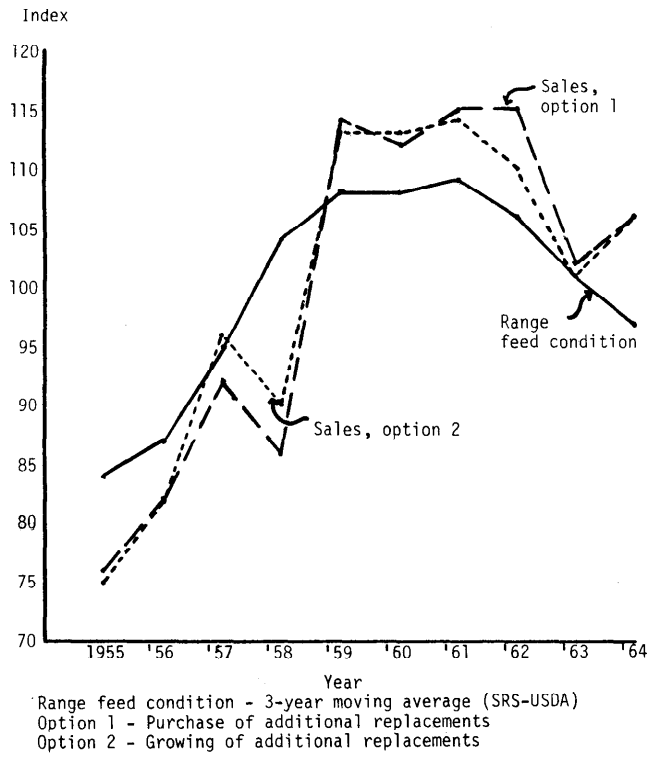

FIG. 3. Index of pounds of cattle and yearlings sold, and range feed condition, cow-yearling system, 1955-1964. (Base: 1955-64=100)

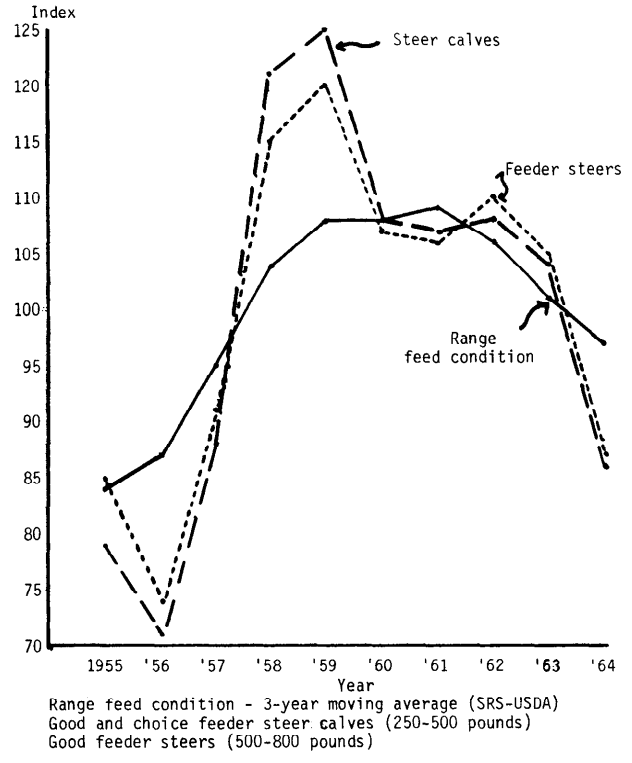

FIG. 4. Index of prices received at Ft. Worth for selected classes of cattle compared with the index of range feed condition, 1955-1964. (Base: 1955-64=100)

price level for each previous year included in the analysis.

Average gross returns and average costs varied only slightly among the 4 options (Table 2). Most of the cost items remained fixed as range feed condition and cattle numbers varied. Only costs of supplemental feed, veterinary supplies and services, marketing and taxes changed as range feed condition changed. Generally, supplemental feed costs were greater for the cow-yearling system. Costs of labor, marketing, taxes, and veterinary supplies and services were higher for the cow-calf system. Postponing extensive repairs and reducing the amount of labor hired are common practices followed by ranchmen during drought and periods of low prices to reduce income variation (Boykin, 1962). Because of differences in individual cases, no allowance was made for such adjustments in this analysis.

Average net ranch income was highest for the cow-calf system, option 1, at $12,482, and lowest at $10,665 for the cow-calf system, option 2. Under option 1 where additional cows were purchased in response to increases in range feed condition,

Table 2. Ten year average of income and costs (in dollars) for two cow herd systems with two replacement options each, 425 animal unit ranch, 1955-1964.

Item	Cow-calf system Option 1	Cow-calf system Option 2	Cow-yearling system Option 1	Cow-yearling system Option 2
Gross returns	33,891	32,074	32,721	32,476
Cash costs	14,393	14,393	13,390	13,390
Net cash income	19,498	17,681	19,331	19,086
Depreciation	3,056	3,056	3,056	3,056
Operator labor	3,960	3,960	3,960	3,960
Net ranch income	12,482	10,665	12,315	12,070
Cost of cows purchased	1,516	0	401	0
Returns from sales of additional cows[1]	735	118	118	118
Net capital need[2]	781	118	283	118
Return on investment (%)[3]	2.43	2.08	2.42	2.37

[1] Cows sold because of reduced supply of range forage.

[2] Capital need for purchase of cows as range feed condition improves, less returns from sale of cows that were sold because range forage supply was short.

[3] Investment figured at 1964 price levels.

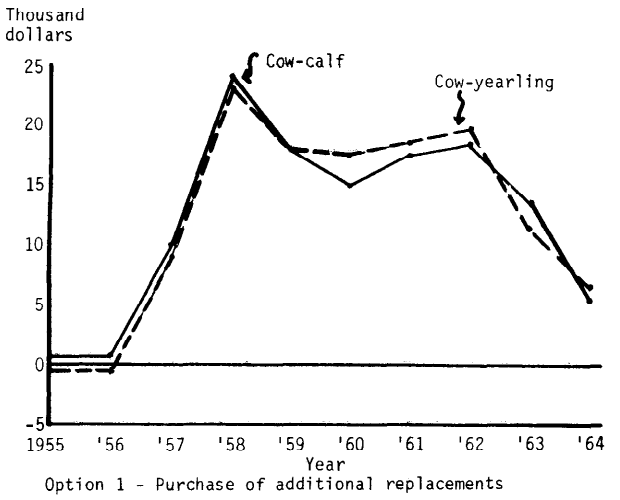

FIG. 5. Net ranch income from cow-calf and cow-yearling systems, option one, 1955-1964.

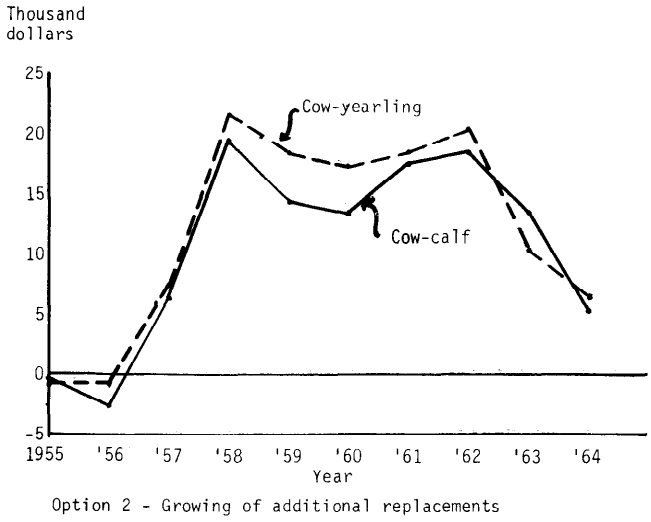

FIG. 6. Net ranch income from cow-calf and cow-yearling systems, option two, 1955-1964.

average net ranch income was $167 greater for the cow-calf system than the cow-yearling system. Under option 2, where additional replacements were held over from the calves and yearlings grown on the ranch, the average net ranch income was $1,405 greater for the cow-yearling system than the cow-calf system. Average return on investment, with investment figured at the 1964 level, amounted to a high of 2.43% for the cow-calf system, option 1, and a low of 2.08% for the cow-calf system, option 2.

Under the cow purchase option an average of $1,516/year was required to purchase additional replacements for the cow-calf system, and an average of only $401/year was required to purchase additional replacements for the cow-yearling system (Table 2). Returns from sales of cows because of decreases in range forage supply reduced the capital requirement for cattle purchases to an average of $781/year for the cow-calf system, and to $283/year for the cow-yearling system.

Annual net ranch income varying with cattle prices over the 10-year period ranged from a low of —$2,426 for the cow-calf system, option 2, to a high of $24,020 for the cow-calf system, option 1. Under the cow purchase option net ranch income was higher for the cow-calf system than for the cow-yearling system 5 out of 10 years (Fig. 5). When no replacements were purchased, the cow-yearling system was more profitable 8 out of 10 years (Fig. 6).

Conclusions

There is little difference in relative profitability between the cow-calf and cow-yearling systems when additional replacements are purchased in response to increases in range forage supply. And while flexibility is greater and income is higher from buying additional replacements, rather than raising them, the additional capital requirements and the difficulty of buying suitable replacements would make this alternative less attractive to the ranchman.

The cow-yearling system is more profitable when additional replacements are raised in response to increases in range forage supply. This system is also more flexible, for except in the most severe forage deficit years, the inventory of breeding cows can be retained by selling yearlings early to relieve grazing pressure. As range forage supply increases breeding cow numbers may be increased by holding over additional yearling heifers.

In adjusting from a cow-calf system to a cow-yearling system cow numbers must be reduced in proportion to the number of yearlings if overgrazing is to be avoided.

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