

The analyst must change input values in Tables 1, 2, and 5. Calf crop percent and relevant feed sources are changed in Table 1. AUMs are reallocated in Table 2 to reflect the above changes. Forage balance (Table 4) must be maintained. Pounds/head produced by steer and heifer calves are changed in Table 5. FEEDSTORIS then calculates all other changes in program values.

FEEDSTORIS will calculate a net return over variable costs for the ranch after the seeding has been implemented (\$8,213). This value is then compared to the baseline value to yield an annual net benefit from the seeding of \$5,615. Since this value is positive, the analyst should then estimate the economic feasibility of the project by comparing net cash flow to the required investment.

In addition to providing an estimate of the annual net benefit of a management practice, FEEDSTORIS also outlines any necessary changes in herd size, seasonal forage balance, and both feed and non-feed inputs. Any required additional forage or purchased feeds will be apparent in the revised Table 4.

The program is flexible enough to be adapted to most types of western livestock ranches. The program can help evaluate numerous management options and situations including the effects of obtaining additional forage through range improvements or forage acquisitions, alternative livestock management options, and different cost/price, livestock, and crop parameters. Although the program enables rapid evaluation of alternatives, FEEDSTORIS cannot make the decision. The rancher must ultimately evaluate each alternative's biological, economic, political, and social feasibility.

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## Economic Conditions Influencing Ranch Profitability

John M. Fowler and L. Allen Torell

*Editor's Note:* This paper should be required reading for anyone who thinks that ranching is a foolproof way to make a lot of money.

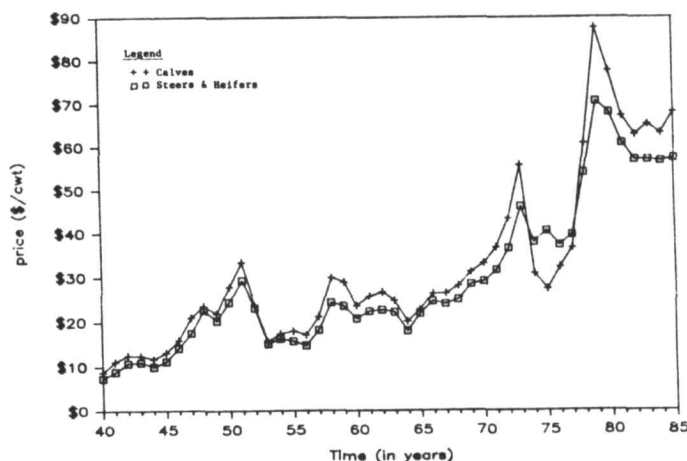
The economic performance and well-being of the range livestock industry varies considerably. No single performance indicator can capture the variation that exists between ranches or different ranch managers. Ranches have many physical factors affecting ranch profitability, including topography, climate, vegetation types, soils, and range conditions. They also have various economic and social influences including managerial ability, planning time horizon, and motivation for ranching. The equity position of ranchers varies from complete ownership of land assets to servicing a considerable debt. Size and type of ranching operations also varies. Ranching is dynamic in nature with gross returns, costs, production, and net returns varying greatly through time.

### Cost-Price Squeeze

Viewing the economic well-being of the range livestock industry at a single point in time can be very misleading. Livestock prices vary considerably, often within short time periods. Several types of information are necessary before an adequate assessment of ranching profitability can be determined. Both revenue and costs must be considered, including the quantity of livestock products sold, product prices, and quantities and cost of ranch inputs.

### Ranch Revenue

Gross income from ranching is predominantly derived from the sale of livestock, usually calves, steers, sheep, and lambs. Additional revenue may come from selling breeding stock, horses, and cull animals. Total revenue consists of four elements: kind of livestock, number of livestock sold in each class, average market weights of each class, and the price received per unit. A historical perspective of cattle prices received in New Mexico for the period 1940 to 1985 is provided in Figure 1. The most evident trend has been an



**Fig. 1.** Annual average calf and steer and heifer prices in New Mexico, 1940-1985.

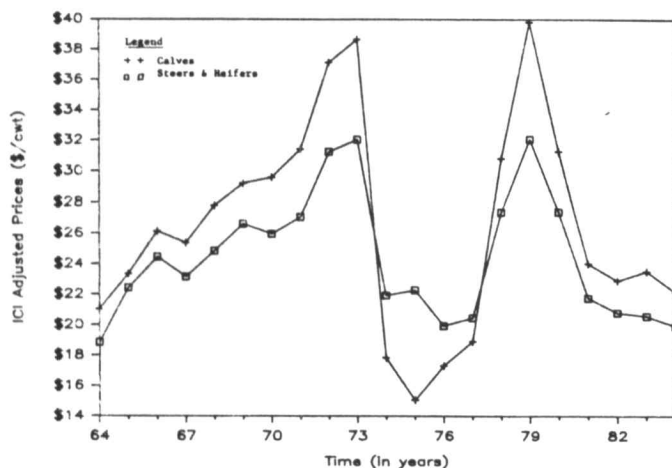
Source: Fowler and Gray (1983) and *Agricultural Prices, P & L (10 & 11, 78-85 series)* and *Cattle & Calves, New Mexico Crop and Livestock Reporting Service, 1985.*

increase in the nominal price (dollars) received per hundred weight.

Livestock prices are dependent upon the general level of business activity, per capita income, consumer preferences, and a host of other factors which affect the demand for livestock products. As is true of all commodities, livestock prices are determined by the forces of demand and supply.

In the past, beef prices have exhibited a time trend which has been called the cattle cycle. The cycle lasts, on average, about 10 years. Consider, for example, the last cycle of prices shown in Figure 1 for steers and heifers. The price peaked in 1973, fell during the period 1973 to 1975 and started a sharp rise through 1978. Prices started to fall after 1979 but have basically stabilized at 1982 levels for all classes of livestock. Extreme price variations can occur between a peak year such as 1979 and a trough year such as 1975.

Nominal livestock prices through time are not directly comparable because of the effect of inflation. When the general price received for livestock products is deflated to account for inflation levels experienced by the western livestock industry, a more accurate comparison among years is possible. Figure 2 shows the nominal prices received for steers, heifers, and calves devalued by the input cost index which is weighted to reflect production costs for the typical western cow-calf operator. All prices are adjusted to a base year of 1964-68 as used by the Bureau of Land Management and U.S. Forest Service in recent public land grazing fee evaluations (USDA/USDI, 1986).



**Fig. 2.** Input Cost Index (ICI) adjusted prices. Sources: Fowler and Gray (1983) and Agricultural Prices, P & L (10, & 11, 78-84 series)

The deflated steer and heifer price received during the 1980s is comparable to that received in 1973-76 and lower than prices received in 1965. Calf prices have been slightly better than depressed 1973-76 levels but, again, they are lower than prices received since 1965.

Examination of the revenue side of ranch income requires more than just the prices received for different classes of livestock; it is also necessary to examine the number and weight of livestock sold to determine gross income. Livestock numbers have fluctuated by class during the period 1978 through 1984. The numbers in all classes of breeding animals peaked in 1980, a year after the price peak.

Virtually all classes of livestock have been involved in the gradual herd reduction through 1985. Herd size increases are far from instantaneous and require a minimum of 2 or 3 years before a replacement heifer has a marketable calf. Currently, the total number of beef cows and heifer replacements are well below the 1980 peak. There has been no increase of herd numbers which often occur when the ranching community anticipates more favorable beef prices. This indicates that the ranchers anticipate continued poor product prices through 1986. Poor livestock prices and reduced herd sizes have decreased the percentage of total New Mexico agricultural receipts being derived from cattle and calves to less than 50% of the total agricultural receipts. This is considerably below the long-run average of 65%.

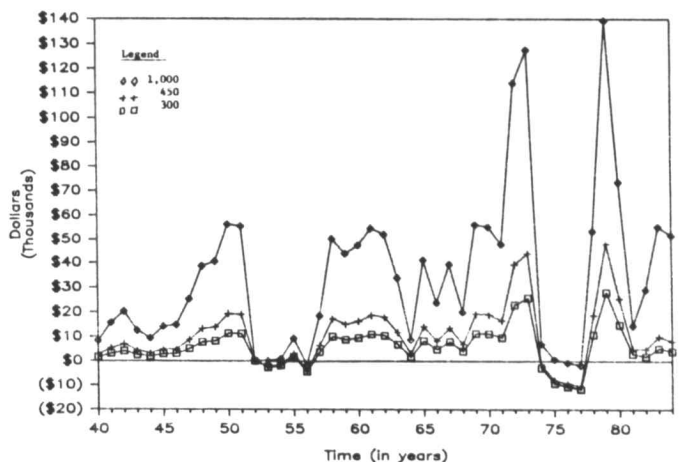
### Production Costs

Double digit inflation is not new to arid land ranchers; it was prevalent in the 1970s and early 1980s for many of the major cost items related to ranching. However, prices for many of these items have stabilized during the mid 1980s. Several items including federal grazing fees, feed costs, interest rates, and fuel costs have actually decreased. Cost stabilization has been the only bright spot for the industry. However, poor output prices have overshadowed reduced inflation rates. The tightness of the cost-price squeeze was most pronounced from 1982 to 1984 for the working rancher.

### Net Ranch Income

A popular conception, or perhaps misconception, made by the general public is that ranchers are receiving a good return from their investment, particularly if they can graze on federal lands. This is not necessarily the case.

Historical ranch budget data prepared by the Agricultural Economics Department at New Mexico State University over the 45-year period from 1940 to 1984 are plotted in Figure 3.



**Fig. 3.** Net returns on New Mexico cattle ranches, 1940-1984. Source: "Financial Status of the Range Livestock Industry: The New Mexico Example". 1985.

The figure presents the net return to operator labor, management, and capital on working cattle ranches. Three ranch sizes (300, 450, and 1,000 Animal Units (AUs)) were traced through time.

The most evident feature of the net returns is the presence

of negative numbers for all ranch size classes. Even the large AU ranching operations, enjoying all the advantages of economies of size, still experienced 6 years of earnings less than \$1,000 and 3 years where expenses and depreciation weren't completely paid by gross receipts. The 300 and 450 AU operations had negative returns to land, capital, risk, and owner's labor in 7 of the 45 years. The 300 AU operation had net returns of \$10,000 or more to labor, management, and land and risk in only 12 of the 45 years.

Even when the returns to operator labor, management and capital were estimated to be positive, ranch returns from the livestock were minimal when the magnitude of capital investments in New Mexico ranches is considered. The typical investment in land, improvements, and cattle for the peak land value year of 1982 was estimated to be \$1.15, \$1.83, and \$3.39 million for the three ranch sizes outlined in Figure 3. A "fair" return to these levels of investment is a substantial amount.

Rates of return on investment in both cattle and sheep ranches have traditionally been low by non-ranching standards. Workman estimates that rates of returns in recent years have only been about 2 percent. Only when past rates of land appreciation are considered have ranch returns been a competitive 10-15 percent (Workman 1986).

Net return on investment is always a key indicator of the general health of an industry. It also is a good indicator of the reallocation of dollars that will gradually result in response to economic conditions. A budgeting study conducted in 1979 for ranch operations in southeastern New Mexico indicated the net return on owned investment in 1978 with both small (100 AU) and medium (300 AU) sized cattle ranches was basically zero. Large (600 AU) cattle enterprises returned less than 1% (Gray, Fowler, Jones, 1981). A follow-up study conducted in early 1983 for the year 1982 determined the net return on small ranches was adequate to cover cash expenses, but not enough to pay for depreciation, operator labor and management, and total capital (Gray and Fowler 1983). Net returns on medium and large cow-calf ranches were large enough to pay cash expenses, depreciation, and operator management when valued at 5% of total receipts. Medium sized sheep ranches (586 AU) were the only type of ranch operation that yielded a positive net return on owned investment during 1982.

### Land Value and Number of Ranches

Most ranchers who have been caught in the cost-price squeeze documented in the previous sections have survived. Since the depression of the 1930s, rising land prices provided enough increased equity to keep most ranchers financially liquid. From 1940 to about 1981-82, grazing lands increased in value, leading to a continued increase in rancher's net worth, equity, and borrowing capability. Since 1982, however, agricultural land, including cropland and grazing land, began to decline in value. The United States Department of Agriculture (1985) reported declines in agricultural land values ranging from 9 to 25% throughout the West and Midwest. In New Mexico, declines in ranch values since 1982 range from 16% to 38% (Torell and Fowler 1986).

One of the major factors contributing to the decline in New Mexico ranch values was decreased oil revenues, which eliminated a major type of buyer. High interest rates and low

returns in ranching contributed to a reduction in the number of people willing and able to buy ranches. Recently proposed changes in public lands grazing fees have left prospective ranch buyers wary of investing in ranches dependent largely upon public lands forage.

Statistical analysis of 385 recent New Mexico ranch sales indicated the recent grazing fee debate has contributed to the downward trend of value for permit ranches. Federal grazing fees have been extensively studied and there is a strong desire by many political groups to substantially increase BLM and USFS grazing fees. In addition, New Mexico state land grazing fees were reevaluated with a proposed 150% fee increase phased in over a 5-year period. This substantial increase in fees is being challenged by the ranch industry and is currently in litigation.

Increased fees have further increased the risk and uncertainty in public land ranching. Torell and Fowler (1986) estimate a significantly different trend of ranch value, depending upon the amount of leased land included in the sale. By January 1985, leased land (BLM, FS, and state trust) was estimated to have declined 38% from peak levels to less than \$1,000 per AU. In contrast, a 100% deeded land ranch was estimated to have maintained its value much better with only a 16% decline in value from peak levels.

The ranch market is in a state of turmoil. Few ranches are selling, yet many ranches are for sale. In the southern New Mexico deserts, for example, it is estimated that 40% of the ranches are actively for sale (Torell and Fowler 1985).

An end product of the financial conditions is a change in the number of farms and ranches. There has been a decreasing trend in the numbers of ranches from 1940 to 1974; however, a slight upturn in numbers is evident from 1974 to 1982. A closer look provides several reasons that may explain the phenomenon. There has been a change in the definition of a farm or ranch that allows many more subsistence operations to be included in the number. In addition there seems to be a shift to more gentleman ranching, where gentlemen ranching is defined to include individuals on small operations, not necessarily out to make a profit, and where ranch income is only a small portion of family income.

In spite of the slight increase from 1974 through 1982, the long-run numbers tell the story. The numbers of farms and ranches nationwide in 1982 constitute only 42% of the numbers in 1945. This was evident before land prices peaked in 1982. It is quite likely that the future numbers reported by the Bureau of Census for 1986 will indicate the poor financial status of the industry by reflecting an even further decline in ranch and farm numbers.

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# Implications of Technological Advances in Range Livestock Production

E.T. Bartlett and Larry R. Rittenhouse

Dr. Earl Butz, at a lecture for Ag-Awareness Week at Colorado State University, 2 April 1986, said that in the future someone would determine how to consistently produce twin calves for the livestock industry. To some, this statement implies a doubling of efficiency. Twin calving will neither double livestock production nor efficiency. Any technological advancement would have a major impact on the supply schedule, and thereby a downward impact on beef prices.

**An increase in reproductive efficiency** would increase but not double economic efficiency on cattle ranches. Twin calves would be smaller at birth and most likely at weaning. Total pounds marketed and gross returns per cow would be greater but not double compared to traditional approaches. Costs of production charged against each live calf marketed include cow maintenance, heifer replacement, bull replacement, and other factors required to maintain a viable cow herd. If calf numbers are doubled, costs per calf are not necessarily halved. Nutritional requirements for the cow increase with lactation and gestation. Fewer cows could be maintained on the same area. There would undoubtedly be cost increases associated with the breeding system to insure twin calving; the cow would need a higher level of nutrition throughout the year. The level of management required to maintain twin calving is an important factor. Management intensity would have to increase, not only at calving but also at other times of the year.

**There are many interrelated factors that impact beef cattle markets.** We will use a simplified hypothetical example from the current market situation. For several years, experts have been forecasting increases in beef prices based on declining beef herds. This has not occurred. Many reasons are given such as dairy policies, grain prices, efficiencies in the production of poultry and pork, and so on. Little attention has been given to the impact of technological change within the beef industry. Pounds of calf produced per cow have increased at a steady of 7 pounds per year since 1935 with only short-lived changes above or below that level.

Producers are using implants and feed additives for range calves, stockers, and yearlings as well as in the feedlot. The widespread adoption of a systematic cross-breeding systems has increased weights of market animals. All of these practices have increased production efficiency by increasing marketable beef from a constant herd. Twinning should be considered in the same context as any other technology. Our ability to increase production per animal does not necessarily mean increased profit. Similarly, the benefit of range improvements or "new" grazing management systems must be weighed against costs and risk.

**Our hypothesis is that while cattle numbers** have decreased in recent times, the advances in technology have maintained levels of production. Price has remained low because the supply schedule has shifted. If production is increased further, assume 30 to 40% by twin calving, the supply would be shifted further. The equilibrium with demand would be for a lower price at a greater quantity. Consumers might buy more beef; a quality product would be more affordable. Unfortunately, a lower price might not translate into a higher per capita red meat consumption rate. Other variables such as dietary preferences and health concerns may constrain consumption more than price.

Implications of technological advances are numerous and raise many questions and issues. Will future advances continue to reduce potential profit per head? Will U.S. beef be more competitive in international markets? What does this imply about the contention that the beef industry is a mature industry?

**What does this imply about adopting new technologies?**

We have simply raised questions, and are not suggesting that new technologies should not be used. The first who adopt successful new technologies will benefit the most. Other ranchers can benefit from adopting technology, but at a decreased amount. Marginal benefits of implementing technology approach the costs of implementation as markets adjust to increased efficiency. The last rancher to adopt a technology will gain little. Ranchers should not be encouraged to implement technologies unless they are profitable to their operations.

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