

- Torell, L.A., and J.M. Fowler. 1985.** Market values of ranches and grazing permits in New Mexico, 1984. New Mexico State Univ., Agr. Exp. Sta. Res. Rep. 570.
- Torell, L.A., and J.M. Fowler. 1986.** A model for predicting trends of New Mexico grazing land values. New Mexico State Univ., Agr. Exp. Sta. Bull. 723.
- US Dep. Agr. 1984.** New Mexico crop and livestock reporting service. New Mexico agricultural statistics.
- US Dep. Agr. 1985.** Outlook and situation summary: Agricultural land values. June.
- US Dep. Agr. and US Dep. Interior. 1986.** Grazing fee review and evaluation. Final Rep. 1979-1985. February 1986.
- Workman, John P. 1986.** Range Economics. New York, Macmillan Publ. Co.

# Implications of Technological Advances in Range Livestock Production

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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 system 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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