

Economics of Value-Adding Rangeland Beef Cattle Enterprises

Gerald E. Marousek, Leroy D. Stodick, Patricia Carlson, and Chad C. Gibson

The subject of U.S. Forest Service (FS) and Bureau of Land Management (BLM) public land grazing fee structure and permit levels continues to be debated in the U.S. Congress and at livestock gatherings. From the standpoint of public policy as well as the economic viability of livestock enterprises and the rural communities of which they are a part, administration of public grazing lands needs a regional focus.

Our hypothesis is that public grazing permits may not be as crucial as livestock interests insist, nor is the value of their use as great as advocates of alternative public land use contend. In many areas and individual livestock enterprises, resource substitution and alternative production management systems can result in comparable and stable returns. Community and regional economic returns may be further increased by supplier and marketing activities which result from diversified ranching operations.

Several studies relating to the economic linkage between the western livestock industry and rural communities are being pursued. They address the impacts of public land grazing users on the level and stability of economic activity in local communities, but seldom investigate the effects of modified ranching practices.

The information reported here entails an analysis of production management alternatives for livestock producers using public grazing in two distinct geographic areas of Idaho: Western mountain-type ranches and high (elevation) desert ranches.

Purpose and Approach

The study used a linear programming model to address production, marketing, and management decisions encountered by cow-calf producers using public range. The specific objectives were:

1. To develop a total ranch, long-term, profit maximizing management plan.
2. To determine expected gross margin, reduced-risk production and marketing alternatives, thereby illustrating the tradeoffs between income and the associated level of risk.

The long-term ranch plan maximizes expected total

ranch gross margin. Gross margin or income is defined as cash receipts less operating expenses. The long-term plan uses five-year average costs and prices. Year-to-year price variations are used to develop the relationship between expected or average income and income fluctuation (variance). From this, a series of successively lower-risk annual production and marketing plans can be calculated.

Risk is measured by adding the amounts that annual income falls below the five-year average income. This sum is mathematically converted to an estimator of income variance (Hazel and Horton 1986).

Mountain-Type Ranch

This ranch is typical for Lemhi County, Idaho, with an elevation of approximately 4,000 feet. The ranch holds title to 160 acres of irrigated cropland and 125 acres of meadowland. Meadowland may be used for hay production and aftermath grazing or strictly as pasture. Private leases provide a total of 908 AUMs of grazing. Public range permits issued by the FS and BLM provide an additional 820 AUMs of grazing. Alfalfa hay production is the principal use of cropland, although barley is grown as a companion crop when establishing alfalfa. Ranches in this area tend to be self-sufficient in feed for their cattle enterprises. However, the programming model allows hay and feed grain to be bought or sold.

Budgets were developed for a typical spring calving commercial beef cattle ranch. The livestock inventory includes 200 cows, 10 bulls, and 36 replacement heifers. Average annual costs and prices for 1984–88 were used in the long-term plan. The reduced-risk alternative plans used annual deviations from the five-year averages.

Traditionally, most cow-calf producers sell 6- to 8-month-old calves after weaning in the fall. There are two production alternatives for each sex of calf not sold at weaning: Backgrounding to spring yearlings on a growth and preconditioning diet, or retaining ownership to slaughter in a custom feedlot. Yearling backgrounded cattle may be sold as spring yearling feeder cattle or placed in a custom feedlot. In all alternatives, ownership of the cattle is maintained by the cow-calf producer. Figure 1 shows the options: The mountain-type ranch did not include the yearling stocker option.

The program determines (1) optimal cattle and crop marketing and feed utilization activities (2) expected annual income or gross margin, and (3) income deviation,

The authors are agricultural economist, operations research specialist, former research associate, all in the Department of Agricultural Economics and Rural Sociology, University of Idaho, Moscow 83844-2334, and Owyhee County extension agent, Marsing, Idaho 83639, respectively. Joseph G. Schimmel, former research associate, contributed to the mountain-type ranch study.

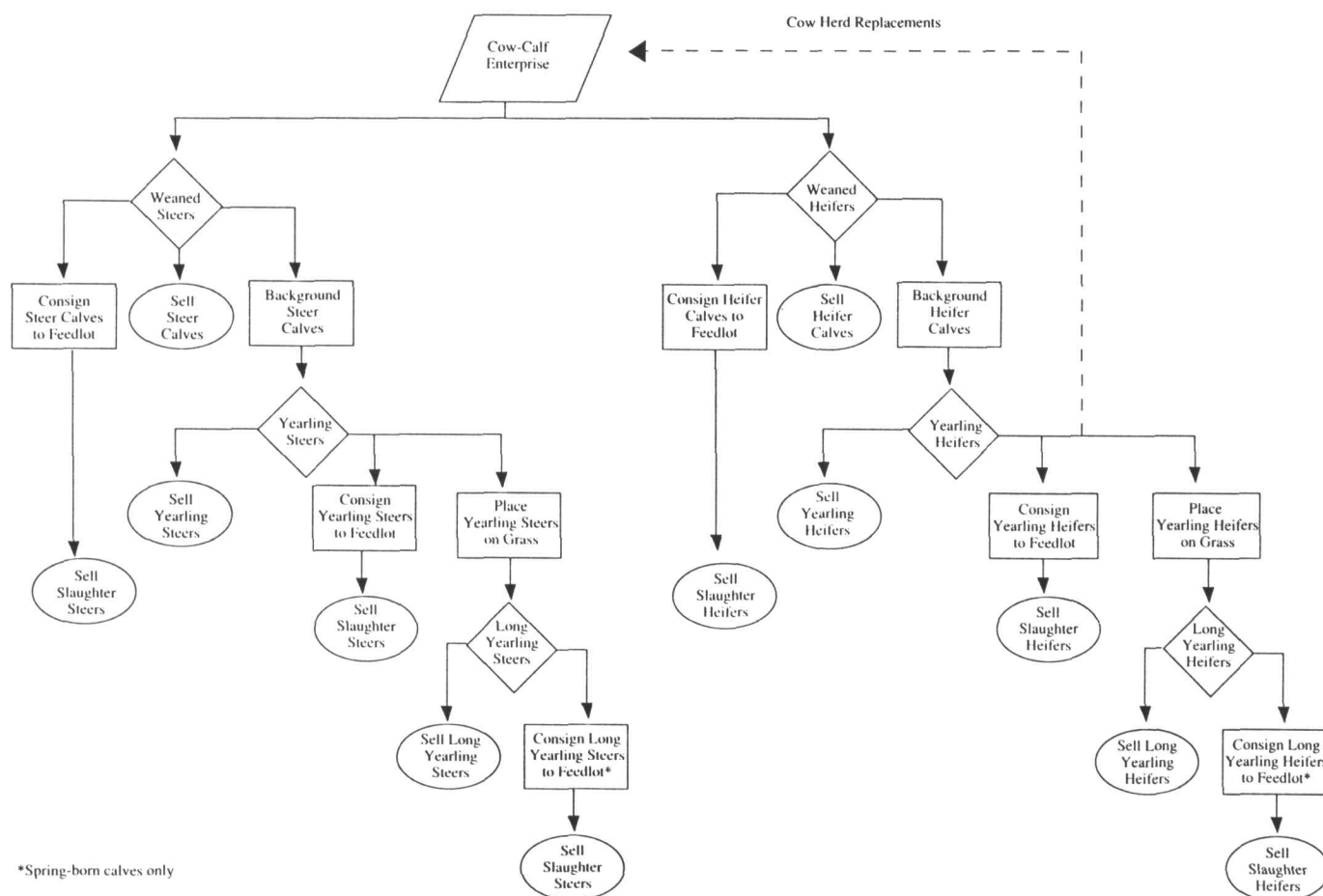


Figure 1. Beef production management and marketing options

for the optimal long-term production management and marketing plan and for each of six successively lower risk short-term plans. The plans result from maximizing the gross margin for any combination of the production management options, as risk is reduced. Each plan may include one or more of the specified options, with any number of animals in an option. A plan may have animals being marketed at several different stages, e.g., weaners, yearlings, fed cattle. The details of the numerous marketing outcomes of the several plans are recorded in a research bulletin (Marousek et al. 1992).

The focus of this article is on the income/risk tradeoffs among the plans. Risk, as measured by income deviation or variance, drops more rapidly than income when moving to lower risk plans. However, the most conservative plans sacrifice income with essentially no further risk reduction (Fig. 2).

High Desert Ranch

This ranch is based on an Owyhee County, Idaho, operation. Elevation is 3,000 to 6,000 feet; annual precipitation is less than 10 inches. Feed resources include 4,000 AUMs of BLM grazing, 900 AUMs of private leased pasture, 400 acres of irrigated cropland (alfalfa and oat hay), and 75 AUMs of leased hay aftermath. The cattle breeding

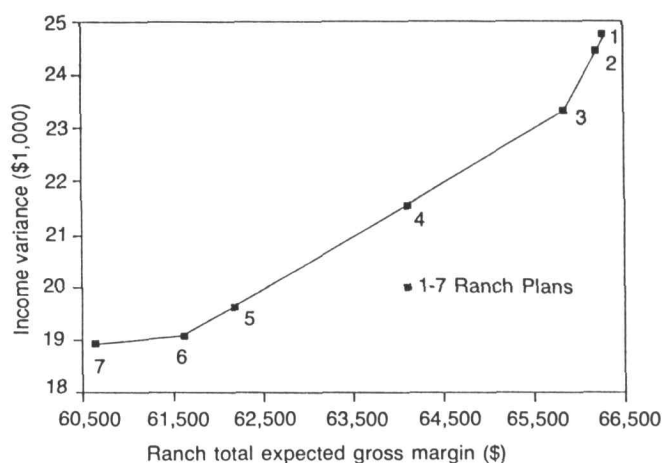


Figure 2. Expected income - income variance, seven Idaho mountain-type plans

herd consists of 500 cows, 20 bulls, and 95 replacement heifers. Twenty percent of the cows calve in December, spreading the labor requirements relative to 100 percent spring calving.

The production management and marketing options considered for the high desert ranch included all those for

the mountain-type ranch (selling weaners, backgrounding, custom feeding, buying or selling feed), plus placing backgrounded yearlings on summer pasture and then selling as long yearlings or consigning to a custom feedlot (Fig. 1). Because fall-born calves are heavier at any given calendar date, the timing of their activities expanded the programming model to twice that of the mountain-type ranch.

Costs and prices for the high desert ranch included the five-year period, 1986–1990. Rather than using income variance as a measure of risk, in this analysis the risk factor for each plan is expressed in relation to the long-term plan risk level. Risk, relative to the long-term plan level, goes down while income is nearly stable in high income/high risk plans. At low income and risk levels, income falls as much as risk (Fig. 3).

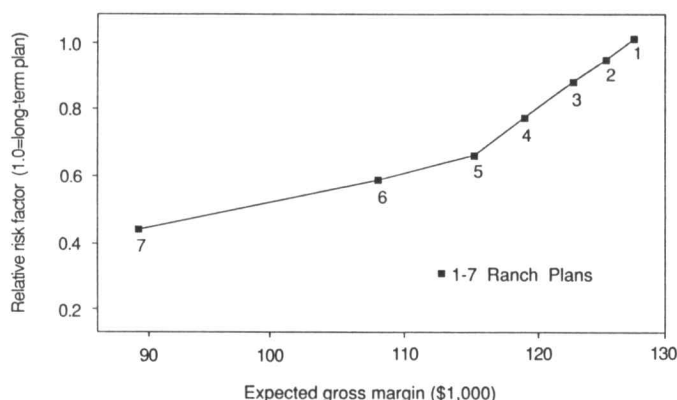


Figure 3. Income - risk relationships, seven Idaho high desert ranch plans

Effects of Increasing Public Grazing Fee

The budgets used the average BLM/FS grazing fees for the years included: \$1.45/AUM for the mountain-type ranch (1984–88) and \$1.58/AUM for the high desert operation (1986–90). The formula for determining the fee

includes a base value derived in 1966 from the relationship between public and private grazing fees, adjusted annually for changes in production costs, beef price, and private grazing land lease rates. In recent years, the fee has ranged from \$1.35/AUM (1986 and 1987) to \$1.97/AUM (1991). The U.S. Congress in the past several sessions has considered legislation to set grazing fees on federal lands at a minimum of \$8.70/AUM (Doane's Agr. Rep. 1991).

The impact of a change in grazing fees on the alternative ranch management plans was considered. Cow-calf grazing on BLM/FS lands is common to all plans in the model. Therefore, production costs change by the same amount in each plan, and the rank order of expected income does not change. The effects on the long-term optimal high desert ranch plan when the grazing fee is increased from \$1.58/AUM to \$8.70/AUM are a \$30,431 (24%) decrease in expected income and a \$14,240 (14%) increase in borrowed capital (operating loan). The initially passed but ultimately rejected fee for 1993 (\$2.56/AUM) would have lowered income about 3 percent.

Conclusions and Implications

The study results indicate that beef producers who rely on public land forage may have economically viable alternatives to marketing calves directly off the range. These potential value-adding activities include backgrounding calves for sale or for further growth, as well as retaining ownership of calves or yearlings through feeding to slaughter grade in custom feedlots.

Each alternative generates income and entails risk in a direct, but not proportional relationship. In both the mountain and high desert cattle ranch analyses some lower risk production/marketing plans showed considerable potential for maintaining income. As risk level declined, income fell by relatively smaller increments. The most risky plans often showed a sharp rise in income

Table 1. Income, risk and marketing stages for Idaho cattle ranch plans.

Type	Plan ^a	Income ^b		Risk	Income source by class of animal marketed			
		\$	%		Calves	Spring yrlg	Fall yrlg ^c	Fed
Mountain	1	66,327	100	100	0	100	NA	0
	2	66,260	100	99	0	100	NA	0
	3	65,869	99	94	0	85	NA	15
	4	64,145	97	87	13	64	NA	23
	5	62,129	94	80	45	15	NA	40
	6	61,546	93	77	55	0	NA	45
	7	60,566	91	77	55	0	NA	45
Desert	1	128,417	100	100	0	0	0	100
	2	126,870	99	95	7	0	0	93
	3	124,536	97	89	16	0	0	84
	4	118,895	93	73	19	0	0	81
	5	114,147	89	63	35	0	0	65
	6	108,154	84	58	49	0	0	51
	7	89,933	70	44	42	0	0	58

^aIn descending level of risk; 1 is long-term optimal outcome where risk is not considered.

^bIncome or gross margin is defined as cash receipts less operating expenses.

^cYearling stocker option not included in mountain-type ranch.

deviation with little improvement in average income, relative to lower risk options. Table 1 (left side) shows the percentage reduction in income and risk, moving from the long-term plan (Plan 1) where risk is not considered.

The analyses did not include production management plans without BLM/FS grazing. For these ranches, there is no readily available substitute for federal grazing permits. (Public lands comprise 92 percent of Lemhi County and 84 percent of Owyhee County). Grazing fee increases will raise operating costs and reduce net returns, but will not change the resource use pattern under current production management systems. However, this is not the likely result if the AUMs of public grazing are reduced. In such a situation, beef cattle producers would either have to decrease their size of operations or substitute other resources for public grazing.

One means of offsetting reduction of BLM/FS forage is to market fewer animals with higher value, i.e., to incorporate value-adding production activities into the operation. As the right hand side of Table 1 shows, higher income

plans (the lower numbered plans at the top of the column) generally result in larger proportions of ranch income coming from more advanced stages of animal production and marketing. These are the plans with higher risk. But they also require additional production inputs and market transactions, which generate more economic activity within the community and region. This raises the challenge of finding a balance of ranch income/risk tradeoffs compatible with community economic growth and development goals. Production specialists, economic analysts, and policy experts all have roles in specifying the possibilities and pitfalls.

Literature Cited

- Hazell, P.B.R., and R.D. Norton. 1986.** Mathematical programming for economic analysis in agriculture. Macmillan Co., N.Y.
- Marousek, G.E., L.D. Stodick, and J.G. Schimmel. 1992.** The economics of alternative beef cattle management and marketing systems. Res. Bull. 153. Idaho Agr. Exp. Sta. Univ. Idaho, Moscow.
- Doane's Agricultural Report. 1991.** Heading off higher grazing fees. 54(6):4.



SHARP BROS. SEED CO.

*Producing
Quality Seed
For Over
30 Years.*

- SHARP'S IMPROVED TREATED BUFFALOGRASS
- NATIVE AND INTRODUCED GRASSES
- RECLAMATION GRASSES
- TURF GRASSES
- CUSTOM SEED MIXES
- WILDFLOWERS
- WILDLIFE MIXES
- HYBRID FORAGE SORGHUM
- SORGHUM SUDANGRASS HYBRIDS
- MULTI-LEAF ALFALFA

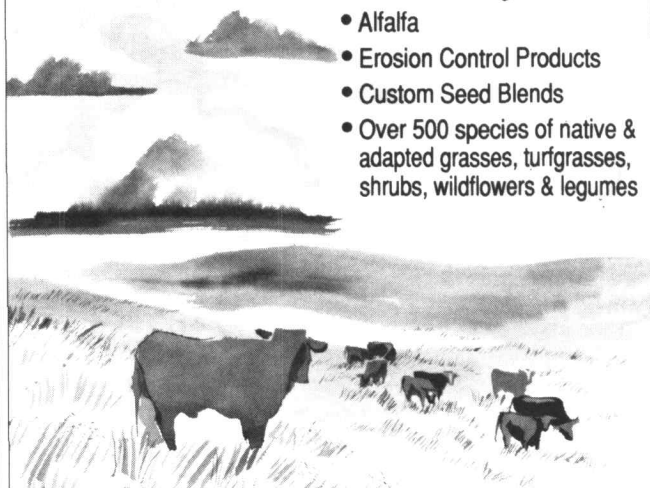


SHARP BROS. SEED COMPANY

BOX 140 • HEALY, KS 67850 • 1-800-462-8483

granite SEED

- Pasture & Range
- Alfalfa
- Erosion Control Products
- Custom Seed Blends
- Over 500 species of native & adapted grasses, turfgrasses, shrubs, wildflowers & legumes



Call or Fax for our Catalog (801) 531-1456, Fax (801) 768-3967
Granite Seed Co., P.O. Box 177, Lehi, Utah 84043