Such a record would clearly reveal trend in the range condition. The account could be examined periodically (every 10 years, and/or the end of each wet-dry cycle) and used to justify adjustments to average annual carrying capacity. In Roe's case for example, assume that this long-term evaluation of his account reveals that the BLM has consistently owed him 1,200 AUM's. Obviously, Roe's good management has increased the ranch's ability to carry a base herd of 300 cows by 100 cows (1,200 AUM's ÷ 12 mos). Therefore, his average annual carrying capacity can now be increased to 667 cows (from 500). He would continue to stock at 60% or would carry a base herd of 400 cows and would receive an annual adjustment credit of 3,204 AUM's computed as follows: (667 AU/yr Avg. Carry. Cap. minus 400 AU/yr 60% stocking rate) times 12 mos/yr equals 3,204 AUM's coming from the BLM each year.

Flexible stocking rates, in more cases than not, will result in improved range condition and upward adjustments. However, any opposite trend would, of course, result in a commensurate reduction.

Costs and Benefits

From the agency point of view the primary cost would be the increased work load. The primary benefit would that such record would be a sound basis for management decisions and the resolution of conflict.

The major costs to the rancher would be only short-term. He would lose AUM's of grazing in the short term but with some guarantee of recovering them in the future. Furthermore, in dry years he might be required to sell his calf crop on a depressed market. A short-term benefit would be more efficient gain by relieving overgrazed conditions in dry years that result in increased maintenance requirements. His major benefit would be the increased grazing capacity that would surely come about over the long-run. He would also benefit from the fact that such action would have a stabilizing effect on markets and make them more predictable.

From the point of view of society, the added agency work load would represent a cost. However, more products at more stable prices would certainly be benefits. Perhaps most important would be the conservation and preservation of the public's lands to meet future needs.

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Analyzing Ranch Income Statements—A Modified Approach

John P. Workman

The ranch income statement

"This stuff is really interesting. It's just too bad it doesn't tell us what we want to know." The above quotation is typical of the responses I have received over the years from range management students being introduced to ranch income statements. I have to agree with my students. Table 1 displays a standard ranch income statement. While the cost and return data contained are extremely interesting, they fail to provide the information that is really needed. The standard income statement offers no explanation of *how* today's ranchers manage to stay in business while receiving extremely low net returns (or even losses) on large investments in land and improvements. Nor does the standard income statement furnish an explanation as to *why* anyone would want to invest in ranch property when faced with such a bleak cost-price outlook. Whether student, rancher, public land manager, teacher, researcher, banker, realtor, or potential investor, analyzing and understanding the financial aspects of a ranching operation requires the answers to two simple but important questions. First, will the ranch produce sufficient *net income* for the ranch family to *live on* after all operating expenses (including loan service) have been paid? Second, how much net ranch income (including real estate appreciation) is available to compensate investment of *owned* capital (equity)? Neither of these crucial questions is answered by the standard ranch income statement of Table 1. For this reason I am proposing a modified approach for analyzing ranch income statements.

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Note from the Author: Although hypothetical, the cost, return, and investment figures are pretty close to what was really happening in 1980.

The standard income statement

Before examining the proposed "modified" approach, let's first review the "standard" budgeting procedures of Table 1. This 12-month ranch income statement reports revenues and expenditures for a hypothetical 300 cow ranch. Total *annual cash returns,* $70,000, consists of all receipts from livestock or crop products sold. Subtracting *annual cash costs,* $31,000, (all cash operating expenses except loan interest and principal payments) yields *net cash ranch income*, $39,000. It is this amount of cash that is available to purchase new machinery and improvements, provide for family living expenses, and to pay principal and interest on any outstanding loans against land, improvements, livestock, and machinery.

Next *depreciation costs* are subtracted to form *net ranch income.* Depreciation is the gradual but inevitable "wearing out" of all improvements and equipment, no matter how well

Table 1. Standard income statement for a hypothetical 300 cow ranch, 1980.

Item	Dollars	
Annual Cash Returns		
Cattle sold	65,000	
Crops sold	5,000	
Total		+70,000
Annual Cash Costs		
Feed and grazing fees	3,500	
Labor hired	6,000	
Machinery repairs	2,000	
Buildings and improvement repairs	1,000	
Veterinary	500	
Real estate taxes	5,000	
Crop expenses	6,000	
Bulls purchased	5,000	
Other expenses	2,000	
Total		-31,000
Net Cash Ranch Income		39,000
Depreciation Costs		
Buildings and improvements	2,000	
Machinery and equipment	5,000	
Total		-7,000
Net Ranch Income		32,000
Allocation of Net Ranch Income to Capital		
Value of Operator and Family Labor		-15,000
Net Return to Investment		17,000
Percent Return on $830,000 Total Investment		2.05%
Allocation of Net Ranch Income to Labor		
Interest on Capital		
Real estate (10%)	60,000	
Livestock and equipment (10%)	23,000	
Total		-83,000
Net Return (Loss) to Operator and Family Labor		(51,000)

they are maintained. Depreciation is often called a "non-cash" cost since it does not have to be paid in cash each year (and can occasionally be postponed for several years in a row). Still, the cost of replacing fences, pickups, etc., that are finally completely worn out must eventually be paid. The calculation of depreciation is simply an accounting technique to systematically convert large future expenditures into more manageable annual costs. During years of unfavorable prices or drought there is a natural tendency to postpone setting capital aside for replacement of improvements and machinery. This common postponement practice is sometimes termed "living on depreciation." At best, however, this is only a stalling procedure and failure to reserve the necessary funds only makes future replacement more difficult. Subtracting total depreciation costs, $7,000, yields a net ranch income of $32,000. These are the returns available for loan service and family living expenses. Usually standard income statements next allocate net ranch income to its two claimants, capital and labor. In Table 1, allocation is first made to capital by subtracting the *value of operator and family labor* (3,750 hours at $4 per hour) from net ranch income and attributing the remainder, $17,000, as a return to total ranch investment. Dividing this remainder by the total value of land, improvements, machinery, and livestock, $830,000, gives a rate of return on total ranch investment of 2.05 percent.

I should admit at this point that years ago, when first introduced to the standard method of ranch budgeting, I gave in to the temptation to find a real world problem to practice on. My "case study" in this instance was my father's northern Wyoming farm. I carefully subtracted operator labor from net income to obtain a residual to attribute to capital. Dad took one quick look at my proudly presented college kid numbers and said "I can't charge for everything I do around here or there won't be anything left to run on". And, of course, Dad was right, not just about his place, but about farm and ranch operations in general. But in order to identify the amount of income actually earned by *capital*, income due to labor *must be* deducted.

The second allocation of net ranch income by the standard method is to labor. This is accomplished by subtracting *interest on capital* (10% of the value of land, improvements, equipment, and livestock) and specifying the remainder, a negative $51,000, as compensation for operator and family labor. This second allocation is based on the premise that *all* capital (including the *owned* or equity portion of real and personal property) must be paid a fair return on investment. In reality, however, both interest on owned capital (when allocating the residual to labor) and compensation for operator and family labor (when allocating the residual to capital) are opportunity costs. Thus *neither* owned capital nor operator labor has to be fully paid, provided, of course, there is sufficient net ranch income for the family to live on. With that conclusion in mind and with our two original questions still unanswered, let's now turn to the proposed "modified" income statement of Table 2.

The modified income statement

Like the standard income statement, formulation of the modified income statement begins with the calculation of net ranch income by subtracting annual cash and depreciation costs from annual cash returns. Next the modified income statement provides an answer to the first question posed above: "Will the ranch produce enough net income for the family to live on?" The answer comes from explicit recognition of *loan service costs* which, when subtracted from net ranch income, yields *net return available for family living expenses.* In Table 2, the combined principal and interest payment for real estate is calculated for a $81,333, 30-year,

Table 2. Modified income statement for a hypothetical 300 cow ranch, 1980.

Item	Dollars	
Annual Cash Returns		+70,000
Annual Cash Costs		-31,000
Depreciation Costs		- 7,000
Net Ranch Income		32,000
Loan Service Costs		
Real estate	5,909	
Livestock and equipment	13,715	
Total		-19,624
Net Return Available for Family Living Expenses		12,376
Land Appreciation		+51,300
Payment to Mortgage Principal		+11,290
Gross Proceeds to Ranch Investment		74,966
Value of Operator and Family Labor		-15,000
Net Proceeds to Owned Ranch Capital		59,966
Percent Return on $733,164 Owned Capital		8.18%

6% loan established 20 years ago (1960). The payment for livestock and equipment is based on an $88,025, 10-year, 9% loan established in 1975. Thus $12,326 in net cash returns are available to meet living expenses of the ranch family. Combined with several "perquisites" such as household utilities and automobile expenses already included in annual cash costs, housing, home grown milk, meat, eggs, garden vegetables, etc., the $12,376 appears sufficient to cover family living costs. This measure of net cash returns might be considered "short-term" annual net income.

To convert this "short-term" income to "long-term" annual net income, the modified income statement introduces two additional income sources. First, *land appreciation* is included, calculated in our example at the 8.55% average annual compound rate prevailing for 11 western states grazing land values for the period 1960-1980 (USDA, 1980). The purpose of including the increase in land value as income is not to encourage inflation but to recognize that a realistic ranch income statement must acknowledge that inflation is taking place. Current high land prices, apparently much higher than those justified by crop or livestock production, are perhaps the best proof that expected land appreciation is at least as important to the investor as revenue from agricultural production.

Second, the modified income statement includes the *payment to mortgage principal* as income. This inclusion is based on the recognition that a principal payment is actually a payment from the borrower to himself since $1 paid toward the principal increases the borrower's equity position by $1. Like land appeciation, such "principal payment income" is not available to the borrower until he either refinances or sells the land in question. Still, such gains in equity (the difference between the market value of an asset and the amount owed on it) are just as important to the investor as *cash* income.

The modified income statement includes one final item to complete the analysis. As explained for the standard method above, it must be recognized that part of the *gross proceeds to ranch investment* are due to the contribution made by labor. Thus to calculate the income attributable solely to *ownership* of land and livestock, income rightfully belonging to labor must be subtracted (of course, if the ranch owner and operator were different people, the $15,000 *value of operator and family labor* would appear as a cash cost and this last step would not be necessary). *Net proceeds to owned ranch capital,* then, amount to $59,966 annually and we at last have an answer to the second question posed above. This $59,966 represents the annual net income available to compensate the $733,164 of *owned* capital (equity). The resulting of 8.18% rate of return on owned capital accounts for all income (both cash and equity growth) and all costs (both cash and opportunity). This rate of return can be compared directly to rates of return on other long-term investments.

Summary

The "modified" approach is recommended for preparing meaningful ranch income statements. It is superior to "standard" ranch income statements in several important ways:

(1) It is more *realistic*—real estate appreciation is included as income. From the investor's viewpoint such income is just as "real" as that derived from the sale of calves.

(2) It is much *simpler*—hypothetical required rates of return on capital are not used. Instead the borrower-/lender can compare the *generated* rate of return on owned capital with his own concept of a "required" rate.

(3) It is *easier* to interpret—net return is expressed in terms of net income actually *available* to live on.

Reported in this way, ranch income statements are more than interesting. They are actually useful.

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Biological Grasshopper Control

The recently developed biological grasshopper control, Nosema Locustae, is now available in Colorado. The trade name of the control is Grasshopper Spore.

V. Bixler, president of Colorado Agr. Feed, Inc., explained that Nosema Locustae is a completely natural, species selective biological control which attacks the variety of grasshopper most abundant in the state of Colorado. Tests conducted by both the U.S. Department of Agriculture and Reuter Laboratories confirm that the spore is environmentally safe. It attacks only the target insects, and because it is species selective, is harmless to man and other animals, including aquatic life and honeybees.

Nosema Locustae, a protozoan disease, occurs naturally in grasshoppers and is carried by spores. The disease apparently occurs only in grasshoppers and their near relatives (such as crickets) within the Melanoplus group. The apparent safety of this product, its species selectivity, and its natural origin will make it particularly attractive to organic gardeners as well as to the agriculture industry.

The Grasshopper Spore is spread by means of air or ground equipment. It is then eaten by the grasshopper as part of its regular food supply. A natural pathogen for grasshoppers, the spore then germinates in the body of the grasshopper, spreading infection and producing more spores. The grasshopper becomes lethargic, feeds less, and its reproduction diminishes. Weakened, the grasshopper falls prey to the cannibalistic habits of stronger members of the herd, providing another way of spreading the spore and its disruptive effects.

The grasshopper spore has been found to be persistent in an area after its application. Eggs laid in the fall by infected grasshoppers may carry quantitites of Nosema spore with them. When they hatch the following summer, the dormant spores germinate in the young grasshoppers, thus continuing the cycle of infection. Therefore, Bixler says, one application could control grasshoppers for several years.