KANSAS FARM MANAGEMENT & MARKETING HANDBOOK

KSU Farm Management Guide MF-1101

Whole Farm, Profit Objective Pricing

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Payday is the day agricultural producers sell their commodities and livestock. Most of us, whether farmers, small businessmen, or employees, wish to earn the most for our efforts. The intent of this guide is to help producers calculate a profit objective price for their commodities in any given year based on that year's farm mix of crops and livestock and on historical price and production data. With the knowledge of this profit objective price, actual marketing plans can be devised and carried out.

At a minimum, profit for a full-time farmer must be able to pay family living expenses, principal payments, income taxes, and self-employment taxes. These four items are paid with taxable dollars. Any farm that cannot generate sufficient profit to meet these needs will either lose equity or must find alternative sources of income.

How objective pricing differs

Whole farm, profit objective pricing differs from break-even analysis of enterprises. Break-even analysis is just that, covering expenses, but not including a profit objective to cover family living, principal payments, and taxes. Whole farm profit objective pricing includes these items in the required net cash flow outcome. Meeting the profit objective price for farm commodities will enable farm operators to meet their obligations.

Calculation of prices to obtain a profit objective is a five-step process:

1. Identify total cash flow needs.
2. Identify farm enterprises for the year.
3. Calculate long-term (5- to 10-year) average production levels and commodity prices for each commodity raised on the farm.
4. Calculate the expense-to-income ratio.
5. Assign investment, labor and management expenses to each enterprise.

Following these five steps and doing some estimation will derive profit objective prices for a farm operation and indicate what prices are needed to obtain a profit to cover the expenses noted.

Analysis Steps

The net cash flow or profit needed is determined by examining historical data as well as current data from loan payment schedules and an estimation of taxes. Family living expenses can be based on past family living expense records or use of a budget. Loan payment amortization schedules will indicate the amount of principal required to be paid in the current year. An estimate of taxes can be obtained using IRS publications or consulting a tax advisor. The sum of family living expenses, principal payments, and taxes represents the total net dollar amount needed from farm operations. Any off-farm income, such as wages, interest, dividends, rents, or royalties must be subtracted from the amount of dollars needed from farm operations. This net value could be called an adjusted net farm income.

Step two is the identification of the farm mix as planned, or in actuality[1]. The allocation of crop acres on a per crop basis is needed to calculate how much production is expected to be available for sale in a year. Similarly, an estimate of the animal units that are available needs to be made. Use of historic data (5 to 10 years) of past yields multiplied by the acres, head, or litters will give a gross number of units available for sale. These calculations provide the operator information from which to plan and use in further calculations.

Step three is the derivation of long-term production levels and commodity prices for each commodity. A review of past crop and livestock production records should provide this information. Five years of selected commodity prices for Kansas are provided in Table 1.

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[1]*For the purpose of this discussion, the farm mix has been determined by prior farm operator experience and history. This Farm Management Guide does not attempt to determine the optimal farm mix arrangement through linear programming or other analytical tools.*

Step four derives an estimate of the expense-to-income ratio. This ratio is a measure of farm efficiency. The ratio is total expenses divided by total income. As a rule of thumb, the ratio should range between 0.70 and 0.80. In other words $70 to $80 is spent to earn $100 of gross income. Farm operators who are members of a Kansas Farm Management Association have this number calculated for them in their annual business analysis printouts.

For non-Farm Management Association members, this ratio can be calculated by reviewing past tax returns. To derive this ratio from tax returns, farm operators need to divide total expenses by gross income as shown on Schedule F. This ratio is the linchpin of the total process. Once the expense-to-income ratio is calculated, divide the sum of one minus the ratio into the net cash flow needed to obtain the gross farm income needed. The lower the ratio, the lower the minimum prices that are needed to attain the farm profit objectives. Conversely, the higher the ratio the higher the prices needed to attain the farm profit objectives.

Step five is probably the most difficult. One must assign the percentage of investment, labor, and management to an enterprise and determine a weighted average for the enterprise. When step five is completed, a simple mathematical equation is solved to determine the profit objective price. A review of the depreciation schedule for assets can be used to allocate the investment in machinery, motorized equipment and buildings to the various enterprises. Similarly a review of owned and rented land to determine investment and land cost per crop enterprise is required.

A notebook or daily activity diary may be kept for a period of time to help in the assignment of labor and management per enterprise. Once the percentage of investment, labor, and management has been allocated to the enterprises, then a weighted average can be calculated. This weighted average on a per enterprise basis is then used to calculate the price objective for that enterprise needed to meet whole farm cash flows.

Example

The example below has the following assumptions.

1. Family living expenses, $27,000 per year
2. Principal payments of $2,200 per year
3. Taxes (federal, state, and self-employment) $10,500
4. Off-farm income $0
5. A family of five

The total net cash flow needed from farm operations is the sum of items 1, 2, and 3, less item 4 or $39,700.

The farm mix is assumed to be the following:

1. 80 sows/gilts in swine breeding herd with

   —90% conception rate
   —72 sows farrow 2.15 times per year
   —8.25 sales per litter ,as some gilts are held back for replacement
   —1,277 market hogs per year sold

2. 130 acres of milo

   —75 bu./acre 10-year average yield
   —9,750 bushels raised, with all production fed to swine

3. 205 acres of wheat

   —34 bu./acre 10-year average yield
   —6,970 bushels sold

4. 335 acres of soybeans

   —32 bu./acre 10-year average yield
   —10,720 bushels sold

Historical production records allow use of 5- to 10-year average yields for crop and livestock enterprises to estimate gross number values for sale. The expense-to-income ratio for this farm operation was 0.80. Gross farm objective income is calculated by using the following formula:

$$\text{GFOI} = \frac{\text{Objective Income}}{1 - \dfrac{\text{Expense}}{\text{Income}}}$$

In this example, 0.20 is divided into $39,700. The resulting quotient is $198,500, which is equal to gross farm objective income.

Assigning the investment, labor, and management percentage allocations for each enterprise were computed to be as follows:

60 percent for swine (includes the milo enterprise)
10 percent for wheat
30 percent for soybeans

Thus the calculation of profit objective prices for this example farm are as follows.

Swine: $198,500 × 0.60 ÷ 1,277 head ÷ 250 lbs./head × 100 = $/cwt. = $37.31

Wheat: $198,500 × 0.10 ÷ 6,970 = $/bushel = $2.85/bu.

Soybeans: $198,500 × 0.30 ÷ 10,720 = $/bushel = $5.56/bu.

Changes in the percentages of the allocations to the enterprises affect the prices needed to meet the net farm income objective. Also, a change in the expense-to-income ratio will greatly change the needed prices of the salable commodities. Likewise, increases in objective income increases all prices. Table 2 shows a sensitivity analysis for this example with changes in the expense-to-income ratio. Table 3 shows the same example with changes in the percentages allocated to the enterprises. From these sensitivity studies one can see that a slight change in one or all factors can result in a large change in the price needed to attain the profit objective necessary to reach the net farm income required to meet obligations.

Managers and operators of farms can see how controlling expenses would aid in reducing the expense-to-income ratio. Expenses are often blamed for increasing at a rate faster than income. However, expenses for operating a particular farm remain fairly constant over time when taking inflation into account. Income has a greater effect on the expense-to-income ratio. Use of whole farm profit objective pricing can help farm operators to increase income by realizing what price is needed to meet obligations.

By studying percentage allocation values, farm operators may be able to see where investment, labor, and management are most efficiently implemented. Changes in allocation of resources from a whole farm price objective view point may lead to greater returns to those resources. A more rigorous analysis of a particular farm may yield the optimal farm mix of crops and livestock.

With a little study and effort, farm operators can use whole farm objective pricing to determine their individual cash flow needs and become more comfortable and confident in marketing their agricultural products.

Table 1. Average Prices by Year for Kansas for Selected Agricultural Commodities, 1995-1999. Prices in Dollars per Bushel for Grains, Dollars per Hundredweight for Livestock.

Commodity	1995	1996	1997	1998	1999	Average
Wheat	$ 4.16	$ 4.95	$ 3.68	$ 2.76	$2.35	$ 3.58
Grain Sorghum	2.45	3.34	2.25	1.88	1.54	2.29
Corn	2.72	3.82	2.64	2.21	1.88	2.65
Soybeans	5.82	7.25	7.37	5.82	4.46	6.14
Market Hogs	38.90	50.70	50.90	32.40	30.70	40.72
Calves	75.90	58.90	86.40	86.60	91.90	79.94
Milk	12.33	14.23	12.78	14.73	13.88	13.59

Source: Kansas Department of Agriculture.

Table 2. Sensitivity Analysis of Expense-to-Income Ratio on Prices of Commodities Needed to Attain Net Cash Flow.

Expense/Income ratio	Gross income required	Profit objective price		
		Hogs/cwt.	Wheat/bu.	Soybeans/bu.
.70	$132,333	$24.87	$1.90	$3.70
.75	158,800	29.84	2.28	4.44
.80	198,500	37.31	2.85	5.56
.85	264,667	49.74	3.80	7.41

Table 3. Sensitivity Analysis of Different Percentage Allocation to Enterprises.

Enterprise	Percentage allocation	Profit Objective Price
Swine	60	$37.31 per cwt.
Wheat	10	$2.85 per bu.
Soybeans	30	$5.56 per bu.
Swine	70	$43.52 per cwt.
Wheat	5	$1.42 per bu.
Soybeans	25	$4.63 per bu.
Swine	50	$31.09 per cwt.
Wheat	15	$4.27 per bu.
Soybeans	35	$6.48 per bu.

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