Cooperative Extension Service College of Agriculture Washington State University Pullman, WA 99164

AGRIBUSINESS MANAGEMENT

MANAGEMENT STRATEGIES THROUGH BREAK-EVEN ANALYSIS

(Continued from January issue)

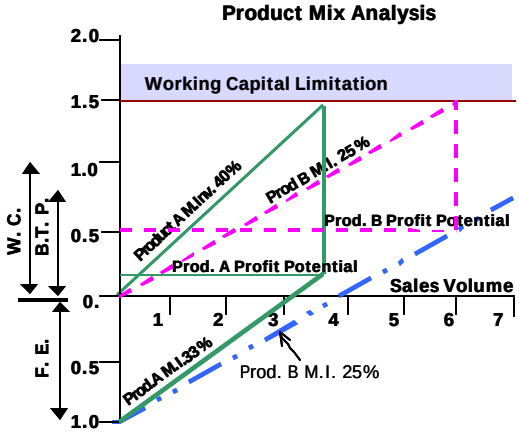
Product Mix Decisions

As described in the January issue, marginal income-investment analysis is quite useful to management in identifying whether market conditions, plant-production capacity, or working-capital availability constitutes the most constraining influence over sales-volume planning. Its usefulness is not limited to this function however, and it can be equally valuable as a management aid in product mix decisions.

Traditionally, in the agribusiness industry the value of alternative products has been measured on the basis of profitability, i.e., the marginal income ratio. However, as has been shown above, the marginal investment ratio cannot be ignored in the product selection decision as it may ultimately impose the most relevant constraints.

Let's assume a feed retailer is considering the selection of one of two highly similar feeds for the addition to his current, product line offering. Feed A promises to be highly profitable and shows a marginal income ratio of 33%. Feed B is found to contribute only 25 cents to overhead and profit per $1 in retail sales and therefore, shows a marginal income ratio of only 25%. If the product selection decision were based solely on the marginal income analysis, Feed A would be selected. However, it would seem wise to also consider the marginal investment of the alternative feeds. It is soon found that high inventories and receivables are required to support the sales of Feed A, resulting in a marginal investment ratio of 40%. On the other hand, inventories and receivables to service the sale of Feed B are low and some cash advances even occur. Hence, its marginal investment ratio is only 25%. Imposed on this product-selection decision is the retailer's working-capital limitation of $1,500. As shown in Exhibit 11, the attractiveness of alternatives A and B can now be more thoroughly evaluated. Although Feed A is more profitable per dollar of sales, its more intensive working-capital requirement places a limit on sales volume of about $3,600. At that sales-volume capacity, Feed A profit potential is about $237. Feed B, while contributing less in profit per dollar of sales, does not perpetuate a

Exhibit 11
Product Mix Analysis



shortage of working-capital shortage until a $6,000 sales volume is reached. At that sales volume, a $500 profit potential exists. Without this combined analysis, Feed A would have been selected over B. However, with the existence of some limit on working-capital availability, the combined analysis suggests to management that Feed B should be selected.

Working-Capital Allocation Decisions

Just as marginal income-investment analysis has been shown to be useful in product decisions, it is also of assistance to management when it is confronted with the decision to allocate available working capital amongst divisions of a multidivision firm.

For purposes of simplicity, let's assume that two divisions of an agribusiness firm have identical profit plans, similar sales volume and comparable working-capital requirements.

Each division has asked firm management for additional working capital to support an expansion of sales volume. There is a limit on working-capital availability, such that both requests cannot be met. Should one division be given priority or should both divisions share equally that working capital which is available? Exhibits 12 and 13 show the marginal income-investment charts for these hypothetical divisions.

Exhibit 12
Marginal Income-Investment Chart
Mass Production Division

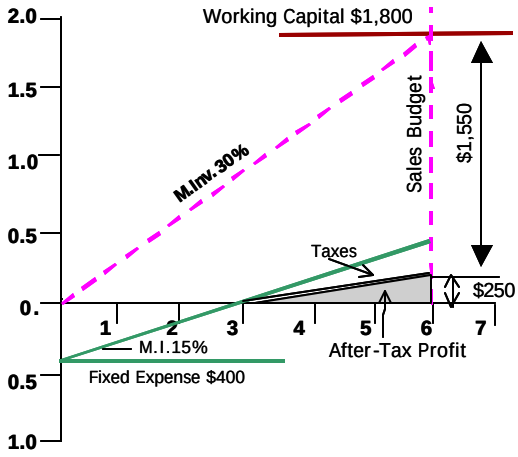
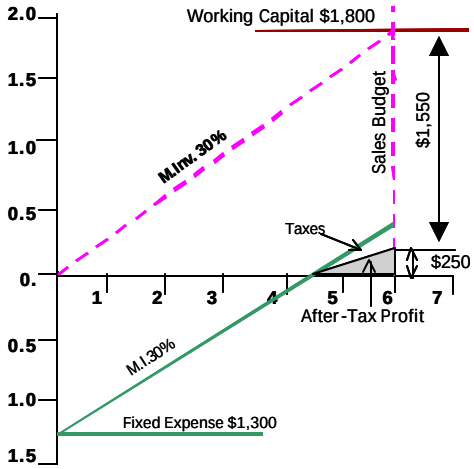


Exhibit 12 is typical of a division which might he characterized by the manufacture of large volumes of a mass-produced product. Typical of mass-production activities are relatively low levels of fixed expenses (e.g., $400) accompanied by relatively high commissions and incentives on sales, resulting in a low marginal income ratio (e.g., 15%). A marginal investment ratio of 30% is assumed for this division. The division's sales budget calls for $6,000 in sales volume and a resultant before-tax profit of $500. Assuming a 50% corporate tax rate, after-tax profits are shown as $250. Since after-tax profits may be made available to service working capital, the working-capital requirements of $1,800 implies the need of $1,550 in "outside" financing.

Exhibit 13 is typical of a division producing highly technical products; i.e., fixed expenses such as administration and engineering salaries are relatively high ($1,000), but because of the nature of the products produced, they command high prices and profit margins; thus the marginal income is high (30%). Again the marginal investment is assumed to be 30%. The budgeted sales volume, tax rate, working-capital requirements and other factors are the same as for the mass-production division.

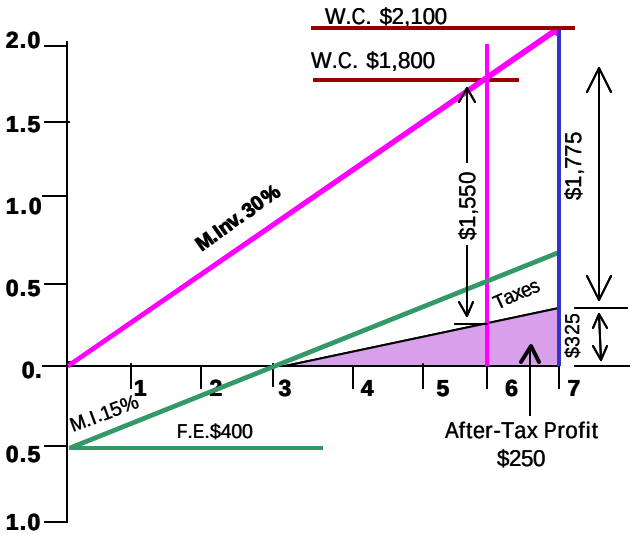
Exhibit 13
Marginal Income-Investment Chart
Technical Production Division



Now let's assume that the demand for the two products of the two divisions increases beyond expectation and both divisions have an opportunity to increase their planned sales volume beyond $6,000 at the current price level. Under those conditions, which division should receive the firm's preferential treatment in the allocation of additional outside financing? Given equal profits, identical net profits as a percent of sales and the same working capital, the two divisions would seem to be equally deserving. As shown in Exhibits 14 and 15, our marginal income-investment analysis shows this not to be true.

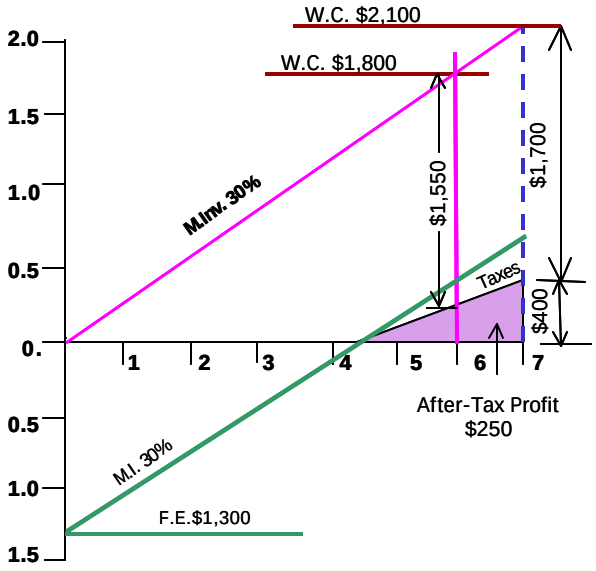
By extending the marginal income and marginal investment ratio lines in the mass production

Exhibit 14
Marginal Income-Investment Chart
Mass Production Division



division (Exhibit 14), it can he shown that an increase in sales volume to $7,000 will increase profits after taxes by $75 to $325. Total working-

Exhibit 15
Marginal Income-Investment Chart
Technical Production Division



capital requirements will increase to $2,100. However, since a portion of this will be offset by the added profit, only $1,775 of "outside" financing will be needed. Hence an additional $225 ($1,775-$1,550) in outside financing produces $75 in additional profit.

By extending the marginal income and marginal investment ratio lines in the technical production division (Exhibit 15), it can be shown that an increase in sales volume to $7,000 will increase profits after taxes by $150 to $400. Again, total working-capital requirements will increase to $2,100, but $400 will be offset by the after-tax profit, leaving $1,700 to be financed. In this case, $150 more in outside financing produces $150 in additional profit.

As shown, two divisions which first appear equally deserving of an infusion of additional work capital, are now found to be not so equal when studied via marginal income-investment analysis.

Summary

Break-even analysis has long been useful to agribusiness as a tool in management planning. Its use, however, requires a specific understanding of capacity and the role it plays in the analysis. Because operationally-oriented and financially-oriented managers often have a different understanding of capacity, conflicts arise as to whether markets, plant-production capacity, or working-capital availability is most restrictive in the profit-planning process. Marginal income-investment analysis is proposed here as a procedure for the proper consideration of both concepts of capacity. Furthermore, this procedure is shown to have useful application in product mix and working-capital allocation decisions.

Sincerely,

Ken D. Duft

Ken D. Duft
Extension Economist