

# Total Mixed Dairy Rations on Your Farm?

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Total mixed dairy rations (TMR) offer an opportunity to improve business profits through improved animal performance and health, decreased feed wastage, improved labor efficiency and improved butterfat. The installation of a TMR system normally requires added investments in feed mixing and distribution equipment. Additional storage facilities may be required as well.

With a TMR system, each bite is a balanced diet. For small herds, a limiting factor influencing milk production is balancing the ration for the broad range of production levels within the herd. Diets too low in energy and protein may limit production of early lactating cows or result in thin cows with lower production and reduced reproductive efficiency. In contrast, diets too high in energy and protein can result in overconditioned cows at freshening with fat cow problems. In larger herds, cows can be grouped more homogeneously to better balance for nutrient requirements.

In considering the use of TMR, several advantages and limitations are important to consider. The expected benefits, costs and capital investments associated with TMR systems were researched and the results reported in Extension publication [MP662](#), *Total Mixed Dairy Rations: Costs and Benefits by Herd Size*. Refer to this publication for details regarding the implementation of a TMR system for your farm. You are urged to read this publication prior to working through the economic analysis included here.

The purpose of this publication is to provide a format for evaluating the economic consequences of changing to a TMR system. Planning will enable you to determine what investments, labor costs, power costs, etc., are needed to implement the system before making new investments or changes in your operation.

Adopting the TMR feeding system will change your dairy enterprise costs and returns. To evaluate this change, the following partial budgeting procedure (economic analysis) will allow you to balance expected total gains against losses that will result if you switch from parlor grain feeding to a TMR.

The following budgeting procedure allows you to estimate (1) added capital investments needed to make the change; (2) added returns from increased milk production, higher butterfat test and reduced feed wastage; and (3) added costs associated with the TMR system. This "ballpark" analysis will help determine if the potential added returns will outweigh the added costs, indicating whether the proposed change will be profitable for your operation.

Brief instructions follow:

- **Section A** is available to think through and outline the additional cost of equipment and buildings that are needed to switch to the TMR feeding system. Be as accurate as possible on your needs and cost of each investment.
- **Section B** provides a procedure for entering present average milk production per cow and estimating the increase in milk production per cow with TMR (3 to 10 percent) and future average milk price per cwt. for planning purposes. Items 1 and 2 provide a method of calculating the value of increased milk production for the total herd. Item 3 is provided to calculate the added returns resulting from TMR due to reduced feed wastage. Research has indicated a 3 to 5 percent reduction in feed wastage. Guides for feed cost per cow are shown based on different levels of milk production (rolling herd average). If you know your total feed costs per cow (forage, pasture and concentrate), use your own costs rather than the guides. Item 4 is available to include other added returns such as reduced veterinary and medicine costs due to more healthy cows, etc. (You should have a good, reliable reason for these values.)
- **Section C** is available for itemizing appropriate costs associated with the TMR system. Items 1 and 2 provide formulas for calculating additional feed and labor costs.

Item 3 provides guidelines and a method for calculating tractor power costs that are necessary to operate the mixer wagon and front-end loader. Tractor costs are allocated to TMR on a cost per hour of operation basis because the tractor is usually used for other business activities. Thus this is an easy method of allocating this specific cost to TMR. Because labor and machinery operate together, the hours per cow are the same as the labor hours used in Item 2. Also, you can use variable or total costs per hour of tractor operation. For example, if the tractor you plan to use is an older tractor that is fully depreciated, it would be appropriate to use variable costs only. But if you have a newer tractor or have to purchase a tractor specifically for the TMR system, you should use total costs per hour of operation to calculate power costs.

Items 4 and 5 are self-explanatory. Just fill in the blanks and calculate the answer. Note that the marketing costs in Item 4 are based on hundredweight of milk, not pounds.

Item 6 may not be a cost to you. If it isn't, leave it blank.

- **Section D** is available to calculate the potential gain or loss from the switch to the TMR system. If line 3 is negative, there is no need to calculate the rate of return on

line 4.

## Summary

The Partial Budget Analysis Worksheet allows you to estimate the rate of return from the investment needed to implement a total mixed ration system in your dairy operation. The answer calculated on line D3 indicates whether the change has a potential of producing a positive or negative annual profit. Line D4 converts the dollar profit into a percent return to the additional capital needed to make the change, i.e., from parlor feeding to TMR system. For this reason the major capital investments needed for the TMR system should be identified and analyzed as accurately as possible.

The actual increase in milk production and the milk price received will vary. Therefore, two or more analyses based on different levels of increased milk production per cow such as 500, 750, 900, 1,200 pounds and at different price levels such as \$11, \$12, \$13/cwt should be calculated. At least a best-case and worst-case scenario should be thought through and analyzed to develop a bracket in which you will be operating.

Producers who feed balanced, palatable rations can expect less productive gains from TMR (lower benefit levels) than others whose rations fall short of nutritional requirements. Under such conditions, producers should experience the higher gains per cow.

Another important consideration is the investment requirement from a total business perspective. If higher outlays for equipment and power are required and must be obtained by borrowing money, debt service becomes an important risk consideration. This could be judged in terms of cash flow obligations to service debt and whether the added debt influences the financial statement of the total business in an adverse fashion (debt/equity ratio).

## Partial Budget Analysis

Change considered: Switch to total mixed dairy ration from present feeding system described as \_\_\_\_\_

### Section A: Added Capital Investments Needed to Make Change<sup>1</sup>

#### 1. Equipment:

Roller mill \$ \_\_\_\_\_

Mixer wagon with scales<sup>2</sup> \$ \_\_\_\_\_

Front-end loader \$ \_\_\_\_\_

Other \$ \_\_\_\_\_

## 2. Buildings and facilities:<sup>3</sup>

Commodity building \$ \_\_\_\_\_

Additional bunk space \$ \_\_\_\_\_

Lot fences for cow grouping \$ \_\_\_\_\_

Other \$ \_\_\_\_\_

## Section B: Added Returns and/or Reduced Costs

### Estimated increase in value of milk production:

Present average annual milk production/cow is \_\_\_\_\_ lbs.(a)

Expected increase in production per cow (guide 3-10%) \_\_\_\_\_ lbs.(b)

Projected milk price (3.5%)/cwt. \$ \_\_\_\_\_ plus value for 0.1% butterfat \_\_\_\_\_ cents/cwt. is projected price for 3.6% milk \$ \_\_\_\_\_ (c)

### 1. Value of increased milk production

\_\_\_\_\_ no. cows x \_\_\_\_\_ (b) lbs. increase/cow = \_\_\_\_\_ total lbs. milk/100 = \_\_\_\_\_ cwt. x \$ \_\_\_\_\_ (c) price for 3.6% milk = \$ \_\_\_\_\_

### 2. Increased value of butterfat for present production

\_\_\_\_\_ no. cows x \_\_\_\_\_ (a) lbs. present production/cow = \_\_\_\_\_ total lbs. milk/100 = \_\_\_\_\_ cwt. x \_\_\_\_\_ cents/cwt. per 0.1% added butterfat = \$ \_\_\_\_\_

### 3. Reduced feed wastage (3-5% of total feed cost)

Feed cost guides based on milk production per cow:

12,500 lbs. = \$1,050; 15,000 lbs. = \$1,150

18,000 lbs. = \$1,250; 20,000 lbs. = \$1,300

\_\_\_\_\_ no. cows x \$ \_\_\_\_\_ feed/cow = total value fed x \_\_\_\_\_ % wastage = \$ \_\_\_\_\_

4. Other returns or reduced costs (i.e., salvage value of old feeding system)  
\$ \_\_\_\_\_

5. Total estimated added returns (add lines 1 through 4) \$ \_\_\_\_\_

<sup>1</sup>Refer to MU publication [MP662](#), page 13, for itemized list and cost of new TMR equipment.

<sup>2</sup>Know horsepower requirement to operate. Will you need to buy a tractor to operate or can you use your present tractor?

<sup>3</sup>Do not include hay, grain or silage storage investments. Feed costs included in Section B3 are based on market value plus transportation and storage costs, therefore investments for hay, grain and silage storage should not be included.

## Section C: Added Costs and/or Reduced Returns Associated with the TMR System

### 1. Added feed cost<sup>1</sup> (use only the extra grain ration required for the added production)

Increased milk production \_\_\_\_\_ lbs./cow/ \_\_\_\_\_ milk/feed ratio<sup>2</sup> (guide 2 to 3 lbs.) = \_\_\_\_\_ lbs. grain ration x \_\_\_\_\_ cents/lb. x \_\_\_\_\_ no. cows = \$ \_\_\_\_\_

### 2. Labor costs

Guides for added labor for TMR system per cow by herd size: 100-cow herd — 5.5 hrs./cow; 200-cow herd — 4.1 hrs./cow; 300-cow herd — 3.7 hrs./cow; 500-cow herd — 3.6 hrs./cow

\_\_\_\_\_ hrs./cow x \_\_\_\_\_ no. cows x \$ \_\_\_\_\_ /hr. = \$ \_\_\_\_\_

### 3. Power costs (use variable costs for tractors presently owned and total costs for purchased tractor for the TMR system)

Guides for tractor costs:

| Tractor hp | Costs per hour operation — variable | Costs per hour operation — total |
|------------|-------------------------------------|----------------------------------|
| 50         | \$3.35                              | \$7.50                           |
| 60         | \$3.75                              | \$8.50                           |
| 90         | \$5.63                              | \$12.50                          |
| 100        | \$6.75                              | \$15                             |

\_\_\_\_\_ hrs./cow (same as labor hours in item 2) x \_\_\_\_\_ no. cows x \$ \_\_\_\_\_ /hr. (costs/hour based on tractor hp) = \$ \_\_\_\_\_

### 4. Marketing costs of milk

\_\_\_\_\_ lbs. increased milk/cow x \_\_\_\_\_ no. cows = \_\_\_\_\_ total lbs. milk/100 =

\_\_\_\_\_ cwt. x 75 cents/cwt. = \$\_\_\_\_\_

## 5. Fixed costs associated with new capital investments

Equipment investment \$\_\_\_\_\_ (line A1) x 23% = \$\_\_\_\_\_ (a)  
Buildings and facilities investment \$\_\_\_\_\_ (line A2) x 14.2% = \$\_\_\_\_\_ (b)  
Total fixed costs (add lines a and b) = \$\_\_\_\_\_ (c)

## 6. Nutrition consultation, feed analysis, computer programs

\$\_\_\_\_\_ cost per cow (guide \$6-\$18/cow) x \_\_\_\_\_ no. cows = \$\_\_\_\_\_

## 7. Other added costs or reduced returns \$\_\_\_\_\_

## 8. Total added costs (add lines 1, 2, 3, 4, 5c, 6 and 7) \$\_\_\_\_\_

<sup>1</sup>Added feed costs include only the concentrate feed necessary to produce the added milk production. This assumes that the feed required to produce the original production has not changed.

<sup>2</sup>Milk/feed ratio is pounds of milk per pound of feed fed.

## Section D: Analysis (Analysis shows the potential gains or losses from the switch to the TMR feeding system.)

1. Total estimated added returns (Section B, line 5) \$\_\_\_\_\_

2. Minus estimated total added costs (Section C, line 8) \$\_\_\_\_\_

3. Equals profit or loss from TMR (line 1 minus line 2) \$\_\_\_\_\_

### 4. Average rate of return on investment<sup>1</sup>

Profit (line 3) \$\_\_\_\_\_ + \$\_\_\_\_\_ average investment on new investment<sup>2</sup>/ \$\_\_\_\_\_ total new investment x 100 = return on initial investment \_\_\_\_\_%

<sup>1</sup>For the change to TMR to be profitable, the percent return should be at least 7 to 8 percent. If providing added purchases from business earnings or savings, compare to returns from a Certificate of Deposit or other alternative. If purchases are financed, compare rate of return with cost of borrowed money.

<sup>2</sup>Average interest on new investment is total new investments (Section A, line 1 + line 2) \$\_\_\_\_\_ x 6 percent average interest rate (equivalent to 12 percent APR).

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