# Reducing Feed Costs While Maintaining Milk and Milk Component Production

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Dairy producers have been challenged with low milk prices and decreased profitability in the last few years. This has provided the opportunity to examine and evaluate their herd management system to define changes that could be made to lower costs without impairing milk production. On most dairy farms, feed cost is the largest single item in determining the cost of milk production. Feed costs may account for 35 - >45% of the total cost of producing milk. Potential adjustments in the feeding program when milk prices are low have been the subject of previous papers (Chandler, 2003; Weiss and St-Pierre, 2013).

Hutjens (2010) reported the results of a survey of nutritionists, veterinarians and extension educators on management changes made in response to low milk prices in 2009. The top 5 correct decisions made were emphasis on the forage program, staying the course with management practices, reviewing ration balancing and the nutrition program, strategic culling and paying attention to milk components and quality. The top 5 incorrect decisions were reducing feed intake or removing nutrients, taking out minerals, vitamins and feed additives, not staying the course, low forage quality and avoiding financial support.

This situation provides dairy producers an opportunity to examine current herd nutrition and management practices. This evaluation should be done in cooperation with the herd nutritionist and other consultants working with the herd. The goal is to explore potential changes that could lower feed costs without impairing milk production, herd health or reproduction. Don't make short-term changes to lower feed costs that could have a long-term negative impact on herd performance and profitability. The transition cow program is one example. The results of this program directly impact metabolic disorders, peak and total lactation milk and reproduction.

## Take Advantage of Home-Grown Forages

The forage program on a dairy farm is the foundation for developing successful, efficient, healthy and profitable feeding programs. Forage quality, consistency, inventory and allocation are the key areas. The goal is to provide the "right" quality forage to match nutrient needs of the various groups on the farm. Table 1 contains information on 4 forages available on a specific farm. In terms of matching cow requirements, corn silage B and haylage B would fit best for early lactation, high producing cows. Corn silage A and haylage A would better match the nutrient needs of later lactation cows and bred heifers.

Table 1. Forage Quality of Available Forages

| Item | Corn Silage A | Corn Silage B | Haylage A | Haylage B |
|---|---|---|---|---|
| Dry matter, % | 32.4 | 34.5 | 36 | 35.8 |
| CP, % of DM | 7.8 | 7.2 | 15.3 | 21.1 |
| ADF, % of DM | 31 | 23.1 | 37.3 | 26.8 |
| NDF, % of DM | 45.4 | 38 | 52.8 | 36.3 |
| NDFD, 30-hour, % of NDF | 50.7 | 59.8 | 48.1 | 57.2 |
| Starch, % of DM | 28.5 | 38 | - | - |

A simple way determined the amount of forage to include in the ration is to use forage NDF intake. A good starting point is forage NDF intake as 0.9 to 1% of body weight. This can then be adjusted based on forage NDF and NDFD values. A more recent method is to use $uNDF_{240}$ in the total ration as 0.3 – 0.4% of body weight for herds feeding corn silage-based rations. A paper from Italy reported total ration $uNDF_{240}$ intakes of 0.4 to 0.48% of body weight for alfalfa hay and chopped wheat straw diets (Fustini et. al., 2017)

What levels of forage are currently fed in dairy rations? A dataset of 16 Holstein herds or groups with an average MP predicted milk of 109 pounds was extracted from a previous paper Chase, 2019). The average ration forage level was 64.3% with a range of 60 to 72%. Total ration NDF was 30.8% (range of 26 to 34%) and forage NDF intake as a percent of body weight of 0.95% (range of 0.75 to 1.14%). A New York herd increased ration forage from 55% of the ration dry matter to 65% over a 4-month period. This was done by the herd nutritionist as a result of improvements in forage quality. Forage NDF intake increased from 0.84 to 0.96% of body weight. Milk production increased by about 2 pounds per cow. The income over purchased feed cost increased by $1.30 per cow per day.

Forage inventory is a key consideration when moving to higher levels of forage feeding. It may take 15 – 30% more forage to feed the same number of cows. Make sure to do a forage inventory to assure that adequate quantities of forage are available before implementing a higher forage feeding program.

## Feed Additives

There are several feed additives that can be used in dairy rations. The daily cost of using these can range from about 2 to >50 cents/cow/day. A mistake made in 2009 was to remove feed additives from rations without looking at return on investment. It is logical to work with your herd nutritionist to evaluate the feed additives used as part of a decision-making process. Key considerations are:

1. Why was the feed additive originally added to the ration?
2. Is it working in your herd?
3. What is the return on investment?
4. Which group(s) of cows should this additive be targeted to?

5. Is your grouping structure designed to feed targeted additives to only specific groups?

## Feed Ingredient Selection

There are many feeds and forages available for use in dairy rations. Many of these are co-products of processing grains for human food. There may be opportunities to select feed ingredients to help in controlling feed costs. The following points should be considered as part of the decision-making process when evaluating feed ingredient choices:

1. Compare choices on cost per unit of nutrient provided rather than cost per ton. A feed may have a low cost per ton but is not a good buy if it does not provide the nutrient(s) needed. Corn gluten feed may be attractively priced but is not a good source of rumen undegradable protein (RUP).
2. Feeds with high RUP will be undervalued unless the program used gives credit for RUP.
3. Try to select feeds with lower levels of variability in nutrient profile. Many co-product ingredients have significant variability due to differences in processing methods and conditions. Many forage testing labs have online feed composition libraries that can be accessed and used to examine the variability of ingredients.
4. When possible, select feed ingredients that come with a feed tag guarantee. There are some co-product blends that provide this information.
5. Another option is to always source feed ingredients from the same processing plant. There should be less variation in nutrient profile within plant than between plants for the same feed ingredient.
6. Using a number feed ingredients in the ration at lower levels of inclusion reduces the impact of nutrient profile of an individual ingredient on potential changes in total ration nutrient composition.
7. Take advantage of cash discounts.
8. Explore options to lock in feed ingredient purchases.

## Grouping Considerations

The goal of grouping dairy cows is to increase the uniformity of group by decreasing the variability of milk production within the group (Weiss, 2018). This provides an opportunity to improve production, feed efficiency and improve income over feed costs. A survey in Pennsylvania dairy herds found that 48.8% of the herds fed 1 total mixed ration to the lactating dairy cows (Buza and Holden, 2015). A survey reported that 64% of Michigan herds ≥200 cows fed 2 or more rations to the milking cows (Contreras-Govea et.al., 2015). In the same survey, 69% of the herds in Wisconsin fed 2 or more ration the milking cows. The ability to have fresh cow or first lactation heifer groups were the most common reasons for feeding more than one ration.

A comparison was done to evaluate the changes in income over feed cost (IOFC) on 30 Wisconsin dairy farms (Cabrera et. al., 2012). The IOFC with no grouping was $2,311 per cow per year. The IOFC when 3 feeding groups were used was $ 2,707 for an average increase of $396 per cow. Using 3 feeding groups increased IOFC by $161 per cow in herds < 200 cows and $580 per cow in herds > 1,000 cows. A recent observational study in a 600 cow New York herd found a decrease in total feed cost of $184 per cow per year and $171 in purchased feed cost when a late lactation ration was implemented. This is compared to the herd having fresh cow and milk cow rations before the third group was added. There was no change in milk production in this herd.

There are also options that can help in controlling feed costs in component fed herds. One is to use a 2-grain feeding system. The most common application of this is to have energy and protein grain mixes. The proportions fed to individual cows can be varied to better meet nutritional requirements. An additional approach is to formulate a fresh cow pack. This can contain some feed additives targeted only for fresh cows. Feeding the grain 3-4 times per day will help to maintain a more consistent rumen fermentation

## Feed Shrink

Shrink is the feed produced on the farm or purchased that is not consumed by the cow. A 1 percent change in dry matter total mixed ration shrink has been estimated to be $25,000 per year in 1,000 cow herd (Stone et. al., 2015). This is based on 52 pounds of dry matter intake and a feed cost of 13 cents per pound of dry matter. Shrink also changes the cost per ton of feed ingredients (Greene, 2014). A 5% shrink loss in soybean meal purchased at $350 per ton increases the cost to $368 when included in the ration.

Dry feeds stored in flat storage ranged from 3.5 to 13% shrink (Greene, 2014). In the same survey, shrink was 1.5 to 7% when dry feeds were stored in upright bins. This decrease in shrink when bulk tanks were used are like a previous repot (Kertz, 1998). One change taking place on dairy farms is a move towards using upright buns or enclosed commodity barns.

Dry matter losses in bunker silos were reported to be as high as 31% in a review paper (Borreani et. a., 2018). This is for silos with no cover and poor management. Greene (2014) reported shrink values of 9 to 16% for corn silage and 12 to 18% for haylage using observations from commercial herds. Forage storge losses include field and harvest loss, transport loss, storage loss and feed out loss. It is difficult to quantify these losses on an individual farm. Attention to details such as forage dry matter at harvest, rate of filling, packing, sealing with a cover, use of inoculants, feeding out 6 – 12” per day and maintaining a straight, tight face at feed out can have a significant impact on decreasing silage losses and quality.

## Replacement Heifers

Feed costs may represent 50 – 60% of the total cost of raising a heifer. As a result of improved reproduction and overall herd management, many herds are raising more heifers than needed if the herd is not expanding. The use of sexed semen can also contribute to a higher number of heifers on the farm. The number of replacement heifers needed can be determined using the turnover rate of the dairy herd, the heifer non-completion rate and the age of heifers at first calving. A 100-cow herd with a 34% culling rate, an 10 % heifer non-completion rate and 24 months at age a first calving needs 76 heifers. If age at first calving is 22 months, the herd needs 69 heifers. One tool that can be used to determine the number of heifers needed in the Heifer Calculator (2020). Genomic testing could be used to determine which heifers to sell.

## Ration Formulation

This area offers opportunities for controlling feed costs but requires a team effort with the herd nutritionist to approach this logically to prevent decreases in milk production or milk components. The goal is to provide a balanced ration that optimizes rumen fermentation and microbial protein production (MPP). An opportunity area in many herds is adjusting feed carbohydrate and degradable protein levels to increase MPP. This decreases the amount of more expensive RUP feeds that need to be used in the ration. Microbial protein is also an excellent source of amino acids and may decrease the amount of rumen protected amino acid needed in the ration. Key considerations in going through this process are:

1. Characterize the current ration in terms of feed costs, milk income, income over feed cost (IOFC) and income over purchased feed cost IOPFC). This sets the benchmark for evaluating the potential impact of changes.
2. Use a computer ration model that predicts changes in MPP, milk production, IOFC and IOPFC. Use energy corrected milk (ECM) as the index of changes in milk production.
3. Use metabolizable energy (ME) and metabolizable protein (MP) to evaluate rations.
4. Balance ME and MP as close to requirement as you are comfortable with. Many high producing herds can balance these at < 110% of requirement. This will require providing adequate rumen fermentable carbohydrates and degradable protein as the building blocks.
5. Target MPP as > 50% of the total ration MP. This decreases the quantity of high RUP feeds and rumen protected amino acids that need to be purchased.
6. Balance lysine and methionine using the guidelines from the specific program you are using. Check the other amino acids (especially histidine) to determine how close they are to requirements. If another amino acid is low, the expected response to lysine and methionine may not be observed.
7. Check the ratio of urinary N excretion and the N excreted in milk. A goal is a 1:1 ratio. If the ratio is > 1:1, there may be an opportunity to lower ration crude

protein and decrease nitrogen excretion to the environment and lower ammonia emissions.

## Feeding Management

The key to an efficient and profitable ration is consistency in daily management (DeVries, 2019). This encompasses all aspects of the nutrition program. Key questions in this area are:

1. Do cows always have access to a fresh and palatable TMR when in the cow housing area?
2. Are records kept of the amount of each feed added to the TMR? Electronic feed management systems can provide this information?
3. How consistent is the TMR delivered along the length of the bunk? One way to check this is the use of a forage particle separator.
4. Is feed delivered to each group at the same time each day?
5. Can all cows eat at the same time?
6. What do the feed refusals look like? If sorted and mainly coarse particles, the cows were underfed.
7. What is the quantity of feed refusals? This will vary between herds but a target of 1 – 3% can work in some herds.
8. How often is the ration fed and how often are feeds pushed up? Herds with more frequent push-ups tend to lower the variation in the feed consumed and provide more opportunity for increasing dry matter intake and milk production.

## Summary

The current situation with milk price provides an opportunity for dairy producers to evaluate areas on the farm that may help in lowering feed cost while maintaining milk and milk component production. It is critical to not decrease milk and milk income in the process. It is also important to not make short-term decreases in feed cost that could have long-term implications on milk production, herd health or reproductive performance. The herd nutritionist and other key advisors need to be part of the team effort to go through an analytical process before any changes in feed cost are made. On many herds, there will be some opportunities to plan in feed costs while maintaining milk income. This will help improve profitsbility.

## References

Borreani, G., E. Tabacco, R.J. Schmidt, BJ. Holmes and R.E. Muck. 2018. Silage review: Factors affecting dry matter and quality losses in silages. J. Dairy Sci. 101:3952-3979.

Brouk, M. 2009. Don’t let shrink kill you with high feed prices. Proc. Western Dairy Management Conf. Reno, NV. Pp:227-232.

Buza, M.H. and L.A. Holden. 2016. A survey of feeding management practices and by-product feed usage on Pennsylvania dairy farms. The Professional Animal Scientist. 32:248-252.

Cabrera, V.E., F.Contreas, R.D. Shaver and L. Armentano. 2012. Grouping strategies for feeding dairy cattle. Proc. Four State Dairy Nutrition and Management Conf. Dubuque, IA. Pp.40-44.

Chandler, P.T. 2003. Feeding dairy cows during times of low milk prices. Proc. Southeast Dairy Herd Management Conf. 7 pgs.

Chase, L.E. 2019. What do high producing herds really feed? Proc. Cornell Nutrition Conf. Syracuse, NY. 6 pgs.

Contreras-Govea, F.F., V.E. Cabrera, L.E. Armentano, R.D. Shaver, P.M. Crump, D.K. Beede and M.J. VanderHaar. 2015. Constraints for nutritional grouping in Wisconsin snd Michigan dairy farms. J. Dairy Sci. 98:1336-1344.

DeVries, T. 2019. Consistency is key when it comes to feed consumption in dairy cows. WCDS Advances in Dairy Technology. 31:143-153.

Fustini, M., A. Palmonari, G. Canestrari, E. Bonfante, L. Mammi, M.T. Pacchioli, C.J. Sniffen, R.J. Grant, K.W. Cotanch and S. Formigoni. 2017. Effect of undigested neutral detergent fiber content of alfalfa hay on lactating dairy cows: Feeding behavior, fiber digestibility, and lactation performance. J. Dairy Sc. 100:4475-4483.

Greene, D. 2014. Is shrink robbing your operation of profits? Pro. High Plains Dairy Conf. Lubbock, TX. Pp:1-11.

Heifer Calculator. 2020. University of New Hampshire. https://ectension.unh.edu/resource/calculating heifer numbers. Accessed: 9/05/2020.

Hutjens, M.F. 2010. Feeding dairy cows for profitability in 2011 and beyond. Proc. Minnesota Nutr. Conf. 8 pgs.

Kertz, A.F. 1998. Variability in delivery of nutrients to lactating dairy cows. J. Dairy Sci. 81:3075-3084.

Stone, W., D. Greene and T. Oelberg. 2015. Feeding management and methods to reduce feed losses and improve dairy cow performance. Prov. Florida Ruminant Nutrition Symposium. Gainesville, FL. Pp:144-151.

Weiss, B. 2018. Incorporating diet and pen variation into ration formulation. Proc. Penn State Dairy Cattle Nutr. Workshop. Harrisburg, PA. Pp:21-26.

Weiss, B. snd N. St-Pierre. 2013. Feeding cows in today's economy. Proc. Florida Ruminant Nutr. Symposium. Gainesville, FL. Pp:119-128.