COPING WITH HIGH CORN PRICES

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It still pays to feed corn

Researchers at the USDFRC evaluated treatment diets ranging from 47% to 2% concentrate (DM basis) on average across the full lactation (refer to the following Table). Feeding diets that averaged less than 36% concentrate across the lactation reduced 305-d fat-corrected milk yield 2,400 to 5,900 lb. Diets comprised of 52%, 42% and 22% concentrate were fed in early, mid and late lactation, respectively, to achieve the 36% concentrate treatment. It did not pay to over feed corn though as FCM yield was not improved by feeding a diet that averaged 47% concentrate across the full lactation.

Response to concentrate: alfalfa silage ratio[1,2]

Tessman et al., 1991, JDS

----------% Concentrate (DM basis)----------

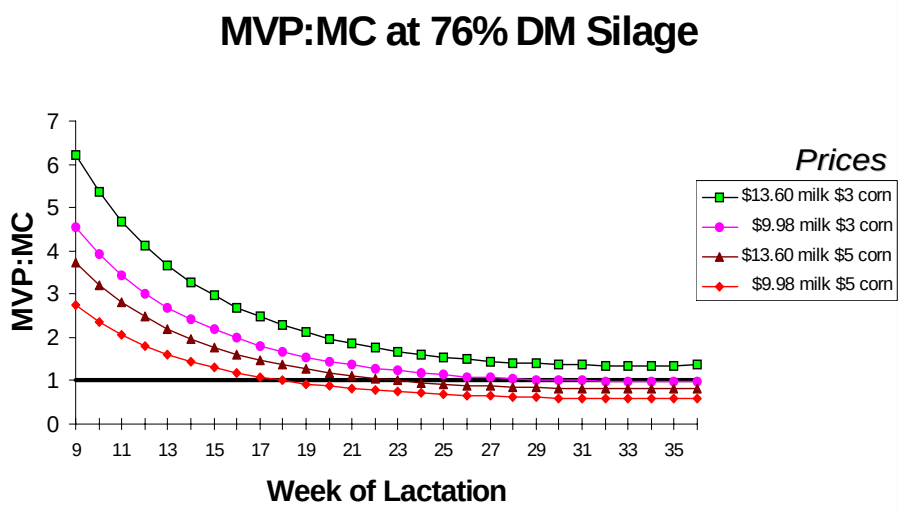
Item	62,52,32 47%	52,42,22 36%	42,32,12 27%	32,12, 2 13%	2%
DMI, lb/d	48[ab]	50[a]	47[ab]	45[b]	42[c]
305d FCM, lb	18250[ab]	19050[a]	16640[bc]	15068[cd]	13200[d]
305d Cheese Yield, lb	1817[a]	1874[a]	1617[b]	1459[b]	1265[c]
Final BCS	3.7	3.5	3.5	2.9	2.9

[1]44 multiparous cows over 44 wk lactation study
[2]AS NDF = 44 ± 5; AS ADL = 6.8 ± 1

Data from this trial was used to develop an economic simulation model to evaluate the marginal value product relative to the marginal cost (refer to the following Graph). The results from the simulations indicated that with $3.00 per bushel corn it was still profitable (MVP:MC > 1.0) to feed corn up to the optimum trial treatment regimen throughout lactation with the milk price at $13.50 per cwt. and for most of the lactation even with the milk price at only $10.00 per cwt. However, with $5.00 per bushel corn

feeding cows less corn in mid lactation becomes more important especially with low milk prices.

These data suggest that three key pieces of information are needed to determine when to adjust corn feeding levels, the price of corn, the price of milk and the milk response to feeding corn by stage of lactation. In general, as the price of corn rises and the price of milk falls it becomes more important to decrease corn feeding to late lactation cows and allocate corn to early lactation cows.



Source: Ph. D. Thesis of T. J. Earleywine, UW-Madison, 2001

Feed more corn silage

Researchers at the USDFRC evaluated 50% forage diets comprised of either all alfalfa silage, 2/3rd alfalfa silage and 1/3rd corn silage, or 1/3rd alfalfa silage to 2/3rd corn silage (DM basis) across the full lactation. Both forages were of good quality. While animal performance was good for all treatments and differences across treatments were small, there was a modest advantage for the 1/3rd corn silage treatment. Although the income over feed cost (IOFC) was highest for the 1/3rd corn silage treatment when corn prices were low, the IOFC was highest for the 2/3rd corn silage treatment when corn prices were high. These calculations of IOFC assumed average prices for corn and alfalfa silages that were not varied with the corn grain and soybean meal price changes, and thus do not likely reflect the true situation for dairy producers that purchase rather than raise their forages since market prices for forages may vary as growers evaluate their cropping alternatives. The upper limit for corn silage in diets for lactating dairy cows is 2/3rd to 3/4th of the forage DM because of concerns over corn silage's potentially high moisture, acidity, starch and energy contents, low physically-effective NDF content, and high supplemental protein costs coupled with crop rotation and risk management issues.

Forage quality must be high

Low forage neutral detergent fiber (NDF) and high in vitro NDF digestibility (IVNDFD) in the dietary forages allows feeding lower amounts of corn in the diet (refer to the following Table). Early-cut forages have lower NDF and higher IVNDFD. Selecting corn silage hybrids for high starch content and high IVNDFD can help reduce the amount of corn grain required in the diet.

%Diet Concentrate to meet minimum NDF from forage with forages of varying NDF%

Min. Diet NDF forage	40% NDF	45% NDF	50% NDF
24%	40%	47%	52%
22%	45%	51%	56%
20%	50%	55%	60%
18%	55%	60%	64%

High IVNDFD →

Increase starch digestibility

The optimum starch content in diets for lactating dairy cows is not well defined, but often falls between 25% and 30% (DM basis). With high corn prices, there is much interest in feeding diets that are 25% starch or less. When feeding low starch diets, starch that is in the diets must be highly digestible. Researchers at The Ohio State University reported a milk yield increase of 5.5 lb./cow/day as the digestibility of dietary starch increased from low (80%) to high (98%). General information on factors that affect corn starch digestibility is provided in the following Chart.

Starch Digestibility

- High-Moisture Corn > Dry Corn
- High-Moisture Corn; > with > moisture content
- Ground > Rolled Corn; > with > fineness of grind
- Steam-Flaked Corn > Dry Rolled; Varies with flake density
- Floury Corn > Vitreous Corn
- Rolled > Unrolled Corn Silage; varies by roll setting
- Early > Late Maturity Corn Silage

To maximize starch digestibility, high-moisture corn (HMC) should be about 30% moisture with a mean particle size (MPS) of 1500 microns or less. Drier HMC will need to be ground finer. Dry corn MPS should be less than 700 microns. Sieving tests to determine MPS are available through most commercial feed testing labs. A new assay, Degree of Starch Access (DSA), is also available through commercial feed testing labs to assess starch digestibility of corn-based feeds (refer to the following Chart).

Potential Range for Starch Digestibility$_{DSA}$

of corn-based feeds commonly fed to dairy cattle

		Starch Digestibility$_{DSA}$ (% of Starch)		
Feed	**Starch % of DM**	**Minimum**	**Maximum**	**Average**
Corn Starch	95.2	97	98	98
Shelled Corn	68.2	79	98	92
Steam Flaked Corn	71.7	92	98	95
High Moisture Corn	67.6	81	98	93
Corn Silage	27.7	83	98	94

Consider alternatives to corn

There are some feeds or feed additives that to some extent can replace starch in the diet. Researchers at the USDFRC reported that lactating dairy cows can be fed up to 5.5 % sugar (DM basis) when included in moderate starch diets. To achieve this guideline, typically 3% added sugar or 6% added molasses is required. Sugar supplement options include dry and liquid molasses, sucrose, whey, bakery waste, citrus pulp, and beet pulp. The cost of supplementing sugar to partially replace dietary starch from corn grain needs to be evaluated for these various sugar sources on a local basis.

Rumensin® has been found to improve feed efficiency in lactating dairy cows. Some calculations suggest that feeding Rumensin® increased dietary energy density enough to provide a "corn equivalency" of 1 to 2 lb. The cost of feeding Rumensin® at the rate of 300 mg is 3 to 4 cents/cow/day versus the potential value in reduced corn feeding of 7 to 13 cents/cow/day. Issues with milk fat test depression when feeding Rumensin® appear to be less of a concern with low starch than high starch diets.

Breakeven prices for byproduct feeds can be calculated using FEEDVAL4 with blood meal (rumen undegraded protein; RUP), urea (rumen degraded protein; RDP), shelled corn (energy), tallow (fat), dicalcium phosphate (phosphorus), and calcium carbonate (calcium) as referee feedstuffs. Some example break-even prices are provided in the following Table.

By-Product Breakeven Prices

Ingredient	1/07 FEEDVAL4 Breakevens[a]
Beet pulp	$95
Brewers grains (Dry), (Wet)	($150), ($35)
Corn gluten feed (Dry), (Wet)	($130), ($70)
Distillers grains (Dry), (Wet)	($180), ($60)
Hominy	$120
Malt sprouts	$120
Soybean hulls	$100
Wheat middlings	$120
Whole cottonseed	$190

[a]Relative to $190/ton SBM-48 solv. & $3.50/bu. corn

Remember, the actual break-even prices will vary as prices of the referee feedstuffs change. Feed prices are dynamic and change from month to month, year to year, supplier to supplier, and location to location. As a result frequent calculation of relevant breakeven prices is recommended. The FEEDVAL4 spreadsheet can be obtained at http://www.uwex.edu/ces/dairynutrition/spreadsheets.cfm.

Always input currently relevant prices for referee feeds into the spreadsheet so that the calculated breakeven prices from the spreadsheet are relevant. For those not wanting to value the RUP and fat in by-product feeds--i.e. trying to value feeds for older replacement heifers, dry cows or low-production cows or for rations not needing supplemental RUP and fat—a different FEEDVAL spreadsheet with soybean meal (CP), shelled corn (energy), dicalcium phosphate (phosphorus), and calcium carbonate (calcium) as referee feedstuffs can be downloaded from the same web site.

Many alternative feeds have feeding limits in lactating dairy cow diets. Suggested upper feeding limits for selected high-fiber byproducts are presented in the following Table. Actual amounts fed should be determined by formulation of diets to: meet animal nutrient requirements, stay within diet constraints for CP, RUP, RDP, NDF, nonfiber carbohydrate (NFC), starch, fat and phosphorus (P), and minimize ration cost. For a detailed discussion of byproduct feeds, refer to: http://www.uwex.edu/ces/dairynutrition/documents/byproductfeedstuffs.pdf.

Ingredient	Maximum DMI Limit
Alfalfa meal	5 – 10 lb.
Beet pulp	8 – 12 lb.
Brewers grains	5 – 10 lb.
Corn gluten feed	10 – 15 lb.
Distillers grains	5 – 10 lb.
Malt sprouts	5 – 10 lb.
Soybean hulls	8 – 12 lb.
Wheat middlings	8 – 12 lb.
Whole cottonseed	5 - 8 lb.

Source: Terry Howard, Hoard's Dairyman, 1988