

Feeding Corn Silage to Pasture-Based Dairy Cattle

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Corn, grown and harvested for silage, is the high-energy forage of choice for dairy producers worldwide, when it can be successfully and economically established. While it plays a significant role in the forage base of a total mixed ration (TMR) in confined operations, it also plays a very important part as a feed supplement on pasture grazing dairies. Its versatility allows it to be fed as a stand-alone supplement to bridge pasture quality and quantity gaps and as an energy-rich forage additive to a partial total mixed ration (pTMR). However, availability of corn silage and concentrates aside, the goal of the grazing dairy producer should be to firstly prioritize the quality and quantity of available pasture through managed intensive grazing (MIG). It is this cheap, high quality grazed forage matched with the right amount of quality supplement that achieves maximum dry matter intake (DMI) and the profitable milk production that follows it. The most important points to producing high quality pasture through MIG are:

- Correct pre-grazing levels
- Correct post-grazing residuals
- Correct stocking to harvest the forage efficiently
- A rotation length that allows a continuation of the above

MIG does however present challenges to the dairy producer. Seasonal changes in pasture cause composition and nutrient values to fluctuate. Lush spring and fall pastures may approach 25% crude protein (CP) and dry matter levels as low as 14% while summer pastures decrease in nutrient value due to heat and the reproductive phase. These seasonal fluctuations mean that the prudent producer needs to monitor his pasture regularly so adjustments can be made to assure maximum DMI.

Matching Corn Silage with Pasture

In the pasture-fed dairy environment, the two most common methods of incorporating corn silage into the diet are either as a stand-alone supplement or as part of a pTMR. Fed as a stand-alone supplement, corn silage is a great match for the dairy producer that feeds a grain mixture in the parlor but is also looking for a high-energy forage to add fiber or 'scratch' to supplement spring and fall high CP/low DM pasture. Corn silage also aids producers with the problem of 'slug' feeding in the parlor. Too high a level of grain fed at once can play havoc with rumen microbiology causing sub-acute rumen acidosis in some cases. The stand-alone method is by far the most common use of corn silage in New Zealand (NZ). Feeding concentrates in the NZ parlor is relatively new as dairy farmers there strive to produce more milk solids per cow and per acre. Corn silage on the other hand, has been a popular choice by NZ dairy farmers for years as a supplement to provide valuable metabolisable energy (ME) that lush spring and fall pasture lack. Because of the almost total seasonal nature of NZ's dairy system and its incredibly tight calving pattern, stored fall and winter pasture disappears quickly as supply is exceeded by demand. Supplementation is needed to bridge the pasture shortage 'gap' and corn silage fills this exceptionally well. Feeding corn silage to supplement lush spring pasture not only helps to transition lactating cows towards a good milk production 'peak' but also valuably aids in the reproductive phase to ensure the calving pattern remains tight. As summer approaches and DM levels increase and CP levels fall in NZ pasture dairy producers back off or quit feeding corn silage altogether. Because of its relatively low CP (8-9%) a high level of corn silage can result in cows gaining liveweight rather than maintaining high milk production. Resuming corn silage feeding in the fall is an option to consider when once again lush pastures abound. Careful thought needs to take place though as the economics of feeding corn silage in late lactation



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may not be justified. Also, corn silage as an aid to liveweight gain is economically questionable too. It's a known fact that a lactating dairy cow is 25% more efficient at converting what she eats into bodyweight in late lactation. If cows are thin approaching dry-off, perhaps the dairy producer should be looking at mid-lactation feeding levels to ensure liveweight loss is not occurring.

Corn silage fed as part of a pTMR is a very common method of supplementing pasture-fed dairy cattle where the 'seasonal' nature of dairy production is small and weather extremes can have a limiting effect in pasture DMI. Because corn silage is typically 40%+ corn grain by weight it is an obvious choice for a pTMR when considering the inclusion of a high-energy forage to the mix. In the US, a large proportion of pasture-based dairies opt for a pTMR because it allows the producer to maintain a consistent balanced DMI as pastures fluctuate in quality and quantity for the following reasons:

- High stocking rates
- Weather extremes (excessive moisture, heat and cold)
- Drought
- Heat stress that limits grazed DMI

Feeding loss (Shrink)

From the time the dairy producer chops and stores his corn crop in silo, bag, trench or pile, is it fair to assume that chopped crop volume will be available at feeding time? The answer is sadly, no. According to research done in 2011, almost 20% of the nation's corn silage crop was lost to spoilage BEFORE feeding. There is no research since that says that this has changed. This loss is commonly known as 'shrink'. The main factors contributing storage shrink are:

- Crop chopped too wet or dry
- Lack of adequate compaction
- Lack of adequate covering

Even with the best attention paid from harvest to storage, shrink still occurs with the fermentation process. Single digit figures are easily achieved provided the ensiling 'best practice rules' are adhered to. Unfortunately, once the lovingly ensiled crop in its silo, trench, bag or pile is opened for use and the face is re-exposed to oxygen, yeasts and molds become active again. They convert residual sugars, fermentations acids, and other soluble nutrients into carbon dioxide, water, and heat. Feedout losses can represent up to 30% of the total dry matter loss in the ensiling process. So let's do some math. If a 26T/ac crop costs \$40/T (2013 figures) from planting to covering, every % loss adds to that figure. If you are one of the unfortunate few who suffer a 30% total DM loss (ensiling plus feeding) your cost is now \$52/T! And you are 30% short if your feed budget called for the beginning amount of silage. Generally, the first signs of aerobic deterioration are heating and an off odor, followed by fungal growth on the surface of the silage and/or in the feedbunk. By the time fungal growth appears, substantial amounts of dry matter and nutrients have already been lost. Don't feed spoiled silage because besides the loss of highly digestible nutrients, some molds can produce mycotoxins which can cause reduced lactation performance and illness...dry cattle included. Management of the silage face is THE most critical issue when it comes to feeding phase spoilage. Determine how much corn silage is required for the day's feeding requirements and scrape that quantity alone from the silage face vertically. Aim to use the daily requirement from the whole face and, if there is a small amount left at the end of the day make sure it is fed in the first load the next day to dry replacement cattle. Other methods of reducing feeding losses include making sure that everything in the loader/tractor bucket makes it to the mixer/silage wagon, adequate bunk space for ALL animals being fed is available and avoid feeding corn silage/pTMR on the ground.



Grazing

The Other ‘Need to Knows’

Dairy producers who are considering using corn silage/pTMR for their operation need to ask themselves firstly if ‘the system’ is right for them. Corn silage, while one of the cheapest ensiled feeds in the dairy industry today, comes at a cost. Based on 2013 figures a 26T/ac crop costs \$40/T from planting to harvest....that’s 5.5-6 cents/lbDM. Quality pasture is half that at 3 cents/lbDM. The machinery, storage system, concrete and steel required to feed corn silage/pTMR with minimum waste and fuss is expensive. Does the scale of the dairy operation warrant the expense? Are there cheaper options? Feed a balanced ration in the parlor and supply ad-lib or the required amount of fiber to compliment the pasture/feed offer?

Know the nutritional values of all forages, pasture included, and share these with your consultant/nutritionist. The most important ones are DM, CP, ADF, NDF,TDN and NEL. There are others, such as RFQ and RFV but these are more relevant when buying forages such as hay.

The producer also needs to know what the required DMI/cow/day is so calculated amounts of corn silage/pTMR match his pasture allocation.

Summary

Well-managed pastures that maximize production and quality are of comparable or better quality than most forages harvested with mechanical harvesting systems. A big challenge of efficiently utilizing pasture for high producing dairy cows is proper and profitable supplementation to complement the nutritional attributes of pasture that contributes to optimum milk production and profit throughout the grazing season. The continual changing of pasture quantity and quality during the grazing season and the potentially low utilization of protein in pasture by the lactating cow are major challenges when supplementing pastures. The inclusion of added balanced energy can be the key. There is no one ‘standard’ mix to supplement pasture. Feeding strategy is important and corn silage/pTMR is likely to improve nutrient utilization and rumen health. To successfully manage the feeding program with grazing herds is challenging and requires even greater management skills in evaluation and monitoring than in total confinement systems.