FERMENTRICS™ TECHNOLOGY DEMONSTRATED THAT QLF INCREASED RUMEN MICROBIAL PROTEIN PRODUCTION

Dietary inclusion of fermentable sugars such as sucrose, glucose, and fructose is known to improve rumen fermentation and microbial growth. Feeding QLF products can increase milk components by enhancing rumen microbial protein production and TMR digestion. A TMR fermentation system called Fermentrics™ Technology is a useful tool to help demonstrate feed fermentation kinetics. By using this technology, we showed increased rumen microbial protein production from TMR supplemented with QLF.

What is Fermentrics™?

Fermentrics™ is a gas fermentation system of TMR or feedstuffs using rumen fluids. By using unique analytical methods, this system can distinguish fast and slow fermenting carbohydrate pools in feed samples, showing the dynamics of feed digestion. This technology can measure gas production, microbial growth, microbial biomass, organic matter digestibility, and the digestion rate of different carbohydrate pools during the 48-hour period. It is a useful tool to help nutritionists and producers evaluate TMR fermentation patterns and make ration adjustments.

TMR Samples

Two TMR samples were taken from two different dairy farms **(Farm A and B)** in Ohio. The two TMR samples contain no QLF products. In order to evaluate the addition of QLF to TMR on rumen fermentation, each TMR sample was weighed and added with a QLF product with 60% DM, 38% sugar, and 12% CP at an equivalent of 4 lbs per head as-fed rate.

Nutrient level of sugar and starch

The detailed Fermentrics™ testing results are shown in **Figure 1 and 2**. For Dairy Farm A, the basal TMR has a sugar level of 6.3%, and starch of 20.6%, with sugar + starch of 26.9%. The TMR added QLF has a sugar level of 8.6%, and starch of 20.5%, with sugar + starch of 29.1%. For Dairy Farm B, the basal TMR has a sugar level of 6.4%, and starch of 22%, with sugar + starch of 28.4%. The TMR added QLF has a sugar level of 7.7%, and starch of 20.7%, with sugar + starch of 28.4%.

Rumen microbial biomass production

Addition of QLF to TMR consistently increased rumen microbial biomass production of the two samples. For Dairy Farm A **(Figure 1)**, the basal TMR has a microbial production of 154.5 mg/g; by adding QLF, this number increased to 184.5 mg/g. For Dairy Farm B **(Figure 2)**, the basal TMR has a microbial production of 152.5 mg/g; by adding QLF, this number increased to 182.5 mg/g. According to Fermentrics™ guidelines, higher microbial biomass production is somewhat the ***"gold standard parameter"*** associated with higher milk production. In Fermentrics™ system, this microbial biomass production is measured "directly by analyzing the substrate that remains after 48 hour incubation with a NDF analysis".

Calculation of rumen microbial protein

According to Fermentrics™ guidelines, the equation below can be used to calculate microbial protein:

Rumen microbial protein (g) = microbial biomass production x 0.41 x 1.3 x DMI (kg)

The 0.41 is the amount of microbial protein contained in the biomass being measured, 1.3 is an adjustment factor accounting for abut 30% of the rumen bacteria existing in the liquid phase thus not measured in the biomass value. If we use 25 kg DMI per cow per day, the estimated rumen microbial protein values are shown as follows:

Dairy Farm A: Basal TMR = 2058 g; TMR added QLF = 2458 g
QLF increased microbial protein by 400 g for this farm.

Dairy Farm B: Basal TMR = 2032 g; TMR added QLF = 2432 g.

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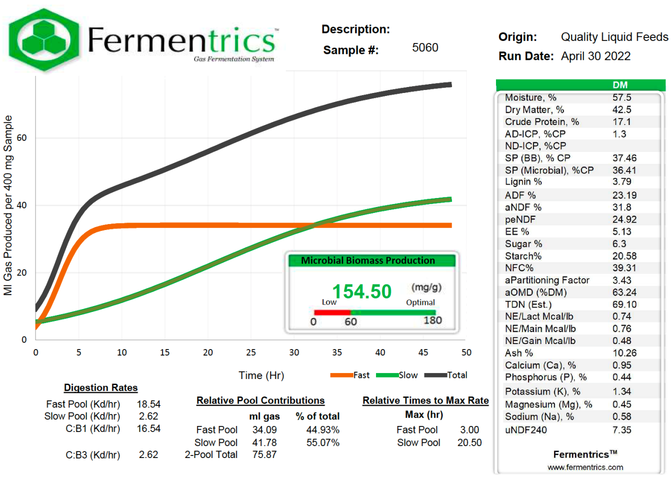
QLF increased microbial protein by 400 g for this farm.

The contribution of rumen microbial protein plus rumen undegradable protein (RUP) provided in the diet is the total protein supply for milk production. ***Please note*** in this calculation, we used the same 25 kg DMI for cows receiving the basal TMR and the TMR added QLF. In the real world, the addition of QLF in the diet would increase DMI, thereby the actual value of rumen microbial protein production from TMR added QLF could be even higher from the additional DMI.

Rumen microbial protein is a high quality protein source to support milk production and animal performance due to its balanced amino acid profile and excellent digestibility. How do we assign an economic value to rumen microbial protein? We can use another protein source in the market (i.e. fishmeal) to estimate microbial protein values. If we put microbial protein value equivalent to the price of fishmeal at $1800 /ton, ***the additional 400 g rumen microbial protein with the inclusion of QLF in the TMR is worth additional 80 cents per cow per day.***

Although rumen in vitro results may not be exactly the same as animal production responses, the additional rumen microbial protein should help translate into additional milk components and animal performance. Nutritionists and producers are trying to balance rations or supplement various types of protein products to enhance rumen microbial protein, and the results here showed that feeding QLF can greatly contribute to this goal besides other benefits.



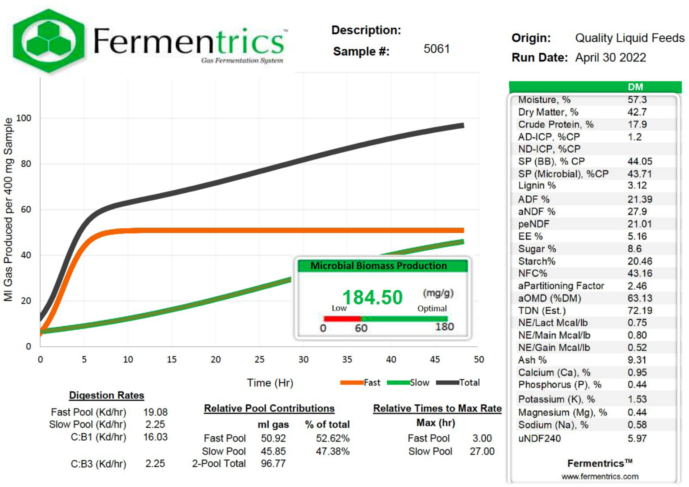
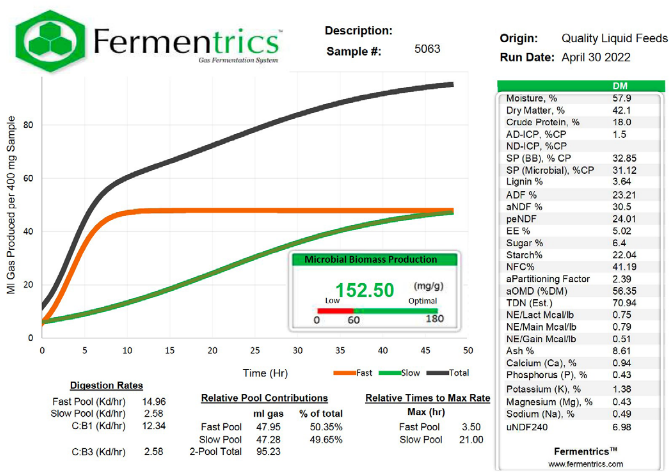


Figure 1: Fermentrics™ results of TMR samples Dairy Farm A without and with added QLF at an equivalent of 4 lbs per head as-fed rate. Note the microbial biomass production increased from 154.5 mg/g to 184.5 mg/g with the addition of QLF.



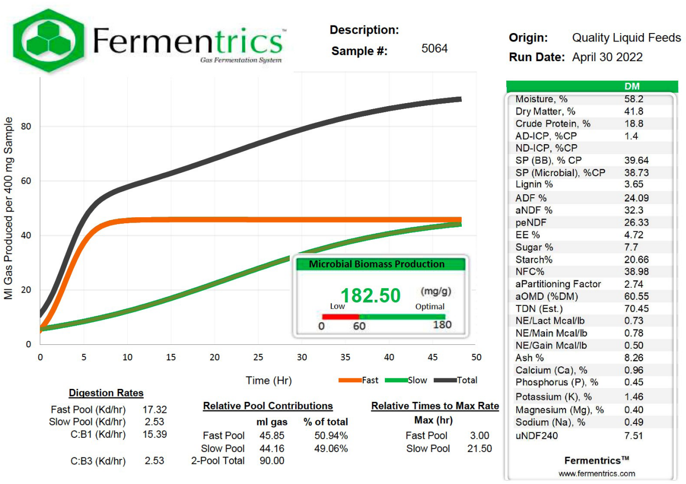


Figure 2: Fermentrics™ results of TMR samples of Dairy Farm B without and with added QLF at an equivalent of 4 lbs per head as-fed rate. Note the microbial biomass production increased from 152.5 mg/g to 182.5 mg/g with the addition of QLF.