

TRIAL REPORT: The Impact of Low Dry Matter, Lower Starch BRIXX Silage-Specific Maize on Cow Rumination, Behaviour, and Milk Quality Compared To A Higher Starch, Grain Maize Diet

FARM:

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HERD SIZE:

299

TRIAL PERIOD:

12 - 22 August 2025 (10 days)

CONTROL PERIODS:

5 - 11 August (before)
23 - 29 August (after)

MONITORING SYSTEM:

CowManager by Senztag

OBJECTIVE

Assess the effect of feeding lower dry matter and lower starch BRIXX™ silage specific Maize treated with EDGE™ inoculant on feeding time, rumination behavior and milk solids compared to a more typical grain hybrid maize normally fed on the farm.

METHOD

- Cows were monitored continuously using CowManager sensors.
- **Three periods were compared:**
 - Before (5-11 Aug): Grain hybrid maize.
 - During (12-22 Aug): Silage-specific maize.
 - After (23-29 Aug): Grain hybrid maize resumed.
- **Data collected:**
 - Nutrient analysis of silage specific maize vs a typical grain hybrid
 - Eating + rumination time (total digestive activity)
 - Rumination time (cud chewing)
 - Eating time (feed intake activity)
 - Milk docket (fat, protein, urea)

NUTRIENT PROFILE COMPARISON

NUTRIENT	BRIXX SILAGE SPECIFIC MAIZE	GRAIN MAIZE
<i>Dry Matter (%)</i>	29.11	34.49
<i>Crude Protein (%)</i>	7.95	7.52
<i>ME (MJ/kg DM)</i>	11.48	11.92
<i>NDF30 (%)</i>	65.87	63.09
<i>NDF (%)</i>	45.26	37.24
<i>Starch (%)</i>	26.46	38.63
<i>Lactic Acid (%)</i>	6.28	4.64
<i>Acetic Acid (%)</i>	3.46	3.57
<i>Total acid (%)</i>	10.15	8.71

COW MANAGER BEHAVIOR RESULTS

PERIOD	EATING + RUMINATING (HRS/DAY)		RUMINATING (HRS/DAY)		EATING (HRS/DAY)	
<i>Before (5-11 Aug)</i>	12.2	—	8.0	—	4.6	—
<i>During (12-22 Aug)</i>	13.0	+6.56% Increase	8.4	+5% Increase	5.0	+8.69% Increase
<i>After (23-29 Aug)</i>	12.0	-7.69% Decrease	7.3	-8.75% Decrease	4.5	-10% Decrease

EATING + RUMINATION

- Eating and Rumination Increased by 48 minutes per day with the silage specific maize compared with grain maize, showing higher overall digestive activity.
- Rumination increased by 24 minutes per day with silage specific maize compared to the grain variety fed before and by 66 minutes per day afterwards. This indicates improved fiber digestibility potential in the silage specific maize, supporting better cud chewing and salivary buffering.
- Eating increased slightly by 6 minutes per day compared with the grain hybrid fed afterwards, suggesting cows found the silage specific maize more palatable and thus spent more time feeding.

Interpretation:

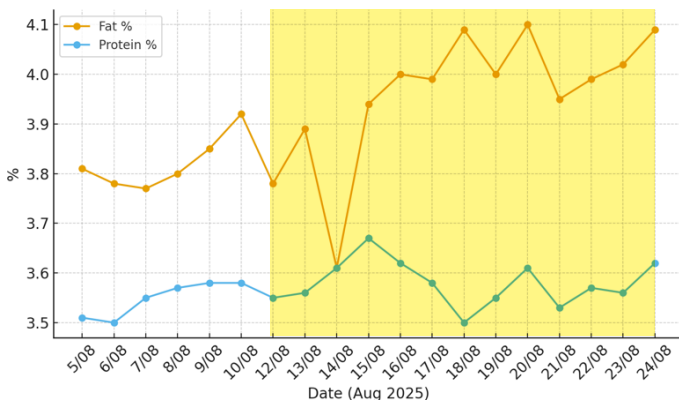
- The lower dry matter BR1XX silage specific maize promoted better rumen function, as indicated by longer rumination times.
- While the grain maize had slightly higher ME (11.92 vs 11.48, with higher starch, but lower effective fiber,), the BR1XX maize supported better chewing activity, which potentially helps reduce the risk of sub-acute ruminal acidosis (SARA) in high-production herds.
- The increase in eating time also points to better palatability and cow acceptance.

Key Takeaway:

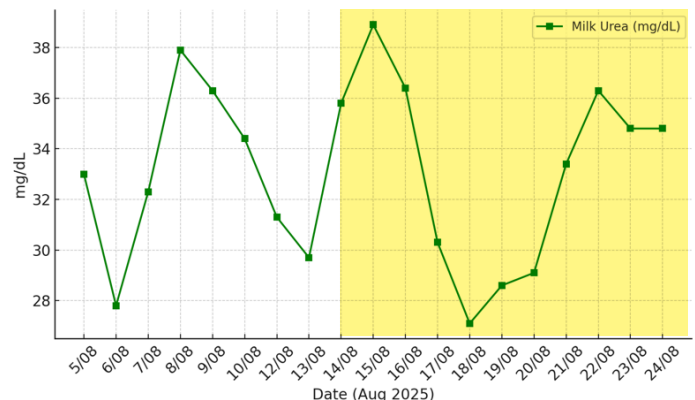
Feeding a lower dry matter silage specific maize improved cow eating and rumination behavior compared to the higher starch and higher ME grain maize silage. This indicates that the trial maize provided more effective fiber, leading to healthier rumen activity and potentially better long-term cow performance.

MILK QUALITY RESULTS

Milk Fat & Protein Trends (5th–24th Aug 2025)



Milk Urea Trend (5th–24th Aug 2025)



INTEGRATED ANALYSIS

- Milk fat increased during the silage specific maize period, peaking at 4.10% (20 Aug), consistent with improved rumen function from higher fiber and lower starch (NDF 45.3%).
- Milk protein remained steady (3.5–3.67%), showing cows maintained energy supply, despite lower starch in the silage specific maize.
- Milk urea dropped to 27–31 mg/dL during the feeding of BR1XX silage specific maize, indicating a better protein-energy balance. Levels rose again when grain maize consumption resumed.

INTEGRATED ANALYSIS cont.

- The higher NDFD 30 (neutral detergent fiber digestibility, 30 hours) coupled with higher lactic acid levels improved cud chewing and stabilized rumen bacteria levels while promoting bacteria, which are associated with component production.
- Increased rumination (8.4 hrs/day) aligns with the higher digestible fiber in the BR1XX silage specific maize identified in the labs. Grain maize, while technically higher in ME, reduced rumination and increased milk urea. While this may seem surprising to New Zealand farmers, long standing university research demonstrates a cow cannot effectively utilise more than approximately 25% starch. Thus in the absence of a true mixed ration, results are predictable.

DETERMINATION

- BR1XX silage specific maize supported healthier rumen activity and improved milk fat and protein efficiency compared with the higher starch grain maize usually fed on the farm.
- Higher NDF improved cow chewing and digestion, while milk data showed better utilisation of protein (lower urea) and higher fat %.
- While lab analyses confirmed that the grain maize used in this study provided higher starch and metabolizable energy (ME), feeding it resulted in less rumination and more milk urea compared to the lower-starch BR1XX silage-specific maize.
- Future evaluations should incorporate a cost-benefit analysis to better understand the overall profitability of these feeding approaches, including potential financial gains of extended grass utilization enabled by shorter-maturity, lower-starch maize hybrids, as well as the effects of EDGE inoculant technology on harvest flexibility, feed stability, and overall cow performance.
- Given that sub-acute ruminal acidosis (SARA) and lameness is relatively common in New Zealand dairy herds, further research to collect long-term data on the herd-level effects of a high starch diet compared to a lower-starch/higher lactic-acid diet could build a better understanding of these differing approaches on production and the overall financial performance of New Zealand herds.
- Further research is warranted to evaluate whether higher intakes of low-starch, silage-specific maize hybrids, like those profiled in this study, could increase fluid milk production (beyond the demonstrated improvements in milk components) via more efficient nutrient utilization.

Supporting Studies

Nutrient Requirements of Dairy Cattle (5th Revised Edition, 1978)

- Authors: National Research Council (NRC) Subcommittee on Dairy Cattle Nutrition (chaired by W. L. Grovum, including contributors from universities like Cornell and Ohio State).
- University Affiliation: Collaborative effort led by land-grant institutions (e.g., Cornell University, a key contributor).
- Key Finding: Recommended starch/non-fiber carbohydrates at 25–30% of dry matter for lactating cows to balance rumen fermentation and energy intake, based on 1970s trials.
- <https://nap.nationalacademies.org/catalog/20049/nutrient-requirements-of-dairy-cattle-fifth-revised-edition-1978>

Effects of Grain and Concentrate Feeding Strategies on Rumen Health in Dairy Cattle

- Authors: D. R. Mertens and J. R. Lofton.
- University Affiliation: University of Wisconsin-Madison (USDA Dairy Forage Research Center).
- Key Finding: 1980 study showed optimal starch at 25–32% to maximize milk yield without acidosis, emphasizing fiber-starch balance (NDF:starch ratio ¹1.2:1).
- <https://pubmed.ncbi.nlm.nih.gov/6256360/>

Starch Digestion and Utilization by Dairy Cows: A Review

- Authors: W. H. Hoover and S. R. Stokes.
- University Affiliation: Virginia Polytechnic Institute and State University (Virginia Tech).
- Key Finding: 1991 review (synthesizing 1980s data) confirmed 25–30% starch for efficient rumen microbial protein synthesis and energy partitioning.
- <https://ui.adsabs.harvard.edu/abs/1991JDS....74.3630H/abstract>

Nutrient Requirements of Dairy Cattle (6th Revised Edition, 1989)

- Authors: National Research Council (NRC) Subcommittee on Dairy Cattle Nutrition (contributors from Michigan State University and University of Illinois).
- University Affiliation: Collaborative, with primary input from land-grant schools like Michigan State University.
- Key Finding: Refined 1978 guidelines to 24–30% starch for high-producing cows, based on additional trials linking ratios to milk fat and yield.
- https://nap.nationalacademies.org/search/?term=Nutrient+Requirements+of+Dairy+Cattle+%286th+Revised+Edition%2C+1989%29+&v%3Aproject=uweb_proj_ext

This is a single-farm trial over a short period; results may vary. Consult a dairy nutritionist for information or advice about your herd.