KEMIN
Compelled by Curiosity™

CholiGEM™

One of today's most concentrated rumen-protected choline chloride supplements for transition cow health.

Maximize profitability with **CholiGEM™**

Optimize transition cow health and productivity

Why choline?

Choline is an essential nutrient for dairy cows that has multiple functions for optimal milk production, reproduction, and health — especially during the transition period. Research shows that 50% to 60% of post-calving cows experience moderate to severe fatty liver.[1]

Choline can enhance liver health during the transition period to improve its metabolic functions and reduce the risk of fatty liver, ketosis, and related metabolic disorders.

Introducing CholiGEM™: The latest innovative nutrition from Kemin.

CholiGEM™ is an enhanced form of rumen-protected choline and one of the most concentrated supplements on the market today. Its combination of a unique core technology, uniform particle size, and specific gravity is proven to reduce transit time in the rumen and provide a highly bioavailable source of choline at the intestinal level.

How is CholiGEM different?

CholiGEM stands out from other choline supplements because:

- As one of the **most concentrated encapsulated forms** on the market today, CholiGEM contains 60% choline chloride (compared to 25% to 28% of choline chloride in other commercially available rumen-protected choline products).
- Due to its high concentration, CholiGEM can create **more space in diet formulations**, making it an effective tool in achieving optimal dairy production.
- CholiGEM has **superior bioavailability**.[2]
- It may contribute to a **greener footprint**[3] by maintaining optimal transition cow health and offering a lower inclusion rate.

Benefits of CholiGEM™

Improved liver function and fat metabolism

CholiGEM provides the choline required for optimum liver function and filters deposited fat, resulting in a healthy liver and better overall dairy cow health. Choline improves the fat metabolism in the liver, which reduces the risk of clinical and subclinical ketosis and associated metabolic disorders.[4]

Optimized energy status

Choline helps the liver metabolize and release more energy, supporting milk and milk component production. It improves the cow's overall energy status, leading to better conception rates and enhanced immunity.[5]

Improved lactation performance

Choline is an essential nutrient for dairy cows with multiple functions for optimal milk production — especially during the transition period. Supplementation of CholiGEM during the transition period can improve milk yield throughout, but not limited to, 150 days of lactation.[4]

Improved health and immunity

In addition to improving liver health, CholiGEM has been shown to enhance uterine immune health and potentially reduce the incidence of metritis.[4,5]

CholiGEM contains more than **double the concentration** of choline compared to the next-leading choline on the market today.

Rumen-protected encapsulation technologies

At Kemin, we are Compelled by Curiosity™ and ALL IN on encapsulation technologies that revolutionize nutrition and health by maximizing precision and efficiency. For over 30 years, we have dedicated ourselves to advancing rumen-protected encapsulation technologies, continuously improving how animal nutrition products are developed and delivered.

With a strong global presence, regional expertise from a dedicated team with advanced degrees in nutrition and health, and our state-of-the-art encapsulation processes, we deliver superior products and services that maximize your return on investment.

Unprotected choline quickly degrades in the rumen, so it must be supplemented in a rumen-protected form, typically as choline chloride with a protective coating — like CholiGEM.

Kemin proprietary GEM encapsulation technology protects the choline in CholiGEM from rumen degradation and allows for its targeted release directly into the small intestine.

Kemin proprietary rumen-protected encapsulation technologies:

1. **Protect high concentrations of core nutrient(s).**
2. **Provide durability and improved handling.**
3. **Reduce rumen-retention time for maximum intestinal release.**

CholiGEM is backed by Kemin support services.

Kemin Animal Nutrition and Health has the most technical, sales, and marketing expertise in the rumen-protected choline market. We provide unmatched customer support from a robust team of dairy nutrition experts, product specialists, customer support staff, and dedicated technical support team members.

When you partner with Kemin, you also have access to our resident experts, including DVMs and Ph.D. ruminant nutritionists. They can offer trusted nutritional guidance based on technical expertise, applied knowledge, and industry experience.

Choline concentration

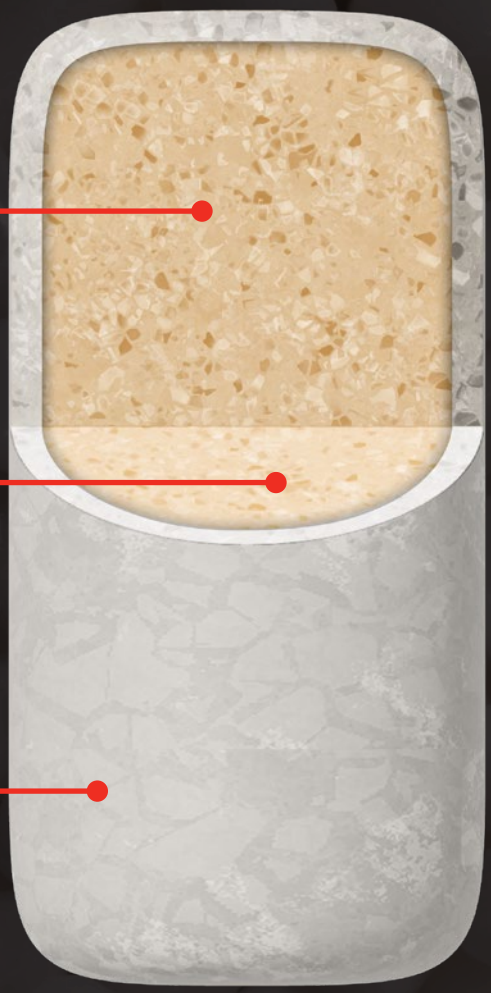
- 60% choline chloride
- Superior bioavailability

Choline core

- Controlled hygroscopicity
- Ideal specific gravity and particle size for favorable rumen passage

GEM pan-coating encapsulation

- Optimal strength for timely release into the small intestine
- Perfect scientific balance of coating on core



"Kemin team members have become experts in encapsulation technologies and applied this dramatically into ruminant feeds. We are able to bypass the rumen with critical essential nutrients like choline, methionine, and lysine, getting them down the digestive tract to a place where they can be directly absorbed by the animal. Ultimately, for every dollar our customers spend on these products, we will deliver in ROI."

– Dr. Chris Nelson, President and CEO

Research

Bioavailability of CholiGEM compared to a commercial rumen-protected product

CholiGEM delivers choline to the bloodstream twice as fast as compared product.

The best way to evaluate choline bioavailability is through animal models, as they closely mimic real-world conditions on the farm. The bolus dose technique, using cannulated cows and measuring blood choline concentrations over time, has been an effective method for assessing bioavailability.

This approach allows for the calculation of the area under the curve (AUC) to provide a reliable comparison of how much and how quickly choline is absorbed into the bloodstream. This makes it the standard for evaluating the effectiveness of encapsulated choline products.

A study at the Universidad Autonoma de Barcelona[1] comparing CholiGEM with another product shows that CholiGEM delivers choline into the blood more efficiently. Choline levels peaked in the blood within 5.4 hours with CholiGEM, compared to 10.9 hours with Product A. This faster absorption is crucial for reaching optimal blood choline levels. Additionally, the area under the curve (AUC) of CholiGEM — a measure of total choline absorption — was 1279 AUC, significantly higher ($P < 0.05$) than Product A's 503 AUC.

With one of the highest concentrations of choline on the market, CholiGEM effectively delivers choline to the cow's intestine for absorption and utilization.

Parameter	CholiGEM™	Product A	SEM	*P*-value
Cbasal, µM	96.8	90.7	0.57	0.09
Cmax, µM	227.1	155.2	10.11	0.22
Tmax, h	5.4	10.9	0.87	0.26
AUC	**1279[a]**	**503.3[b]**	**33.1**	**< 0.05**

Kihal, A., M. Rodríguez-Prado, C. Marques, and S. Calsamiglia. 2022. Bioavailability of 2 different rumen-protected choline products for dairy cattle measured with the area under the curve method. Journal of Dairy Science, Vol. 105. (Suppl. 1)

Research

CholiGEM effects on milk production, health, and reproduction of Holsteins on commercial dairy farm

CholiGEM increased fat-protein-corrected milk (FPCM) by 5.1 pounds per day during the first 120 days.

The milk production field trial highlights the pellet structure and process, with a focus on milk data, subclinical ketosis, and reproduction. The experiment was conducted on a commercial dairy in Belgium, which features sand-filled deep-bed stalls, with 230 multiparous lactating Holstein cows. The cows were milked using an automated milking system.

Control (CON) cows calved from February to May (60 cows in total), while CholiGEM cows calved from August to October (90 cows in total). The diet composition for CholiGEM cows was the same as CON cows, except for the inclusion of CholiGEM that was mixed in a concentrate pellet and fed to dairy cows at 30 g/cow/day from 14 days pre-calving to 40 days post-calving.

CholiGEM was added to the pelleted feed processed at 70°C (158°F).

During the first 120 days in milk, CholiGEM increased FPCM by 5.1 lb/d.

	Milk lb/d		
	Control	**CholiGEM™**	**Difference over control**
Parity = 2	101.0	105.8	4.9 lb/d
Parity > 2	108.7	114.7	5.9 lb/d
Average	105.2	110.3	5.1 lb/d

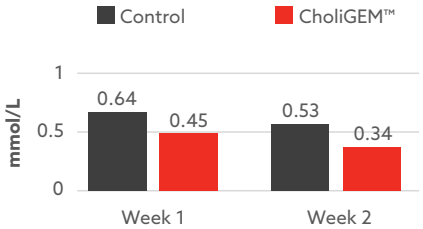
FPCM (fat protein-corrected milk) yield = Milk yield (kg/d) x [0.1226 x Fat % + 0.0776 x True Protein % + 0.2534]

Cows receiving CholiGEM required less inseminations and got pregnant earlier in lactation. Consequently, fewer animals were culled compared to control animals.

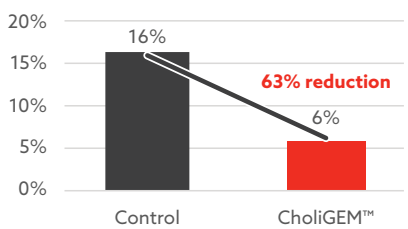
	Inseminations	**Days open**	**Culled cows**
Control	2.8	187	22%
CholiGEM™	2.1	132	12%

Cows fed CholiGEM had lower NEFA concentration in plasma and fewer hyperketonemia episodes.

NEFA postpartum



Incidence of hyperketonemia



Cows were considered with hyperketonemia when blood BHBA ≥ 1.2 mmol/L

Research

ECM data response in primiparous and multiparous cows and carryover effect.

Choline supplementation during the transition period resulted in an overall increase of 3.8 lb of fat-corrected milk per day during the 150 days data was collected.

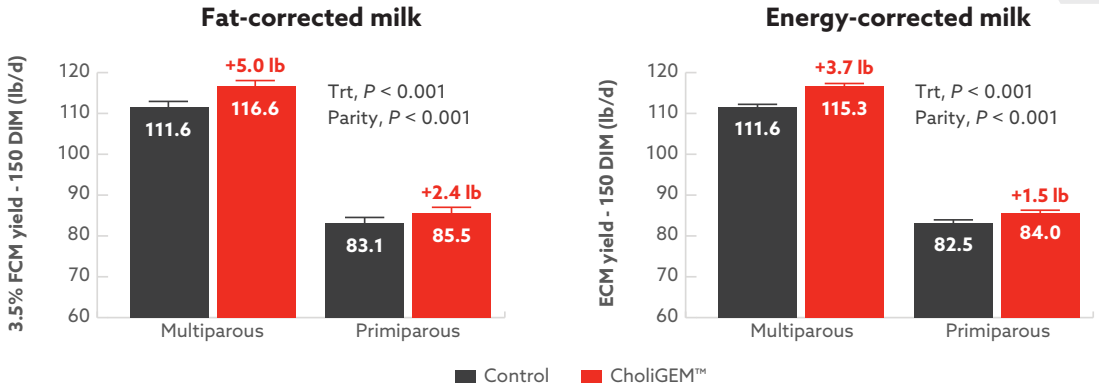
A recent study conducted at the University of California, Davis, evaluated the effects of CholiGEM on dairy cow performance and health. A total of 48 cows were blocked by parity and assigned to control or CholiGEM treatment. Cows enrolled in the CholiGEM treatment received 15 g/d of CholiGEM from 21 days prepartum and 30 g/d of CholiGEM from calving to 21 days postpartum. After the supplementation period, milk production and composition data continued to be collected to evaluate any carryover effect. Results showed improved energy-corrected milk yield and milk fat — not only during the supplemented period but over the full 150 days data was collected, supporting the use of CholiGEM to enhance dairy cow productivity throughout the transition period.[1]

Item	**Multiparous**		**Primiparous**		***P*-value**	
Dry matter intake, lb/d[1]	Control	CholiGEM™	Control	CholiGEM™	Treatment	Parity
Prepartum	49.6 ± 0.6	47.4 ± 0.4	30.9 ± 0.4	29.5 ± 0.4	0.13	< 0.001
Postpartum	59.3 ± 0.6	56.7 ± 0.6	37.5 ± 0.4	34.8 ± 0.4	0.30	< 0.001

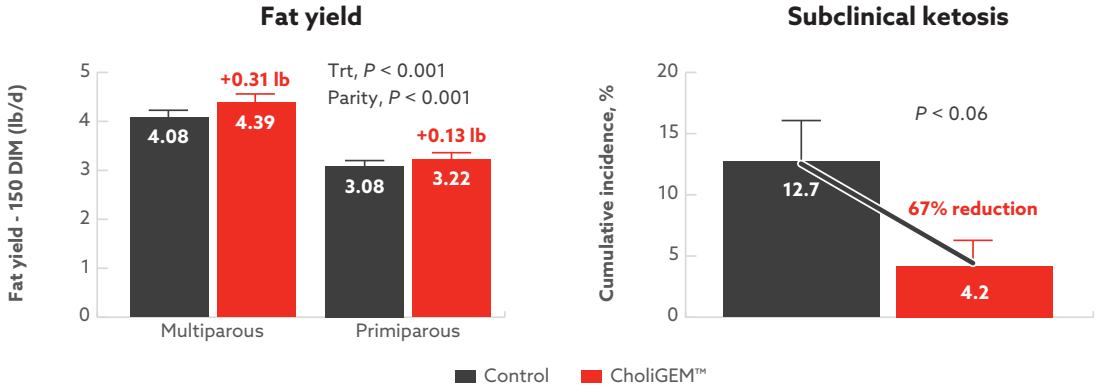
Prepartum = measurements in the last 21 days of gestation. Postpartum = measurements in the first 21 days postpartum.

Feeding CholiGEM during the transition period improved lactation performance with a carryover effect throughout 150 DIM that data was collected.

Feeding CholiGEM increased 3.5% fat-corrected milk up to 150 DIM in multiparous cows (Control = 111.6 ± 0.4 vs. CholiGEM = 116.6 ± 0.4) and primiparous cows (Control = 83.1 ± 0.4 vs. CholiGEM = 85.5 ± 0.4). In addition, it also increased energy-corrected milk in multiparous cows (Control = 111.6 ± 0.4 vs. CholiGEM = 115.3 ± 0.4) and primiparous cows (Control = 82.5 ± 0.4 vs. CholiGEM = 84.0 ± 0.4).



Fat yield was increased in both multiparous (+0.31 lb) and primiparous cows (+0.13 lb). Glucose, NEFA, and BHB were not different between the treatments. However, CholiGEM decreased BHB numerically (Control = 1.07 ± 0.28 vs. CholiGEM = 0.63 ± 0.28) in multiparous cows on the third week postpartum and tended to reduce the incidence of subclinical ketosis.



Founded in 1961, animal health and nutrition is at the heart of what we do. Headquartered in Des Moines, Iowa, Kemin is a privately held, family-owned-and-operated company that spans six continents, serves more than 120 countries, and employs thousands of team members. We use our decades of experience and scientific expertise to unlock discoveries that improve cattle health – from better immune function to nutrient absorption.

Explore what CholiGEM can do for your herd.

KEMIN® Compelled by Curiosity™ | CholiGEM™

REFERENCES

1. Bobe, G., J. W. Young., and D. C. Beitz. 2004. Invited review: Pathology, etiology, prevention, and treatment of fatty liver in dairy cows. Journal of Dairy Science. 87:3105-3124.
2. Kihal, A., Rodriguez-Prado, M., Marques, C., and Calsamiglia, S. 2022. Bioavailability of 2 different rumen-protected choline products for dairy cattle measured with the area under the curve method. Journal of Dairy Science 105: 403.
3. A comparative life cycle assessment study of CholiGEM™ and CholiPEARL™, TL-24-21638.
4. Marques, T. C., et al. 2024. Effect of rumen-protected choline on dairy cows' metabolism, immunity, lactation performance, and vaginal discharge microbiome. Journal of Dairy Science. 107 (5): 2864-2882.
5. CholiGEM™ improves milk production, health, and reproduction of Holsteins on commercial dairy farm, TL-13142.

24.00792
PTP-14817
Mar. 2025