

The ReaShure-XC Difference

With more than 25 years of peer-reviewed research, on-farm studies and composite summaries, ReaShure®-XC *Precision Release Choline* is the most extensively researched and tested encapsulated choline on the market today. Today, Scientists Say the choline in ReaShure-XC delivers many benefits to your cows.

“The available data unequivocally show that feeding choline ion up to 25 g/day as RPC during the transition period promotes not only lipotropic effects on the hepatic tissue, but also improves productive performance and health, making a strong case for choline as a required nutrient in the diet of transition dairy cow.”
-Dr. Usman Arshad,
Feedstuffs, June 2023

“We need to get rid of the dogma that ReaShure is just for problem cows. It's not just fat cows that respond to choline.”
-Dr. José Santos,
Tri-State Dairy Nutrition Conference, 2023

“Is choline essential or required? I think it's required and we should be framing out a requirement in our nutrition models.”
-Dr. Mike Van Amburgh,
Cornell Nutrition Conference, October 2022

“Choline is often a profitable addition to transition and early lactation diets.”
-Dr. Bill Weiss,
Hoard's Dairyman, March 2023

“Certainly, Rumen-Protected Choline appears to have some new opportunities to be placed in high-producing dairy cow rations and may impact animal health during the transition.”
-Dr. Mike Hutjens,
mikehutjens.com

“With the new data in the last five years, if you've avoided choline in the past because you didn't think you had metabolic issues, it's worth looking again at the colostrum and milk yield data because it may be worth feeding simply as a boost to productivity and early lactation.”
-Dr. Barry Bradford,
Progressive Dairyman, August 29, 2023

“There's a carry-over effect of supplemental choline. Cows continued to produce approximately 2 kg more milk per cow per day even after choline supplementation stopped in our studies.”
-Dr. José Santos,
Cornell Nutrition Conference, October 2022

“We saw a pretty substantial effect on colostrum yield. The magnitude of this change was about an 85% increase compared to the control.”
-Dr. Barry Bradford,
Cornell Nutrition Conference, October 2022

“Consistent production benefits are observed with choline supplementation even in very high-producing cows and cows with high genetic merit for milk, regardless of body condition score.”
-Dr. Heather White,
Tri-State Dairy Nutrition Conference, April 2023

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SCIENTISTS
SAY

ReaShure®-XC

Precision Release Choline

ReaShure-XC in your transition cow rations can impact cow productivity and whole herd profitability. With the short inclusion window of just 42 days, the investment is relatively small while the benefits continue throughout the lactation and into the future generations of your herd.

Only 1 Day to Break Even,
Then **Every Day is Pay Day**



● **Invest in Transition**
ReaShure-XC is fed for just the short 42-day transition period.

● **Colostrum Volume**
The newest research shows that cows consuming ReaShure-XC during the 21 days prior to calving saw a 57-85% (approximately 2,3 kg) increase in colostrum quantity.

● **More Milk**
Using 0,35 €/kg milk price, it takes just 22 days of additional milk to cover the investment in ReaShure-XC. And what about the next 283 days left in the lactation?

● **Healthy Transition**
Research from a University of Florida study conducted on a commercial herd in California showed a 15,4% reduction in involuntary culls and a 30% decrease in mortality for cows fed ReaShure-XC.

● **Calf Health & Growth**
Calves born from cows supplemented with ReaShure-XC showed a significant improvement in growth.

With an average equivalent cost of 0,06 €/day of lactation, that's just 18 € per cow per year.

2,3 kg/cow more colostrum is worth about 21 € if you have to purchase it.** Pay for your ReaShure-XC investment with the additional colostrum and more on the very first day of lactation.

Every Day is Pay Day.

2,3 kg more milk per cow, every day (702 kg/cow/year) and 0,81 € per cow, every day (245 €/cow/year) to your bottom line.**

Every Day is Pay Day.

650 € savings for every cow not culled and 1.500 € savings for every cow that does not die and need to be replaced.**

Every Day is Pay Day.

0,05 kg/day improved calf ADG means heifers are 36 kg larger at calving, producing 524 kg more milk and 183 € additional income per lactating heifer.**

Every Day is Pay Day.

When you add up all the benefits seen in the peer-reviewed research, you get an amazing 24 to 1 return on your ReaShure-XC investment.**

Pay for your investment in ReaShure-XC in just 1 day with incremental colostrum yield or only 15 days of incremental milk. **Then Every Day is Pay Day!**

Contact your local Balchem representative to calculate the potential return on your operation or visit Balchem.com/ReaShure-XC.



balchem

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*Estimated replacement costs minus estimated cull cow value. ** Based on calculations from the ReaShure-XC calculator. The statements contained herein do not guarantee any specific results and do not contain any warranty.

ReaShure®-XC

Precision Release Choline

“SCIENTISTS SAY

Choline is a **Required Nutrient** for Essentially Every Cow

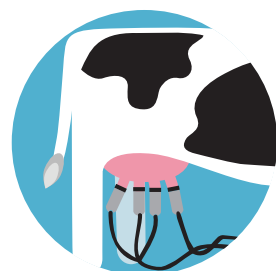




SCIENTISTS SAY

The Choline in ReaShure-XC Delivers:

VLDL MOBILIZER
FOR MILK AND
MILK FAT SYNTHESIS



COLOSTRUM
QUANTITY
ENHANCER



METABOLIC
REGULATOR



IN UTERO
DEVELOPMENT HELPER



Choline – Required for Every Body

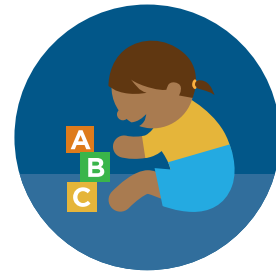
IN HUMAN NUTRITION, choline is considered an essential nutrient, known for its many functions within the body. It has been shown that higher prenatal choline supplementation improves sustained attention in children¹ and choline is an essential nutrient for brain development of the baby.²



MASTER OF
METABOLISM



FUEL FOR
ACTIVE BODIES



BABY BRAIN
BUILDER



MOM'S
BEST FRIEND

ReaShure®-XC
Precision Release Choline

VitaCholine®

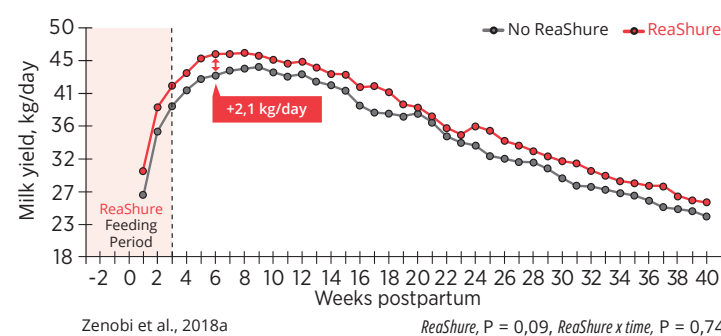
¹<https://pubmed.ncbi.nlm.nih.gov/34962672/>.
²<https://www.ncbi.nlm.nih.gov/books/NBK114308/>.
These statements have not been evaluated by the Federal Drug Administration.
This product is not intended to diagnose, treat, cure, or prevent any disease.

2,3 KG MORE MILK/COW/DAY

2,3 kg
More Milk =
Faster to
Pay Day

More than 25 university studies have consistently shown improved lactation performance from rumen protected choline supplementation during the transition period. The response has been remarkably consistent at approximately a 2,3 kg/cow/day increase in ECM across all trials. All cows, irrespective of health status, body condition score or milk production levels, responded similarly. And the milk production increase didn't end when you finished feeding ReaShure®-XC. Researchers demonstrated that this milk improvement continues throughout lactation, leading to approximately 700 kg more milk/cow/year over a 305-day lactation.

Figure 1 Effect of feeding ReaShure during the transition period on milk production over the full lactation



The newest research continues to show a consistent milk production response across many production situations:

- 747 kg more ECM/cow/year extrapolated over a 305-day lactation for ReaShure-fed cows. Bollatti et al., 2020b
- 1.072 kg more milk/cow/year extrapolated over a 305-day lactation for cows fed ReaShure. Swartz et al., 2023
- 667 kg more ECM/cow/year extrapolated over a 305-day lactation for cows fed ReaShure. Holdorf et al., 2023

*With just a 42-day investment in ReaShure-XC and a 2,3 kg/cow/day average ECM milk increase for the full lactation, you will cover your investment in the first 15 days of a cow's lactation.***

“Even in very high-producing cows, we saw a milk response of approximately 2,3 kg/cow/day after supplementation.
-Dr. Heather White,
Tri-State Dairy Nutrition Conference, 2023

A HEALTHY TRANSITION

Healthier
Transition =
Faster to
Pay Day

Research has shown that starting a lactation strong and healthy is imperative for maximum production.

ReaShure-XC has a 25-year track record of helping cows successfully transition from the dry period into a healthy and prosperous lactation. Though the exact mode(s) by which choline enhances cow performance are still being researched and debated, we do know that choline supports metabolic health through enabling VLDL synthesis to transport fat out of the liver. However, it is unlikely that this is choline's only mode of action to positively impact cow health. Research has pointed toward a number of possibilities including reduction in liver fat, better management of mobilized lipids, reductions in metabolic diseases, reduced inflammation, improved immune function and improved cellular integrity and/or cellular proliferation. Ongoing research continues to explore this required nutrient's role in helping cows achieve their genetic potential.

Though the benefits of improved health are difficult to measure, reducing involuntary culling and death loss is a tangible way to quantify the value.

Table 1 Effect of feeding ReaShure prepartum on health events

| | Control Average, % | ReaShure Average, % | % Reduction | P Value |
|----------------------|--------------------|---------------------|-------------|-------------|
| Retained Placenta | 4,4 | 4,5 | -3,4 | 0,9 |
| Metritis | 21,8 | 23,2 | -6,4 | 0,62 |
| Milk Fever | 1,9 | 0,8 | 60,5 | 0,08 |
| Mastitis | 4,6 | 5,0 | -7,6 | 0,47 |
| Morbidity | 31,9 | 33,4 | -4,5 | 0,62 |
| Multiple Diseases | 7,1 | 5,4 | 24,6 | 0,12 |
| Subclinical Disease | | | | |
| Hypocalcemia | 51,4 | 54,3 | -5,6 | 0,49 |
| Hyperketonemia | 18,8 | 18,9 | -0,5 | 0,96 |
| Left Herd by 300 DIM | 29,2 | 24,7 | 15,4 | 0,05 |
| Sold | 26,2 | 22,6 | 13,7 | 0,08 |
| Mortality | 3,0 | 2,1 | 30,0 | 0,92 |

Poindexter et al., In Review

“Choline plays an important role in metabolic health. Multiple studies have shown ReaShure's impact on transition cow health.
-Dr. Marcos Zenobi,
Research Study from 2018

MORE COLOSTRUM VOLUME, BETTER COLOSTRUM QUALITY

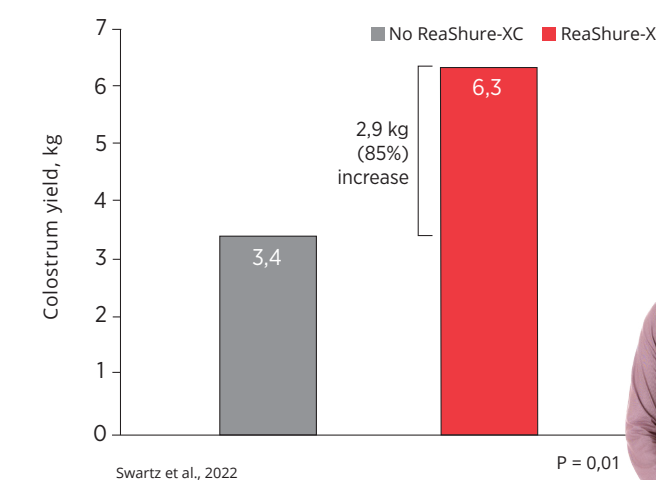
More
Colostrum =
Faster to
Pay Day

High-quality colostrum is often in short supply on many dairies. Recent research from multiple universities shows that supplementing cows with ReaShure-XC during the close-up period can increase colostrum production. Four recent studies conducted at three universities measured ReaShure-XC's impact on colostrum quantity and quality when fed to pre-partum dry cows. Two of the trials showed a large and significant increase in colostrum volume (Swartz et al., 2022 and Holdorf et al., 2023), one experiment exhibited a large and significant increase in IgG (Zenobi et al., 2018), and one showed no response (Bollatti et al., 2020).

In the University of Wisconsin trial, researchers saw a 57% increase in the amount of colostrum produced, and in the Michigan State trial they saw an 85% increase in colostrum volume when pre-fresh cows were supplemented with choline. More research is planned to better understand the mechanisms that contributed to these remarkable gains.

With an average colostrum output of 2,3 kg/cow, you could earn an additional 21 €/cow/lactation return and pay for your ReaShure-XC investment on the very first day of lactation.

Figure 2 Effect of ReaShure-XC supplementation on colostrum yield



“Choline dramatically increased colostrum yield – an 85% increase in our study.
-Dr. Barry Bradford,
Tri-State Dairy Nutrition Conference, 2023

CALF HEALTH & GROWTH

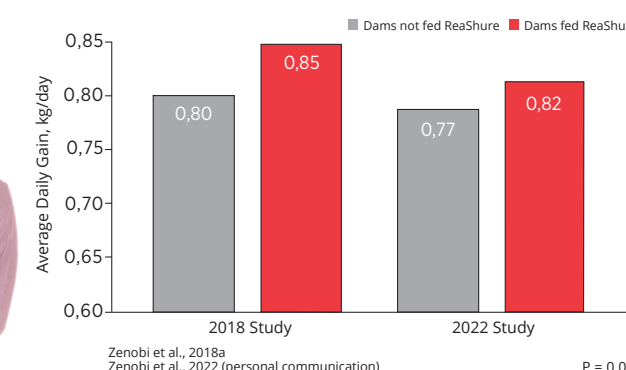
Healthier
Calves =
Faster to
Pay Day

Epigenetics is the study of how the *in utero* environment can modify gene expression without changing the genes themselves. DNA methylation is the most studied mechanism of epigenetics and involves adding a methyl group to a DNA molecule to regulate gene expression, effectively turning some genes on and off. Choline is an efficient methyl donor with three methyl groups, in comparison to most others that offer only one.

New research studies conducted at the University of Florida, Michigan State University and the University of Wisconsin are helping us better understand the benefits of fetal programming when choline is supplemented to pre-partum dairy cows. Researchers were able to demonstrate a significant improvement in key immune markers in the newborn calves and saw an improvement in growth of about 0,05 kg per day, resulting in heifers being 36 kg heavier at first calving. These same heifers produced an additional 1,8 kg of milk per day during their first lactation as compared to the calves whose mothers did not receive choline supplementation during the transition period.

The improved calf average daily gain can deliver 183 €/cow to your bottom line.

Figure 3 Summary of average daily gains for Holstein heifers through 350 days from two independent studies



“Calves born to choline-supplemented dams have the added benefit of improved growth and health.
-Dr. Heather White,
Tri-State Dairy Nutrition Conference, 2023