ReaShure®-XC

Precision Release Choline Feeding Recommendations

Overview

Choline has long been known as a required essential nutrient for monogastric species and most vertebrates, including humans. Though many species can synthesize choline endogenously, it cannot be produced in sufficient quantities to satisfy the body's requirements and must be supplemented in the diet.

Choline is crucial for normal function of all cells. It is the precursor to the neurotransmitter acetylcholine, which controls virtually all major systems and muscle movements within the body ranging from cardiac function to the central nervous system. Choline also serves as a source of methyl groups for the formation of methionine and is important in DNA methylation.

Though there is not an official dietary requirement for choline in dairy cattle, decades of research prove that it is essential for health and productivity, especially during the transition period.

To meet the choline needs of dairy cattle, Balchem now manufactures a high-quality, ruminally protected choline product called ReaShure®-XC Rumen Protected Choline. As the next generation of ReaShure, it delivers bioavailable choline in a more concentrated form.

Research shows the ReaShure family of products can reduce incidence of metabolic disorders such as clinical ketosis and mastitis when fed during the transition period (Lima et al., 2011). A recent meta-analysis of 21 experiments in which rumen-protected choline was fed to multiparous transition cows revealed increases in pre- and postpartum DMI, and improved yields of milk, ECM, protein and fat when compared to unsupplemented controls (Arshad et al., 2020). That study also showed an increase in energy-corrected milk production of approximately 2.1 kg/day.

Research from the University of Florida also showed a strong link between prenatal choline supplementation and calf performance (Table 2). Choline's role in methylation has big implications for the health, growth and future productivity of calves whose dams were fed ReaShure during the transition period.

Recommended Feeding Rate

From early data obtained by Cornell University (Piepenbrink et al., 2003), it was concluded that 12,9 gr/cow/day of choline ion in a rumen-protected form was the best dose to deliver the transition health improvements and milk production. Since that study, the vast majority of transition cow trials have fed approximately 12,9 gr/cow/day of choline ion in a rumen-protected form both pre- and postpartum. Feeding 30 grams of ReaShure-XC provides the recommended 12,9 gr/cow/day of choline required to achieve the desired results. Jersey cattle are lighter, and it is often asked if a lower dose would be adequate. Perhaps, but a dose response study has not been conducted with Jersey cows. Therefore, 12,9 gr/cow/day of choline ion is suggested for all dairy breeds.

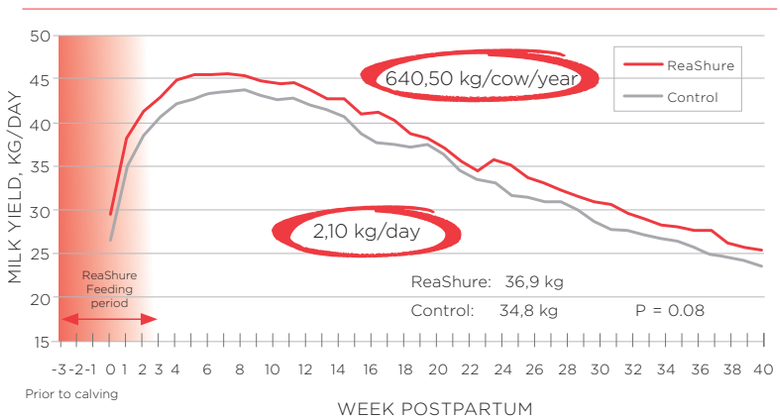
Recommended Feeding Period

Dairy cows can synthesize choline endogenously; however, the transition period represents a window of time in which endogenous choline production is insufficient. This is due to the dramatic increase in NEFA uptake by the liver that begins at calving and continues post calving. Figure 1 shows the results of a University of Florida study that demonstrate the lasting impact choline delivers. The study found that cows fed ReaShure during the transition period had higher peaks and produced an additional 2,10 kg of milk per day during the 40-week trial period. That resulted in 640,50 kg more milk per cow over a 305-day lactation.

21 days Prepartum – Feeding ReaShure-XC for 21 days prepartum is recommended to help reduce the incidence of metabolic disorders after calving. Table 1 shows the results of research completed at the University of California-Davis, which measured the changes in health disorders when animals were fed ReaShure. Research from the University of Florida showed a strong link between prenatal choline supplementation and calf performance.[3] Table 2 shows that calves exposed to choline *in utero* grew faster from birth to calving despite identical nutrition and management post-calving. This resulted in an additional 36 kg of body weight at first calving.

FIGURE 1

EFFECT OF FEEDING REASHURE® *PRECISION RELEASE CHOLINE* DURING TRANSITION ON MILK PRODUCTION OVER 40 WEEKS



Zenobi et al., *J Dairy Sci.* 101:1088 (2018).

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HOW TO FEED REASHURE®-XC

HOW TO FEED REASHURE®-XC

21 days Postpartum – It is recommended that feeding ReaShure-XC be continued for 21 days postpartum. Feeding postpartum will assist the liver in exporting needed triglycerides to target tissues like the mammary gland, deplete fat that accumulated around parturition and help prevent further fat accumulation in the liver around negative energy balance. Feeding ReaShure-XC postpartum should continue until the period of greatest negative energy balance has subsided and NEFA uptake by the liver is moderated to the extent that the endogenous supply of choline can adequately facilitate normal liver function. The length of this period will vary among herds and among cows within a herd.

Not all farms will have transition cow grouping strategies that align with the ReaShure-XC recommended feeding window of 21 days prepartum through 21 days postpartum. That should not preclude feeding ReaShure-XC. For example, ReaShure-XC should still be fed to prefresh groups that begin any time before 10 days prior to calving. Likewise, ReaShure-XC should be fed to any postfresh group with the understanding that benefits may begin to diminish after cows are beyond 21 days postpartum.

Also, some farms may not have a pre- and postpartum group. This should not preclude feeding ReaShure-XC only during the prepartum period or only during the postpartum period. Figure 2 shows expected results of feeding ReaShure-XC prepartum only, postpartum only, and both pre- and postpartum on liver fat accumulation, which is indicative of a choline deficiency and impaired liver function. Clearly, feeding pre- and postpartum would be most beneficial, but feeding either pre- or postpartum should provide benefits to the cow by improving liver function.

Topdressing ReaShure-XC can be an option for some dairy farmers. ReaShure-XC is palatable and readily consumed by the vast majority of cows when topdressed. Using computerized feeders to tailor-feed ReaShure-XC to designated cows is also a successful feeding strategy.

Two decades of peer-reviewed research has demonstrated that cows respond in multiple ways to supplemental choline in their diets (Table 3). Though not every cow responds the same, research proves that delivering choline during transition leads to substantial return from a small investment.

To learn more, visit BalchemANH.com/Launch.

TABLE 1

ECONOMIC IMPACT OF REDUCED METABOLIC DISORDERS

Disease	Incidence Rate %[4]	Cost €/Case	Cost €/100 Cows	% Reduction[4]	Savings €/100 Cows
Mastitis	22.5	236[1]	5.310	34.7	1.843
Metritis	8.9	225[1]	2.003	16.6	332
Retained Placenta	9.4	162[1]	1.523	11.5	175
LDA	4.2	321[1]	1.348	48.5	654
Clinical Ketosis	9.6	145[1]	1.392	55.7	775
Subclinical Ketosis	23.3	101[2]	2.353	50.5	1.188
Clinical Milk Fever	3.0	213[1]	639	32.0	205
Subclinical Milk Fever	45.0	112[3]	5.040	32.0	1.613
Total					**€ 6.785**

[1]Liang et al., *J Dairy Sci.* 100:1472-1486 (2017).
[2]Mostert et al., *Animal*, 12(1): 145-154 (2018).
[3]Guard, C., *CVC Kansas City Proceedings* (2009).
[4]Lima et al., *The Veterinary Journal.* 193:140-145 (2012). Incidence rates and percent reductions in diseases are calculated as the averages observed in Lima et al.
Average results reported by producers from 112 herds, representing 226.630 cows that participated in the ReaShure Real Results program. Conversion to € is based on 2019 average exchange rate €/USD.

TABLE 2

***IN UTERO* EFFECT OF PREPARTUM FEEDING REASHURE® *PRECISION RELEASE CHOLINE* TO DAMS ON GROWTH OF THEIR HEIFER CALVES**

Age	Control	ReaShure
Birth, kg	40,4	38,3*
2 months (weaning), kg	76,7	77,6
12 months, kg	322,2	335,3**
Post-calving, kg	534,0	570,0**

36 kg heavier at 1st calving

*Effect of ReaShure, P<0.10. **Effect of ReaShure, P<0.05.
Zenobi et al., *J Dairy Sci.* 101:1088:1110 (2018).

FIGURE 2

PROJECTED RESULTS OF FEEDING REASHURE PRE-, POST-, OR PRE- AND POSTFRESH ON LIVER FUNCTION AND LIVER FAT CONTENT IN TRANSITION COWS

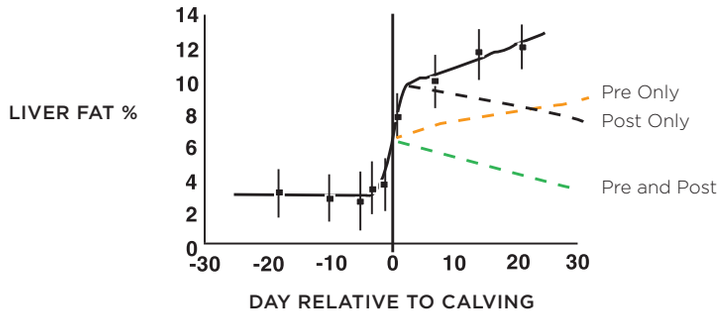

TABLE 3

REASHURE ECONOMICS (100 COWS)

Benefit	Investment[1]	Income & Savings	ROI
Full Lactation Milk Production	€ 1.500	€ 22.418[2]	15:1
Reduced Metabolic Disorders		€ 6.785	4,5:1
Improved Calf Health & Growth		€ 5.574[2]	4:1
Total		**€ 34.777**	**23:1**

[1]30 grams of ReaShure-XC 21 days pre- and 21 days post-parturition. [2]Milk Price € 0,35/kg

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