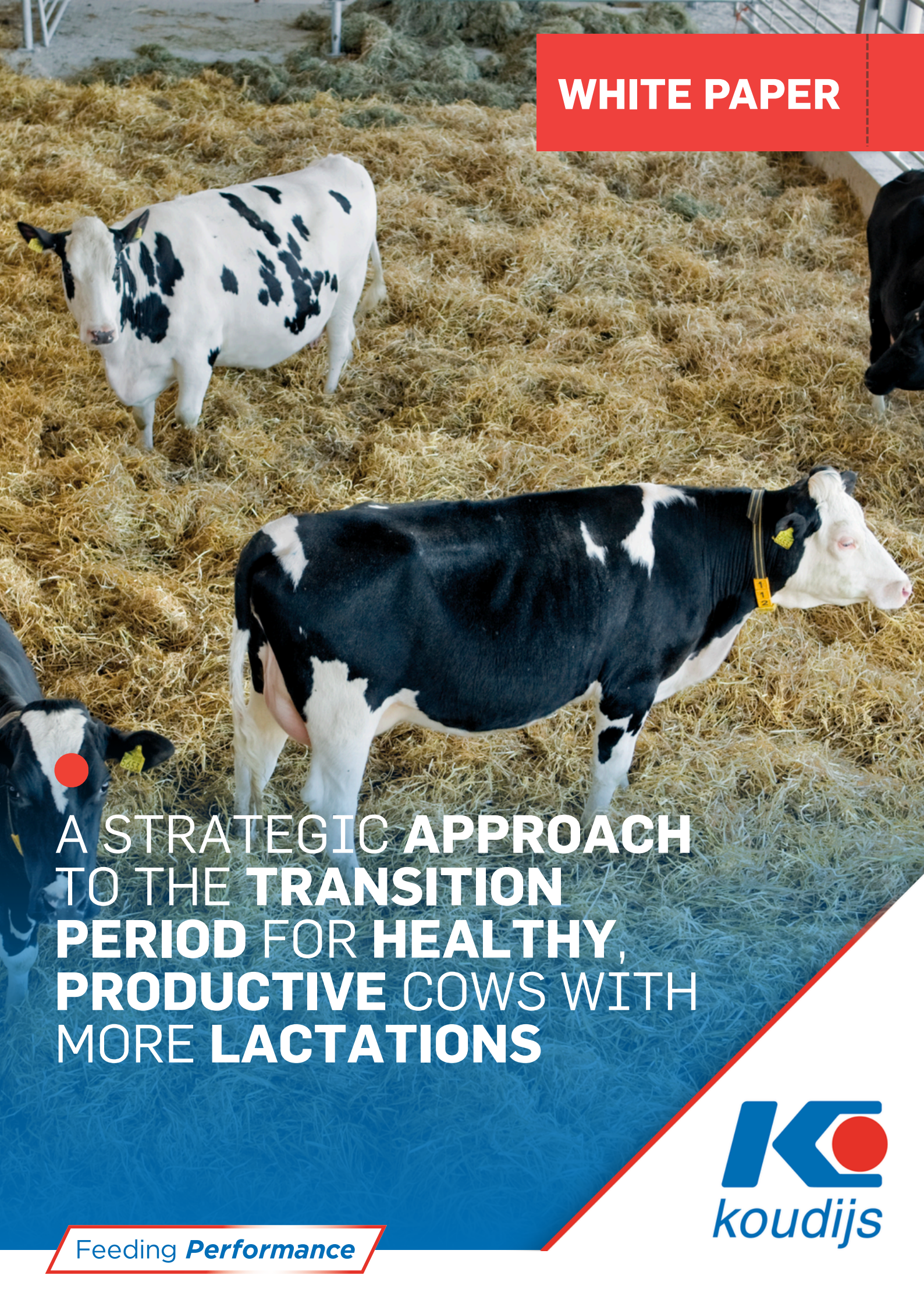




WHITE PAPER

● A STRATEGIC APPROACH
TO THE **TRANSITION**
PERIOD FOR **HEALTHY,**
PRODUCTIVE COWS WITH
MORE **LACTATIONS**

Feeding ***Performance***


koudijs



Thijs Hunink
Specialist Ruminants

The transition period is the most important and vulnerable phase in the lactation cycle of a dairy cow. During this period, the success of the upcoming lactation is determined and, in fact, also that of the lactation after.

At Koudijs, we have a clear vision of the right approach to the transition period. Based on this vision, we can help develop a suitable transition strategy for every compound feed company, under a variety of circumstances. With a strong transition strategy, clear vision, and appropriate product range, you can answer your market's questions as a feed supplier.

We have written several articles related to the transition period. In this whitepaper, we have compiled these articles. You can read why feeding extra phosphorus during the dry period is not a good idea, what the right DCAB strategy is, whether zeolite is a good alternative to a DCAB strategy, and why we advise highly productive farms to use rumen protected choline.

Of course, this is not the whole story. That is why we would be happy to work with you to optimise your transition approach and product range, aiming for an optimal transition strategy that leads to healthy, productive cows with more lactations.

Enjoy reading.



Why high phosphorus in dry cow diets is detrimental to health

More is not always better. This applies to many things but especially to dry-cow rations. Successful, problem-free lactation, as well as calf rearing, starts during the dry period. Unfortunately, many things can go wrong during this period. One of them is phosphorus feeding. While it's increasingly recognised that it's better to feed less phosphorus during the dry period, the opposite is frequently advised. This article explains why it really is better to feed low phosphorus during the dry period.

First things first: getting the basics right

Before diving into mineral and trace element nutrition, we need to make sure the dry-cow ration meets basic requirements: A palatable ration to achieve sufficient feed intake, the right energy level to keep the body condition stable during the dry period and enough protein for maintenance, recovery of the udder tissue and growth of the calf. To formulate an optimal dry-cow ration, all ration components must be analysed, including minerals and trace elements. Determining minerals in feed is essential to calculating the correct dietary cation-anion balance (DCAB) in the ration (ratio of potassium, sodium, sulphur and chloride). But optimal dry cow mineral nutrition goes beyond the right DCAB strategy - it's important to check other minerals levels such as phosphorus and magnesium. As can be seen in the figure below, magnesium has a positive influence on the hormonal regulation of calcium levels in the cow's blood, but is in turn negatively affected by high potassium levels.

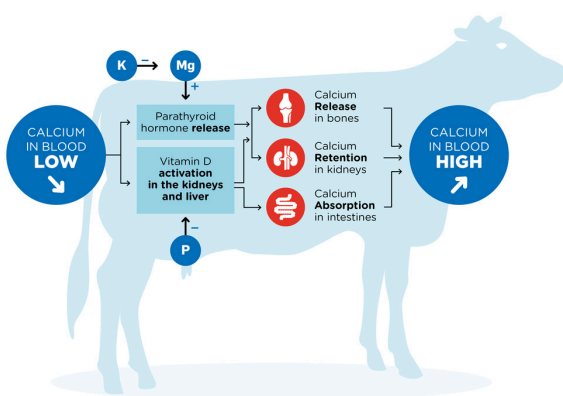


Figure 1 The impact of magnesium on the hormonal regulation of calcium levels in a cow's blood.

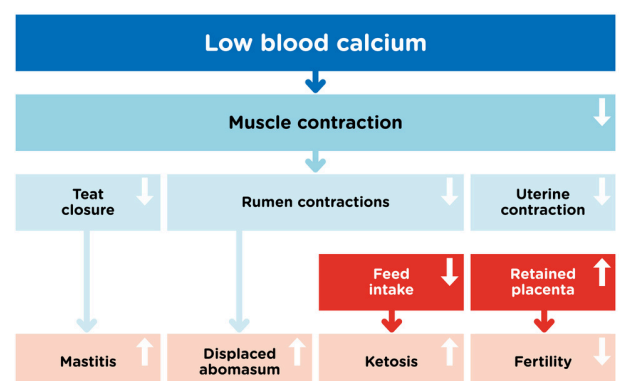


Figure 2 This shows that low blood calcium affects muscle contraction. This has major consequences in the cow's body and can lead to various disorders.

What role does phosphorus play in calcium metabolism?

Phosphorus plays an important but negative role in calcium metabolism. A higher intake of phosphorus limits the cow's absorption of calcium. Higher phosphate concentrations cause reduced production and increased degradation of 1.25-dihydroxyvitamin D and stimulate parathyroid hormone (PTH) release. In this vitamin D deficient state, calcium absorption in the intestines decreases and there's an increase in the secretion of PTH. This stimulates production of 1.25-dihydroxyvitamin D but in this phase, it results in excessive urinary phosphate loss.

We now have a situation where different metabolic systems are working against each other. The cow cannot solve this herself because a low feed intake causes a low intake of much-needed phosphorus and calcium. Intensive treatment is required but with a chance of failure. That's why it's really important to prevent cows reaching this situation.

Low phosphorus dry cow ration in practice

The cow's phosphorus requirement during the dry period is just 2-3g per kilogramme of dry matter (DM). Formulating a low-phosphorus diet for dry cows can involve additional costs, but with clear health and economic benefits in the long term, you will find that this money is well spent. Indeed, field studies carried out by our company confirm the need for low-phosphorus diets. They show that reducing phosphorus by 1g per kilogramme of DM during close-up can lead to 19% fewer cases of subclinical hypocalcaemia (SCHC). The importance of preventing subclinical hypocalcaemia (SCHC) is shown in figure 2.

In addition, you will see that when you start lowering phosphorus in a dry-cow ration, you will usually use feedstuffs that are low in phosphorus but also have a favourable energy-to-protein ratio and are low in potassium. This means that this ration meets all the preconditions to optimally prepare cows for the next lactation. Using this kind of ration, you will prevent a lot of risks during calving, keeping it safe and simple. In conclusion, lower phosphorus is not only better for cow health, it's also better for the phosphorus balance on your farm and can sometimes lead to cost price reduction. The result is a bigger chance of a trouble-free start to lactation.



A healthier transition: Optimising DCAB for dairy cow performance

The transition period is the most crucial phase in the production cycle of dairy cows. During this period, the cow recovers from the previous lactation, allowing the udder tissue to recover. At the same time, the calf grows rapidly and colostrum is produced. This determines the success of the start of the calf's rearing period and for the cow, the success of the next lactation. Unfortunately, this is also the period where cows have a high risk of developing metabolic and infectious diseases. Around 30 to 50% of cows develop a metabolic or infectious disease at this stage. But with the right advice about optimising the dry period, you can help dairy farmers reduce these risks. We can help you get the right knowledge and resources.

Several studies show that 40 to 80% of all older dairy cows have subclinical milk fever (subclinical hypocalcemia, or SCHC) in the first 48 hours after calving. This often goes unrecognised due to a lack of clinical signs. The low blood calcium level affects smooth muscle contractions which have a major impact on the health and performance of dairy cows (see Figure 1). Research conducted in the Netherlands on a large number of dairy farms also showed that on average 66.7% of dairy cows from second lactation developed subclinical milk fever (serum Ca concentration <2.13 mmol/L see also Figure 2).

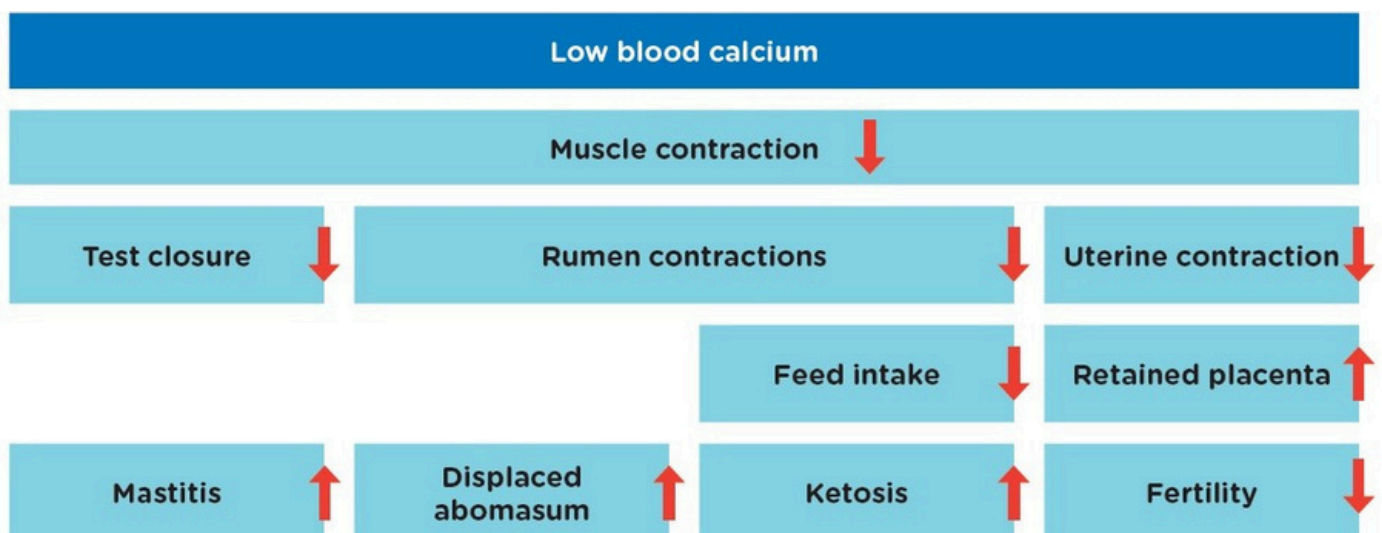


Figure 1. Schematic overview of the relation between subclinical hypocalcemia with other diseases.

Direct financial impact of sub-optimal transition

Without proper prevention, the financial impact of SCHC on farms can soon escalate. Based on a projected incidence of 66.7% and an average treatment cost of €113, the total cost for a farm with 100 calvings per year is more than €7,500. Because low blood calcium reduces muscle contractions (Figure 1), the disease puts cows at increased risk of developing secondary conditions such as metritis, retained placenta and displaced abomasum. In this frequently occurring scenario, the farmer is left with spiralling costs for treatment, which can amount to about €12,000 per 100 calvings, due to these secondary effects. All the more reason to adopt effective measures to prevent cows from getting SCHC.

Effective transition management

Through good transition management, a farmer can significantly reduce the risk of milk fever and SCHC. It's important of course, that the farmer has good, overall farm management, with cows starting the dry period and entering lactation with the right body condition score and an appropriate feed ration. One tool you can use to improve the health of the cows during the transition period is management of the ration's dietary cation anion balance (DCAB). With a correct DCAB strategy, you can keep the calcium metabolism in the cow active so it meets the strongly increased calcium requirement immediately after calving.

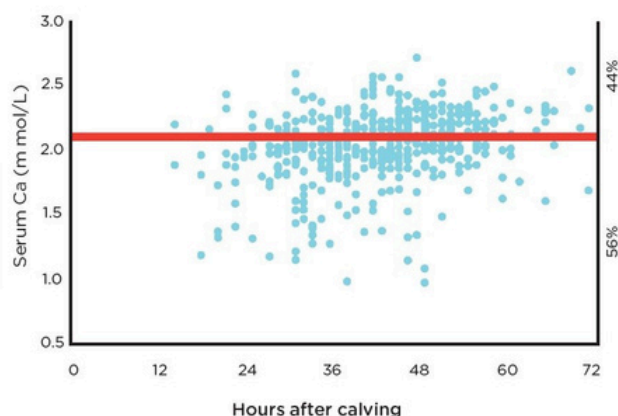


Figure 2. Serum calcium level of 535 dairy cows on 37 farms in The Netherlands.

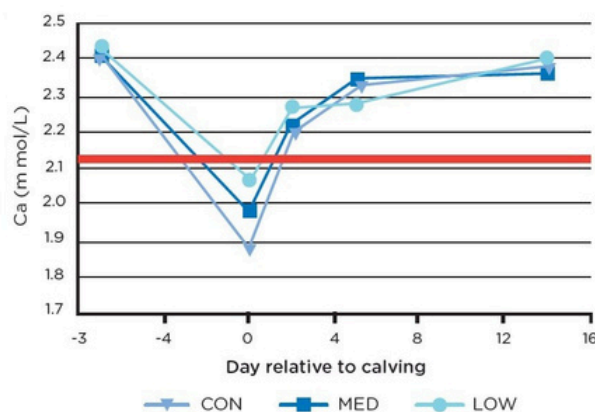


Figure 3. Blood calcium level in 3 different DCAB situations.

Anionic salts as an almost ideal solution

One DCAB strategy is to feed a low-calcium ration or to feed products that inhibit calcium absorption. Well-known examples include feeding rumen-protected rice bran or zeolites. Besides being less effective, these methods often have other negative side effects. For instance, zeolite not only binds calcium but also other macro-minerals such as magnesium.

The use of anionic salts to reduce DCAB in the ration is now a widely known strategy. Lowering the DCAB by -200 meq per kg of dry matter produces a significant reduction in SCHC incidence. The fact that anionic salts' strong smell and taste makes them unpalatable has long been a counter argument for their use. However, you have the option of using different coated variants, which ensure that anionic salts don't affect the ration's palatability and in turn, lead to reduced dry matter intake.



The best strategy, but only for the perfectly managed farm

The most effective strategy to prevent health problems during the transition period is not only to lower DCAD, but to feed a negative dietary cation anion difference (DCAD), acidifying the urine. Figure 3 shows the blood calcium levels of three differently fed groups of cows. The DCAD in these rations was 220 in the CON group, 0 in the MED group and -190 in the LOW group. Lowering the DCAD to negative values lowers the blood pH of the cow, thereby also lowering the urine pH. This acidification increases the availability of calcium in the blood by improving the absorption of calcium in the gut and increasing the calcium release from the bones. This strategy also increases the excretion of calcium in the urine and hence requires extra calcium to be fed in the ration.

Despite the fact that a dry cow ration with a negative DCAD gives the best results, we recommend this only for customers with top-notch farm management. This is because the farmer has to ensure that the urine pH stays above 5,5 - 6. When the DCAD is too negative, the blood pH will become so low that the cow's health will be at risk. So precise feeding and good monitoring is essential. However, this can be planned, avoiding unplanned work due to diseases after calving.

“A one-size-fits-all approach to the dry period does not exist. Success depends on choosing the right approach for each situation.”





Zeolites, a good alternative compared to a DCAB strategy in dry cow rations?

In the previous articles, we informed you about the effect of phosphorus levels in dry cow rations and applying the Correct DCAB. In this article, we would like to tell you a little more about an alternative strategy to influence calcium metabolism around calving: the use of zeolite as an alternative or supplemental to the traditional DCAD (Dietary Cation-Anion Difference) strategy.

From DCAD to Zeolite: different approaches with the same goal

Negative DCAD rations have been the standard to prevent milk sickness (hypocalcaemia) at calving for many years. By inducing mild metabolic acidosis, the cow's calcium balance is activated, leading to improved calcium absorption and mobilization. Yet feeding anionic salts brings challenges-such as reduced palatability and practical limitations in ration composition. This has drawn attention to zeolite, a naturally occurring aluminosilicate that can bind positively charged ions such as calcium (Ca^{+}). We see the use of zeolite increasing in some markets.

How does zeolite work?

Till recently it is believed that Zeolites, work through a mechanism by binding calcium in the gastrointestinal tract leading to a mild calcium deficiency condition before calving, causing the cow's body to activate its calcium mobilization before it is actually needed at the onset of milk production. However several studies (like Kerwin et al in 2019 and Frizzarini et al in 2024) show that Zeolite A lowers plasma levels of phosphorus. Frizzarini et al showed that Zeolites compared to negative DCAD or a control significantly reduced serum plasma levels of Phosphorus, see figure 1a when Zeolite is fed at 500 gram per cow per day. In contrast there was no significant effect in the reduction of serum Calcium while a lower DCAD did significantly decrease this (see figure 1b).

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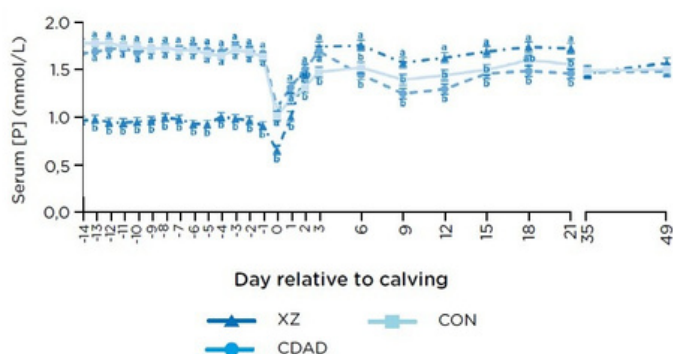


Figure 1a: Effect of zeolite A (XZ), a negative DCAD (-65 meq/kg DM, DCAD) compared to a control (CON, +190 meq/kg DM) on serum phosphorus (P in mmol/L) level in the periparturient period (Frizzarini et al., 2024).

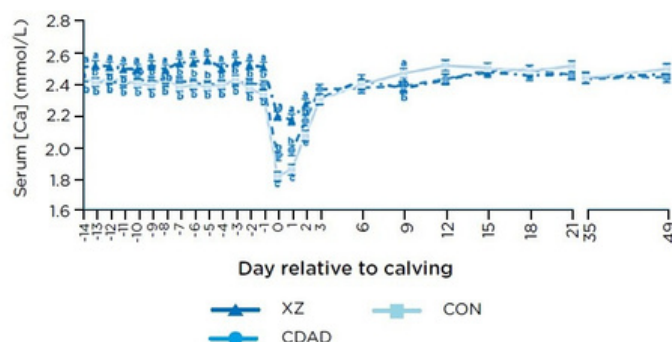


Figure 1b: Effect of zeolite A (XZ), a negative DCAD (-65 meq/kg DM, DCAD) compared to a control (CON, +190 meq/kg DM) on serum calcium (Ca in mmol/L) level in the periparturient period (Frizzarini et al., 2024).

This is important: a high phosphorus concentration inhibits the activation of vitamin D₃ to 1,25 Hydroxy cholecalciferol, which is essential to activate calcium absorption. By binding phosphorus, zeolite appear to contribute differently to an activated calcium metabolism compared to a lower DCAD strategy.



Application on farm

In trials where zeolite was added to the dry matter ration, plasma calcium levels after calving were higher than in control animals, resulting in less (sub)clinical milk fever. In addition, lower plasma phosphorus values were measured before calving. This avoided the negative effect of phosphorus on calcium metabolism. Feed intake remained stable or is decreased partly depending on the dose (range 200 – 500 gram/cow/day). This can also be seen in acidic DCAD rations.

These result, and field experience, show that Zeolites can lead to the same results compared to well executed rations with DCAD strategies. However we see that results with the application of Zeolites are less predictable. Still more knowledge is needed of the effect of Zeolites in rations with different phosphorus levels. Besides this, it can be a challenge to provide 500 gram Zeolites in a pelleted Close Up feed (12,5% inclusion at 4 kilo compound feed/cow/day).

Conclusion: Zeolite or DCAD?

Both strategies are valuable. DCAD has been extensively researched and works reliably if applied correctly. Zeolite offers a non-acidic approach that can be simpler in practice, especially in systems where consistent feeding of acid salts is difficult. Still, the DCAD strategy is preferred because of its high degree of reliable results. We know exactly which parameters are important for a predictable and successful result.

WHAT WAS THE EFFECT OF PHOSPHORUS ON CALCIUM METABOLISM AGAIN?

Phosphorus plays an important but negative role in calcium metabolism. A higher intake of phosphorus limits the cow's absorption of calcium. Higher phosphate concentrations cause reduced production and increased degradation of 1.25-dihydroxy-vitamin D3 and stimulate parathyroid hormone (PTH) release. In this vitamin-D-deficient state, calcium absorption in the intestines decreases and there's an increase in the secretion of PTH. This stimulates production of 1.25-dihydroxyvitamin D but in this phase, it results in excessive urinary phosphate loss. There's now a situation where different metabolic systems are working against each other. The cow cannot solve this itself because a low feed intake causes a low intake of much-needed phosphorus and calcium. Intensive treatment is required but with the chance of failure. That's why it's really important to prevent cows reaching this state.





New in our factory: Rumen protected Choline to further strengthen your dairy portfolio

Over the past few years, the use of rumen protected choline in dairy nutrition increased significantly. To provide the right solution for every situation, we have selected a high-quality source that can be incorporated into farm minerals and premixes. In our selection process, we considered not only the product's effectiveness in the animal, but also its processability in farm minerals and premixes and its impact on flow characteristics and homogeneity.

Highly productive dairy cows go through major metabolic stress, especially around calving. During this transition period, the cow's liver works harder to manage energy and fat metabolism. Choline is an essential nutrient that supports liver function by promoting the formation of very low-density lipoproteins (VLDLs) which carry fat from the liver to other parts of the body. This process helps reduce the risk of fatty liver and other metabolic diseases linked to a negative energy balance.

The importance of rumen protected choline

To be effective, choline needs to reach the small intestine, where it can be absorbed into the bloodstream. However, normal choline cannot be used effectively in ruminants because it is broken down by microbes in the rumen before it can be absorbed. That is why it is important to use rumen protected choline. By coating choline with a protective fat layer, it bypasses the rumen and reaches the intestine intact, ready for absorption.

Rumen protected choline is a premium product. When applied correctly, it provides a strong return on investment through increased milk yield and reduced health costs. For optimal effect, rumen protected choline should be fed during the last three weeks before calving and in the early postpartum period. However, it is important to realise that it is only effective at the correct dosage.

Selecting the right source for homogeneity

As a quality-conscious premix producer, Koudijs strives for a homogenous free-flowing product, which requires a careful selection of ingredients based on strict quality parameters. To identify the most suitable source of rumen protected choline, samples from multiple suppliers were evaluated.

With choline, the first thing to consider is hygroscopicity - the ability to absorb moisture from the surrounding environment. Normal protected choline is known to have a high hygroscopicity which can cause stickiness or clumping of mineral feeds and premixes. Rumen protected choline is coated with fat, which decreases the hygroscopicity of the ingredient significantly. The fat coating acts as a physical barrier between the choline and the environment.

This coating increases the particle size of the ingredient. For our products, ingredients with uniform particle sizes, in line with other raw materials, are crucial to ensuring homogeneity of the final product. As a result, some rumen protected choline sources were excluded due to excessively coarse particles that could increase the risk of segregation of the final product.

Fat coated products can be sensitive to high temperatures and light, which can affect the quality of the product. To maintain ingredient quality, we store our raw materials in an air and temperature-controlled warehouse.

After the careful selection process we concluded that the selected source for rumen protected choline meets our nutritional, technological and quality standards, making it suitable for use in both mineral feeds and premix formulations.

Applying rumen protected choline in your portfolio

We are happy to advise you on the use of rumen protected choline in different farm situations at the appropriate dosages and to assist you in identifying the most practical application. For more information, please contact your Koudijs representative.



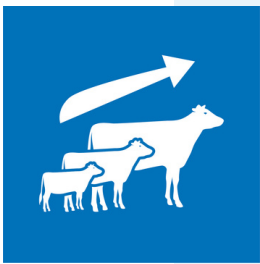
Optimise your assortment

At Koudijs, we partner with feed producers by delivering hands-on support in nutrition, assortment development, and feed manufacturing. Our ruminant range is designed with a clear focus on improving animal health and maximising performance. Each product is supported by extensive global research and development, ensuring consistent quality and predictable, measurable results. Our products are custom-made for your specific market and therefore adapted to its unique conditions, challenges, and opportunities.



PREMIXES

We specialise in producing custom-made premixes. With our expertise and support, we assist you in formulating premixes that meet the nutritional needs of dairy cows. The premixes are produced in our dedicated, state of the art plant, which is built to meet the industry's highest quality standards. This ensures that every bag contains a reliable, high-quality and homogeneous product.



FARM MINERALS

The right balance of minerals, vitamins, and trace elements is essential for productivity, health, and fertility. Our farm minerals deliver a reliable, balanced supply for consistent results. In addition to powdered options, we offer highly palatable, low-dust molassed minerals, which improve intake and mix evenly into rations.



FUNCTIONAL INGREDIENTS

Our functional ingredients are designed to protect, prevent and stimulate animal performance in a healthier, more efficient way. The ruminant range includes:

- Topguard Rumen+, supporting faster, more efficient weight gain and overall health.
- Topguard Protisafe and Protisafe Pasture, enhancing nitrogen efficiency in both stable- and grass-fed dairy cows.
- Our Mycoguard range, supporting cows in mitigating mycotoxin risks under different circumstances

YOUR BRAND. YOUR SUCCESS

Together, we identify the most effective and cost-efficient solution to strengthen your business. Our support helps you build a high-performing, competitive assortment that enables your customers to achieve optimal results.

Interested in exploring the possibilities?

Visit our website and schedule an appointment with Thijs Hunink.

www.koudijs.com/drycowapproach

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Feeding **Performance**