Milk – but not as you know it

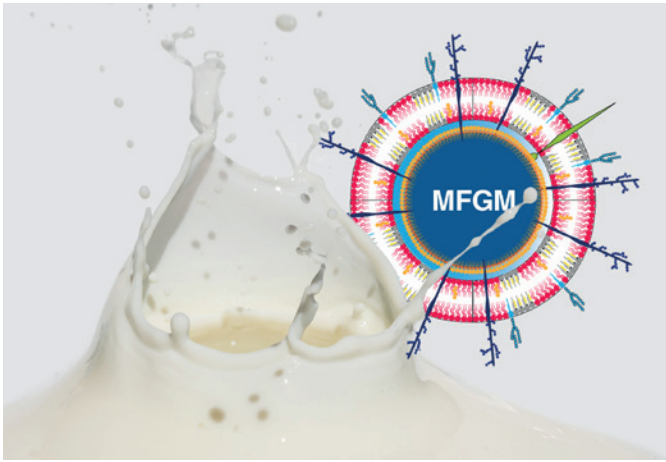
Nukamel ProtéGo : THE secret pow(d)er for new born calves

For lifetime performance the first weeks of the calf's life are critical but also a window of opportunity for dairy farmers. The health status in early life has been shown to be a major factor for milk yield, fat and protein production. Just born calves are vulnerable for diseases because they lack an active immunity system. The gut epithelium still needs to develop, and microbiota colonization still needs to take place. Moreover, the calf is born as a functional monogastric and needs to make the shift to a ruminant. Diarrhoea is the most common cause of calf death in the first weeks of life and often multiple pathogens are related; viral, parasitic and/or bacterial. Intestinal health support in the first weeks of life is needed to prevent that diarrhoea occurs.

Every farmer is aware that good colostrum management counts! It is the first opportunity to ensure that calves receive enough energy to maintain their body temperature, enough maternal antibodies to support the first line of health defence and enough bioactive components and other nutrients that stimulate gut and body development. Calves receive passive immunity by colostrum containing a high immunoglobulin content. Calves have been defined as having failure of passive transfer if the serum IgG concentration is less than 10 g/L when sampled between 24 and 48 hours of age, based on increased mortality risk below this threshold.
After the colostrum phase (gut closure), nutrition is equally important in the further development of the gut and immune system. The quantity and quality of early life nutrition impacts the intestinal architecture, the colonization in the gastro-intestinal tract with healthy bacteria and the education of the immune system. Beyond the gut closure proteins, oligosaccharides, growth factors (insulin like growth factor, epidermal growth factor), cyto- and chemokines, lactoferrin and white blood cells are active nutrients in colostrum to stimulate gut maturation and microbiota development and to train and regulate the immune system. In nature, this persists through transition milk. Transition milk is the milk cows produce after colostrum (from milking's two to six) and before what we consider whole milk. Research on optimal nutrition for calves after the first colostrum feeding is limited however, Nukamel has developed state-of-the-art precision calf feeding approach that improves early-life growth and health, called ProtéGo. This approach starts with practical and specific colostrum management advice provided by ARTI team. Indeed, it is an art to start growing a young ruminant. Our ARTI's are the specialists translating Nukamel science into your daily practice.
The second step is to feed the calves with ProtéGo milk replacer, providing them with exclusive nutrient sources for newborn development.

What's so special about Nukamel ProtéGo?

The calf's first months are a critical time of rapid growth and development, which must be supported by an adequate plane of nutrition subsequent to the colostrum feeding.
Meanwhile the beneficial effects of low heated dairy proteins were identified in numerous studies. But the effects of complex dairy lipids are until now overlooked. Recent scientific research has discovered that specific fat molecules and particular **Milk Fat Globule Membrane (MFGM),** naturally present in milk plays an important role in gut health and development of the neonatal. Many studies on mice, rats, piglets and humans have shown the benefits of feeding **MFGM** in early life, though research on calves is scarce. In this article we will shortly address the science behind **MFGM** and how we have applied it as one of the pillars of our new Nukamel starter milk within the ProtéGo appoach.



How does MFGM benefit early gut development?

By digging deeper into the world of MFGM, the Nukamel research group found many studies proving the critical role of these complex dairy molecules for young animal development. Bindher et al. (2017) demonstrated in a rat pup study that a control diet deficient in MFGM produced shortfalls in intestinal development compared to mother's milk, whereas addition of MFGM in the feeding formula restored intestinal growth. Le Huërou-Luron et al. (2018) found that MFGM enriched diets in new-born piglets improved the development of the jejunum and ileum at day 7 and 28 post-natal compared to diets without MFGM.

Another reason to justify the use of MFGM in early-life nutrition is its anti-pathogenic effect. MFGM either has direct bactericidal activity or interferes with pathogen adhesion to the intestinal epithelium, thus preventing pathogens, such as Escherichia coli and/or rotavirus from either access into the body or the initiation of physiological cascades leading to adverse effects such as infection-induced diarrhoea and inflammation (Figure 1 and 2).

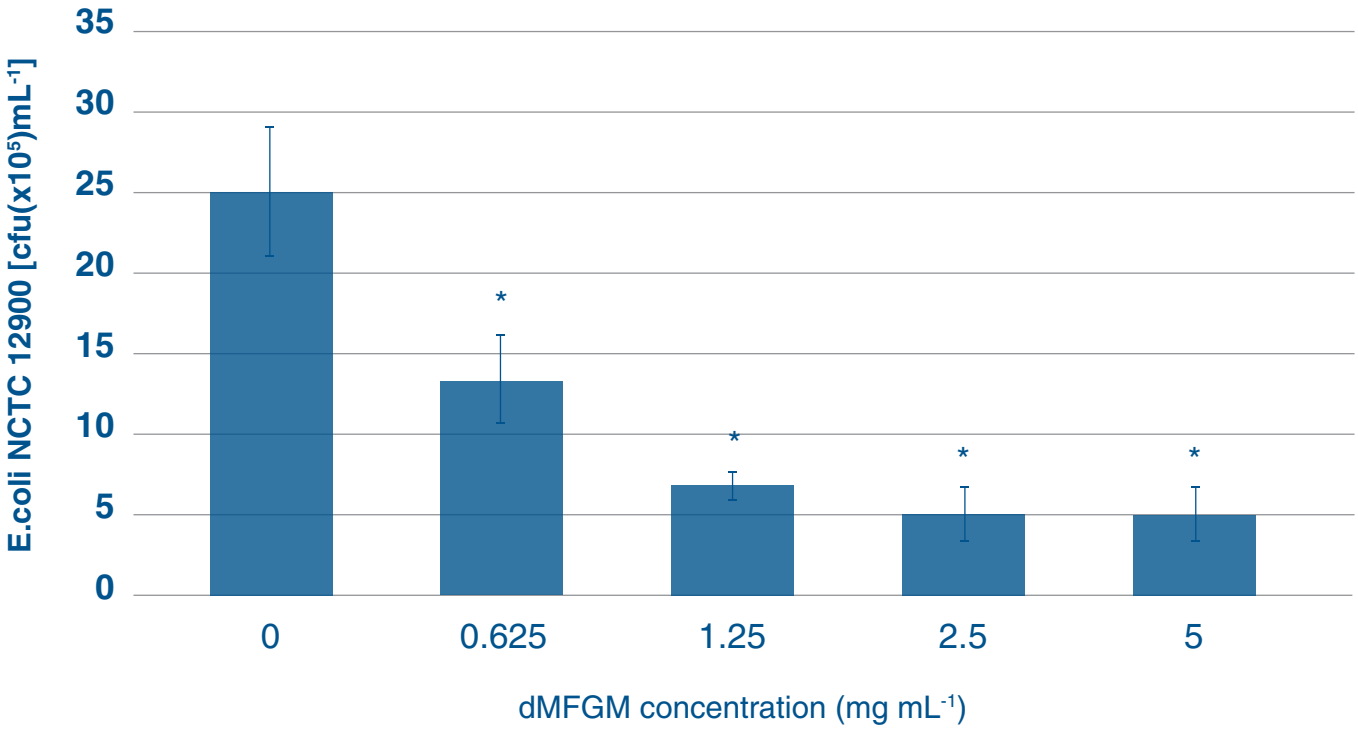


Figure 1. The effect of defatted MFGM-enriched fraction (dMFGM) milk on the anti-infective activity against E. coli NCTC 12900 (Ross et al., 2016).

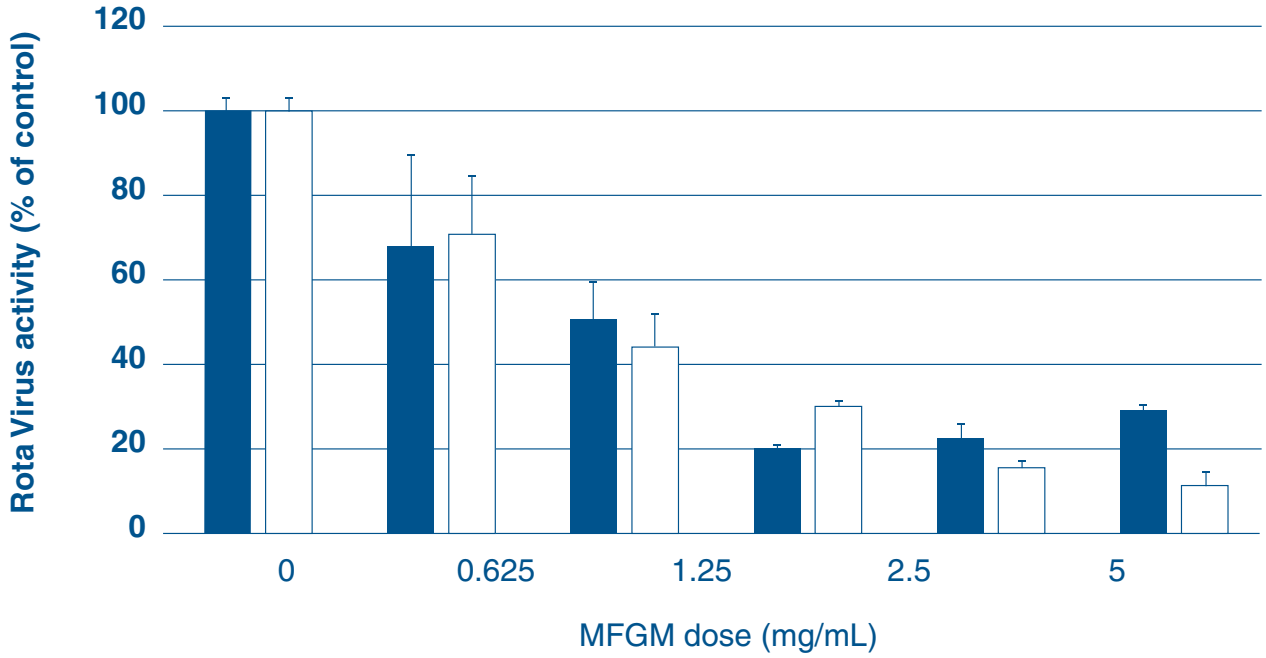


Figure 2. Anti-infective activity of MFGM against rotavirus (Fuller et al., 2013).

The proof of the pudding is in the eating

As calf studies are lacking, the Nukamel research group has tested the Nukamel ProtéGo milk, rich in MFGM, under practical field conditions. Because you know, even without understanding the full details of the science behind it, the calves should tell us why MFGM matters for calves in the early stages of life.

In the first trial, 75 calves were involved, divided into 3 test groups. One group of 25 calves received Nukamel ProtéGo milk enriched in MFGM for two weeks followed by Nukamel CMR. The two other groups of 25 calves received one of two competitor starter milks (Nukamel R&D, Belgium 2021). Our results show that the calves on the MFGM treatment had 2 kg higher final weight than the other two treatments. Furthermore, these calves had higher average daily gains in the first two weeks (Figure 3a), an increased gain to feed ratio (Figure 3b) and a reduction of incidence of diarrhoea cases (Figure 4).

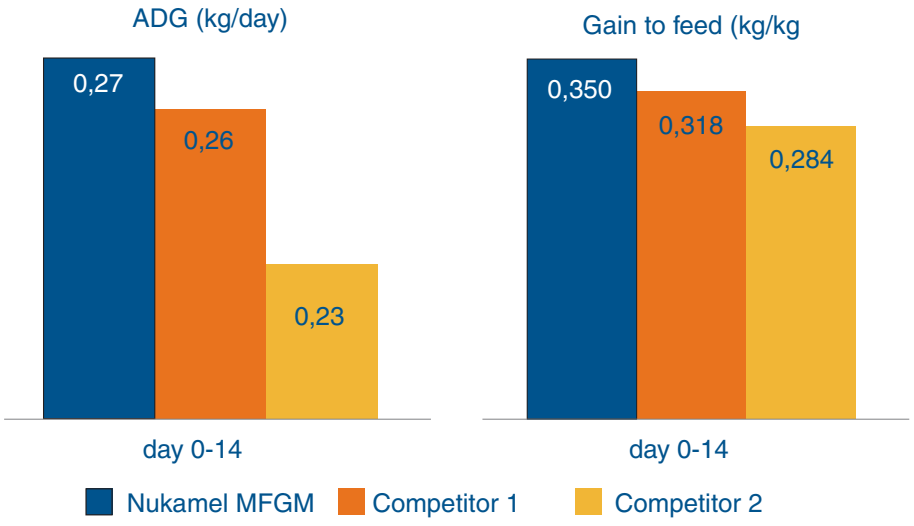


Figure 3. Average daily gain (ADG; kg/day) and gain to feed (kg/kg) in the first two weeks of the trial.

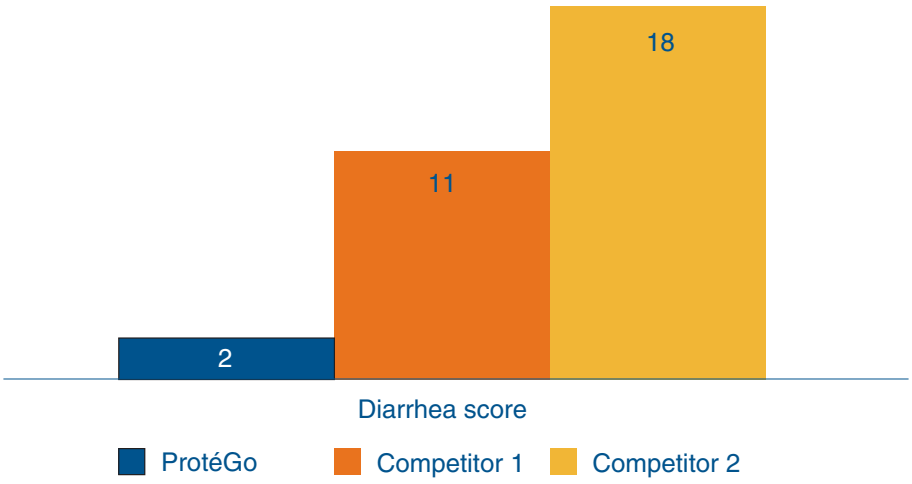


Figure 4. Number of cases of diarrhoea.

In the second trial, Nukamel ProtéGo milk with MFGM, was tested in a field trial with 25 individually housed calves against a competitor starter milk. The milk was fed immediately after the colostrum, for two weeks long. After the starter milk, all calves received a Nukamel CMR as follow-up milk. The start milk was fed three times a day in portions of two litres.

After that, the calves could drink up to eight litres a day of the Nukamel CMR (Nukamel R&D, The Netherlands 2022). Only after 17 days, the calves on the Nukamel ProtéGo milk treatment showed 2 kg heavier body weights compared to the calves on the competitor starter milk (Figure 5).

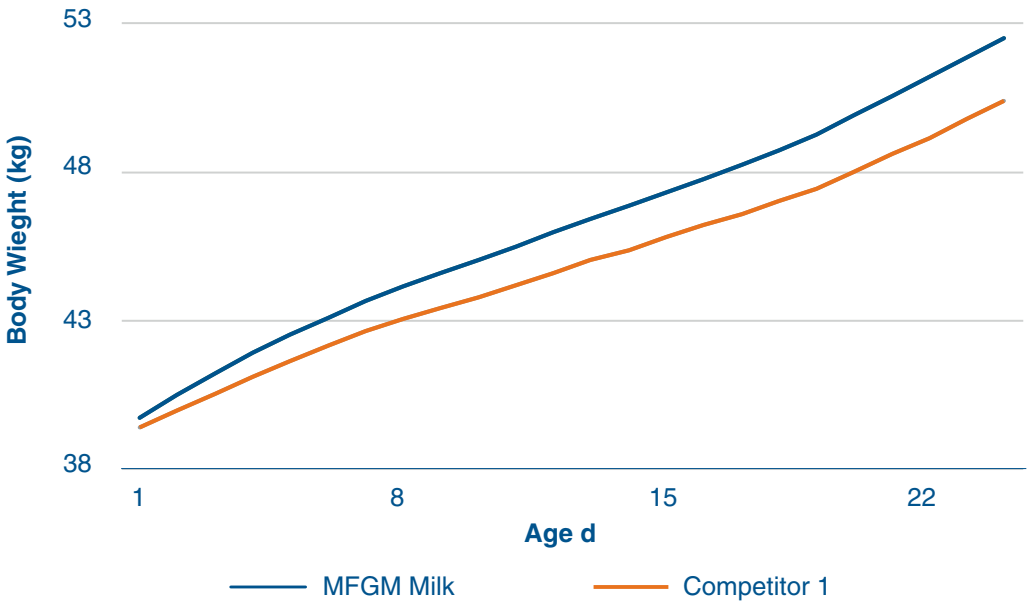


Figure 5. Effect of MFGM technology on body weight development in the first 17 days over life.

When Nukamel ProtéGo milk was applied in the field, the farmer's feedback was outstanding.
"With Nukamel ProtéGo the calf keepers experience is that the diarrhoea is gone and that they can increase the supply to the calf faster, without diarrhoea occurring. They want to give 6 liters of CMR when the calf is about 3 weeks old, but it has previously been worrying when the calves had diarrhoea. Now they can increase up to 6 liters faster without any worries" (Swedish farmer).

Disease is related to 6% of the cost made from birth to weaning. Most treated health conditions are scours and pneumonia. Thus, management practices that reduce the occurrence of diseases, especially in the first weeks of the calf's life, are essential to the efficiency of rearing systems. Nukamel ProtéGo can offer that to the farmer and increase the animal's welfare.

Advances in calf nutrition
Nukamel ProtéGo : THE secret pow(d)er for new born calves

Nukamel goal is to continually improve nutritional performance of our milks for a healthy, productive dairy herd.
Nukamel ProtéGo is THE secret pow(d)er for new born calves
The development of a milk with a new lipid component with properties analogous to the colostrum is an important step toward reducing the gap between colostrum and a calf milk replacer with regard to early gut and immunity development. The ProtéGo approach minimizes disease risks and increases performance in rearing heifers.