International Dairy Topics

Volume 19 Number 5 (2020)

Practical information for progressive dairy professionals

FEEDING
An excellent start with brewer's yeast derivatives

HEALTH
Cryptosporidiosis and calf and heifer management

KETOSIS CONTROL
We look at options from around the world

AUTOMATION
Implementing efficient feeding strategies

PLANT EXTRACTS
Promoting calf growth and rumen development

BIOSECURITY
Principles, fundamentals and structure

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chewing the cud

Look at the World Organisation for Animal Health's alerts for foot and mouth disease for 2020 and the countries highlighted are Malawi, Rwanda and China.

These are three beautiful countries and, even during these current challenging times of Covid-19, there will still be people travelling into these areas. Any one of these visitors could come into contact with foot and mouth disease, become contaminated with the virus and then transfer it back home.

One route of contamination can be via faecal material on their shoes or trousers. Back home on the family dairy farm all that is needed is for contact with livestock, and it does not need much imagination to think of ways in which this faecal material on their shoes could be transferred to, and infect, one or more animals.

What one tends to forget is how globally connected we all are, with flights from East Africa to Europe only taking seven or so hours, and flights from China less than 12.

Expand this thinking to other bovine diseases and human foodborne zoonotic pathogens and it becomes apparent why farm biosecurity is so important and why it warrants you spending some of your hard-earned time and money.

Another thing to consider is that some diseases can be transferred by unpasteurised dairy products such as cheese, milk and cream.

Are you aware of what foods your staff are bringing on to your farm in their lunch boxes, where they eat them and more importantly where they discard their leftovers?

Do not let anyone give your animals food that is not intended for them. Human foods can contain salmonella, Listeria monocytogenes, E. coli and campylobacter, and be the cause of various diseases of dairy cattle.

How can you improve your biosecurity? Start by considering a boundary around your farm and then list everything that crosses it (and could conceivably be carrying the causes of various diseases).

This list should consider people, feed, bedding, equipment, air and water as well as many other things.

You should then take each item on this list and ask whether the associated biosecurity risks can be eliminated. If they can, remove them!

Cover Picture:

Focus on cow health
(Photo courtesy of GEA)

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worldfocus

An executive summary of key international issues

USA

Carbon neutrality by 2050

The Innovation Center for US Dairy has introduced the Net Zero Initiative, an industry-wide effort intended to help US dairy farms implement new technologies and economically viable practices. The initiative is to be inclusive of all sized farms across the whole country. It will play a vital role in the US dairy's environmental stewardship goals; to improve water quality and achieve carbon neutrality by 2050. A $10 million partnership with Nestle supporting the Net Zero Initiative has been announced to increases access to environmental practices and resources to farms, which is a significant milestone towards the carbon neutrality goal.

Canada

Dairy cattle traceability programme

A farmer-run organisation, Lactanet Canada, has launched a national dairy cattle traceability programme. It has been designed to be the main national system for the management of all dairy cattle traceability data and provide protection to the Canadian dairy industry in the event of an animal health emergency. The programme will also provide dairy herd management services, such as milk recording, genetic evaluations and health and disease laboratory diagnostics. The aim to have all data stored in one national system also offers the opportunity for information sharing between farmers across the country, which would not normally be possible.

UK

Dairy workers not on shortage list

Farm workers, including dairy workers, will not be added to the Shortage Occupation List following a final attempt to gain the UK government's approval. After a four month consultation, the Migration Advisory Committee did not recommend adding farmers on to the list. The Royal Association of British Dairy Farmers claimed the new points-based immigration system will prioritise individuals with the 'highest skills and greatest talents', with dairy workers supposedly not falling into these categories. There is now a real fear that dairy farms that rely on foreign workers could be left with a labour shortage when the new immigration system is introduced next year.

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Feeding brewer's yeast derivatives for an excellent start in life

A basic requirement for high vitality, fertility and longevity in the dairy herd is a successful rearing period. Therefore, it is crucial to pay attention to this special phase. Due to their immature immune system calves are very susceptible to intestinal and respiratory diseases in the first weeks of life.

by Petra Bisesti, Product Management Livestock (Ruminants), Leiber GmbH, Germany. www.leibergmbh.de

Environmental challenges, for example humid and cold climate conditions, as well as emotional or social stress can harm the animal. Different infectious agents like E. coli, rota and coronavirus and cryptosporidia can proliferate and lead to microbiota imbalances in the gastrointestinal tract (GIT).

In addition to proper colostrum management, biosecurity and other preventive measures, young animals need to have access to high quality nutrition. It is proven that what you feed the calf in early life determines its future growth and performance.

A high proportion of highly digestible and palatable raw materials as well as gut flora stabilising ingredients like prebiotics should not be omitted in a well-balanced diet for calves. One effective tool to strengthen the body's defences and enhance gut microbiota and morphology is the use of real brewer's yeast Saccharomyces (S.) cerevisiae. Applied in milk replacers or starter diets, the risk of scours can be reduced. Fig. 1 shows the broad range of yeasts available for animal nutrition. To stabilise rumen pH and microbiota, feed for dairy cows usually contains supplements based on whole yeast cells: either live, probiotic micro-organisms or inactivated, prebiotic yeast combined with functional fibre, though so-called yeast derivatives are often supplied in calf nutrition. The mode of action and effects on animal health and performance depend on origin, manufacturing process and composition of the product.

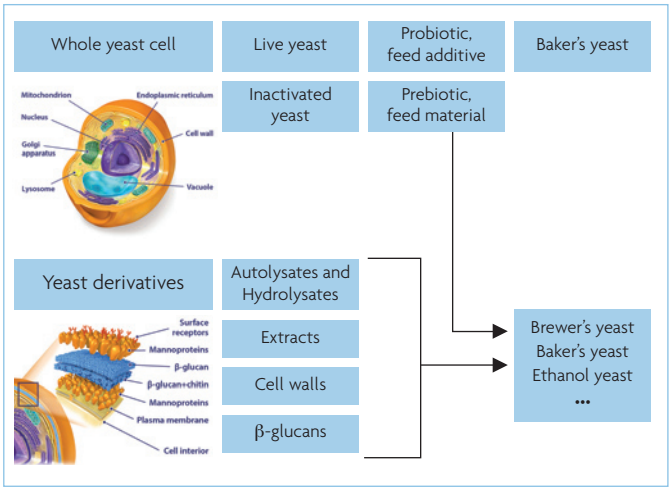


Fig. 1. Range of yeasts in animal nutrition.

Beneficial effects on gut health

In animal nutrition the most common and effective yeast products are based on S. cerevisiae. Beside other yeast derivatives consisting of, for example, baker's or ethanol yeast, the real brewer's yeast is of great interest – also in terms of sustainability. Real brewer's yeast is a by-product from breweries which is refined and processed to different feed and food specialties.

Whereas yeast cell content (yeast extract) is mainly used in food and the pet food industry, yeast cell walls or parts thereof are popular in livestock diets. In addition to other valuable ingredients like B vitamins, real brewer's yeast contains components of hops, which has been used as a medical plant for centuries. For instance, calming, bacteriostatic and antioxidative effects are described for hops. According to in vitro-studies a preventive use can result in inhibition of Gram-positive pathogens.

Furthermore, the brewer's yeast cell wall product Biolex MB 40 consists of high mannan-oligosaccharides (MOS) and (1.3)-(1.6)-β-glucan contents. It is evident that MOS serve as a growing medium for beneficial bacteria like lactobacilli in the gut.

In an in-vitro model (simulator of intestinal microbial ecosystem) the prebiotic, dose-dependent effect of Biolex MB40 could be demonstrated.

Biolex MB40 is digested moderately and selectively, in particular in the distal colon. Among other effects, a significant increase of propionate and butyrate was seen.

Additionally, with specific receptors at their surface MOS bind certain Gram-negative pathogens and (myco)toxins. An in vitro study at the University of Berlin showed that Leiber brewer's yeast significantly reduces adhesion of coliform pathogens and salmonella to intestinal epithelial cells by 30 and 50%, respectively. Positive effects on gut health of calves, lambs and piglets were confirmed in several feeding trials. For example, in a piglet trial from Thailand 0.1% Biolex MB40 reduced the incidence of diarrhoea in the rearing period by 30%.

In another trial from Iran with 75 Holstein calves 5g of Biolex MB40 in milk replacer or 0.1% in the starter feed resulted in less diarrhoea days

Continued on page 9

Fig. 2. Influence of Biolex MB40 on body mass and daily weight gain of lambs.

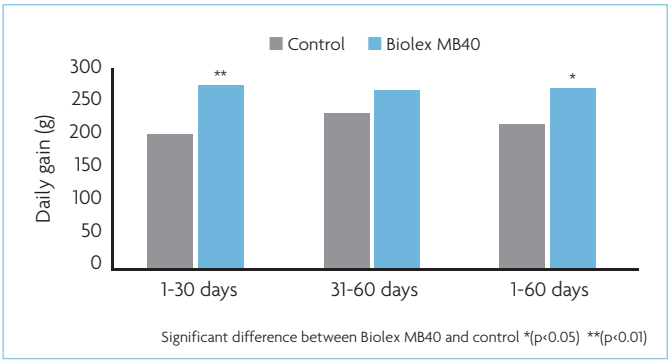
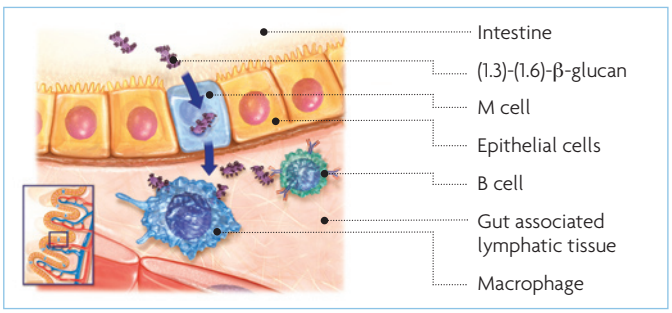


Fig. 3. Activation of macrophages by β-glucans and antigen presentation to B-cells.



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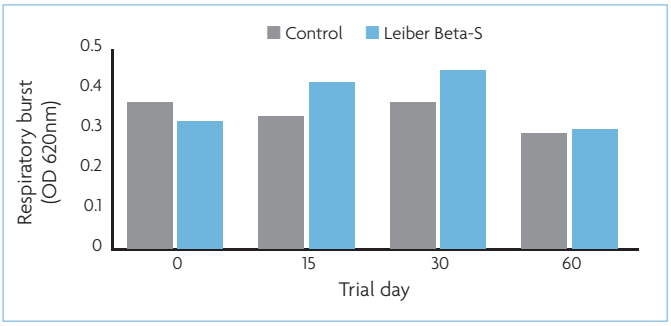


Fig. 4. Influence of Leiber Beta-S on selected parameters of cellular immunity in the blood serum of calves.

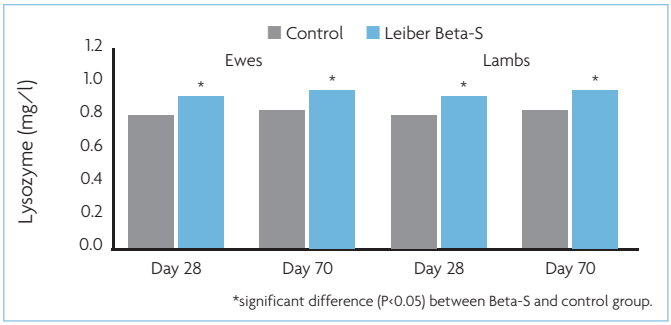


Fig. 6. Effect of Leiber Beta-S on lysozyme level (non-specific, humoral immune parameter) in ewes and lambs.

Continued from page 7

and improved the faecal score. Instead of 6.4 diarrhoea days (control), both trial groups showed scours for only 2.3 days. As a result of improved microbiota balance, higher weight gains were observed in calves fed with prebiotic-supplemented diets.

Additionally, yeast cell walls consist of (1.3)-(1.6)-β-glucans which are known to stimulate the immune-system of young or stressed animals. As shown in Table 1, Biolex MB40 improves humoral immunity in lambs. In this scientific trial from Poland the trial group showed increased lysozyme activity and γ-globulin content. The use of brewer's yeast cell walls in lambs also resulted in better growth (Fig. 2).

Parameter	Group	Investigation day 0	Investigation day 15	Investigation day 30	Investigation day 60
Lysozyme activity (mg/L)	Control	0.79 ± 0.08	0.79 ± 0.09	0.77 ± 0.08	0.81 ± 0.06
	Biolex MB40	0.79 ± 0.06	1.09 ± 0.09 **	1.14 ± 0.06 **	1.17 ± 0.04 **
γ-globulin content (g/L)	Control	30.22 ± 5.41	33.17 ± 2.83	31.61 ± 1.27	30.67 ± 3.13
	Biolex MB40	34.11 ± 6.81	36.44 ± 5.82	35.44 ± 3.87 *	39.44 ± 3.83 **

Significant difference between Biolex MB40 and control *(p<0.05) **(p<0.01)

Table 1. Influence of Biolex MB40 on parameters of humoral immunity in blood serum of lambs.

Immune-stimulating effects

Leiber Beta-S consists of a high proportion of purified (1.3)-(1.6)-β-glucans. Numerous feeding trials provide evidence about immune effects of β-glucans derived from brewer's yeast with 1.3-β-linked backbone and 1.6-β-linked side chains.

The manufacturing process and isolation method impact the structure of β-glucans and consequently effects the immune system.

Fig. 3 demonstrates macrophage activation and antigen presentation in gut associated lymphoid tissue (GALT) triggered by brewer's yeast β-glucans.

A Polish university trial demonstrated the positive effect of Leiber Beta-S in calves on unspecific and specific immune response by increasing phagocytic activity and proliferation of B and T lymphocytes. The activity of phagocytes (shown in the respiratory burst activity in Fig. 4) rose in the first 15 days of the trial.

Moreover, the proliferation of B and T lymphocytes increased over the entire trial period (Fig. 5). Results suggest that supplementation of Leiber Beta-S sets the immune system in an excited state and therefore a faster immune response occurs when pathogens enter the body.

Another university trial from Poland found that feeding ewes with 0.05% Beta-S positively impacts the offspring as well. Beta-S resulted in significantly higher γ-globulin and lysozyme levels in blood of dam and lamb (Fig. 6) and increased B and T cells (Fig. 7).

From studies in dogs and man it may be concluded that orally applied, insoluble yeast β-glucans are able to strengthen the body's defence, especially in creatures with a weakened immune system. In dogs suffering from inflammatory bowel disease (IBD) brewer's yeast β-glucans decreased the level of pro-inflammatory IL-6 and increased anti-inflammatory IL-10. Moreover, several clinical studies in man show that subjects supplemented with yeast β-glucans benefit by reduced severity of respiratory tract infections symptoms. Similar beneficial effects in young or stressed animals like calves are expected. However, further investigations are necessary.

Conclusion

The intestinal health of young animals plays an important role for their development and future performance. Since calves are born with a limited immune capacity a sufficient intake of colostrum is essential to protect newborns against pathogenic agents and environmental stressors.

The supplementation of brewer's yeast derivatives in the offspring of ruminants is a very effective tool to enhance gut health and support the immune system. The yeast cell wall product Biolex MB40 is characterised by a high MOS and β-glucan content. The use in milk replacers or starter feed results in prebiotic effects, improved gut integrity and humoral immunity. Purified β-glucans in Beta-S increase unspecific and specific immune parameters. ■

References are available from the author on request

Fig. 5. Effects of Leiber Beta-S on proliferation of B and T lymphocytes.

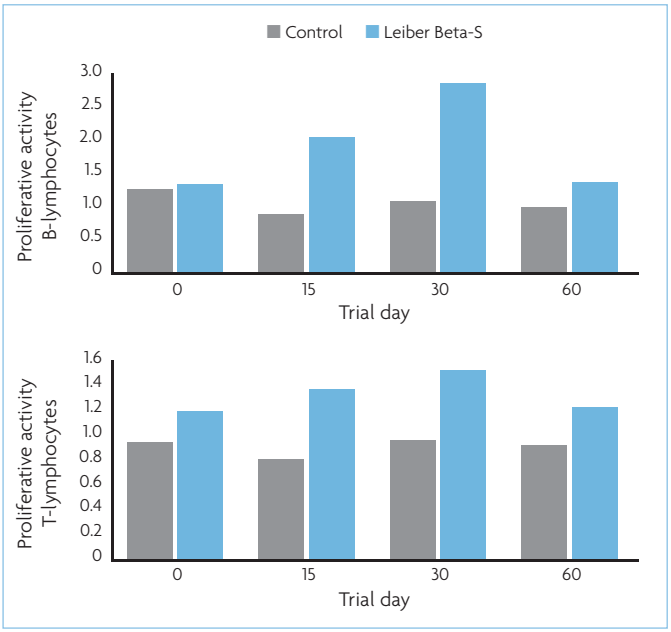
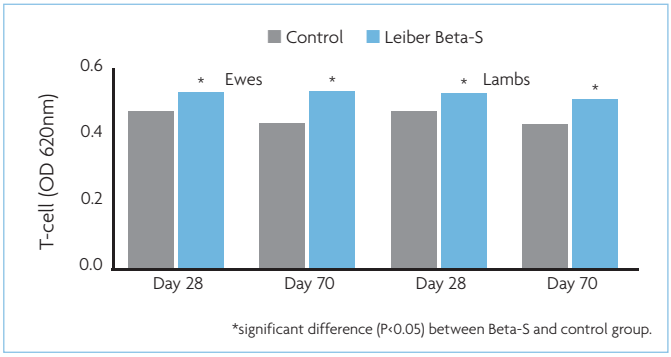


Fig. 7. Effect of Leiber Beta-S on T-cell proliferation in ewes and lambs.



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Cryptosporidiosis: an important concern in calf and heifer management

More than 100 years after the first description of Cryptosporidium parasites by Edward Tyzzer, the treatment and prevention of cryptosporidiosis remains a challenge for scientists.

by Brigitte Duquesne DVM, Global Technical Manager Ruminants, Huvepharma.
www.huvepharma.com

Cryptosporidium has a worldwide distribution and this protozoan is considered the agent of an emerging zoonosis. Because of its substantial economic impact in farms and in preventing the spread of a zoonotic agent, the control of cryptosporidiosis remains a major challenge for a successful 'One Health' response.

WHO estimates that nearly two-thirds of all human pathogens originate from zoonoses, making it important to adopt a global 'One-health approach', involving veterinary and human sectors alike, to control and prevent zoonotic pathogens.

Cryptosporidium may occur in 30-50% of calves on a worldwide scale and, in some countries, it is the most important cause of neonatal diarrhoea in young ruminants. Cryptosporidium is transmitted via the faecal-oral route.

The low infectious dose of directly infective oocysts, prolonged survival in moist environments and resistance to most disinfectants explains the difficulty of eradication when the parasite is established on a farm.

Although cattle should no longer be blamed as the single source of human cryptosporidiosis, more than 90% of human infections are caused by C. hominis and C. parvum and the transmission from cattle to people is nevertheless an important public health concern.

Vet practitioners play a key role in communicating and implementing cryptosporidiosis control on farm: they should inform the livestock owner of the hazards that result from contact with visibly and invisibly infected animals and provide them with the basic knowledge of sanitary measures required to protect animals, people and the environment.

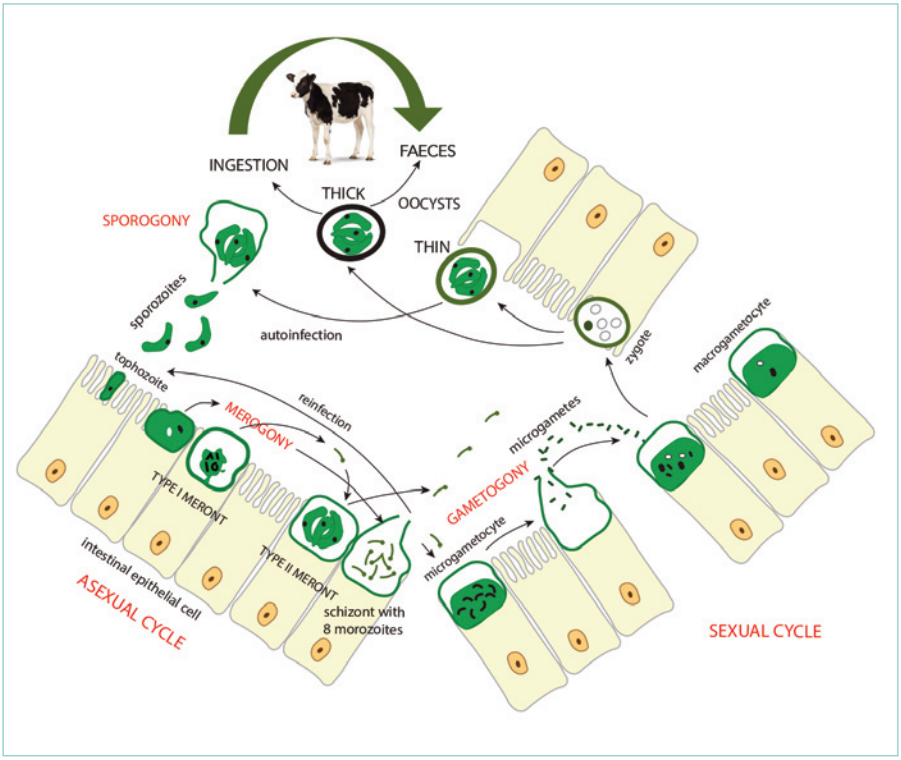

Fig. 1. Life cycle of Cryptosporidium parvum.

Cryptosporidiosis on farms

The history of the farm is important in the diagnosis of cryptosporidiosis, which is often recurrent from year to year.

Even when effective disinfection has been set up, the resistance of oocysts in the environment is such that it is unlikely that there are none in the environment.

The disease generally occurs when the animals are housed and the pressure of infection increases during the calving season.

The first-born calves are quickly infected soon after their birth with environmental oocysts.

The parasites replicate and excrete, multiplying the challenge; the pressure of infection increases during the following births to a 'threshold' – triggering diarrhoea, reaching a peak in the second half of the calving season or beyond, depending on the hygienic conditions and management of operations.

Control of cryptosporidiosis

The general hygiene conditions on the farm, the animal density and the gathering or not of animals into age groups are important factors.

Prevention is essential and is based, firstly, on limiting exposure to oocysts and, secondly, on raising animals' defences.

Minimising transmission

Implementation of biosecurity principles is an essential element in cryptosporidiosis control.

● **Limitation of contaminant entry into the site:**
The introduction of animals poses a major risk to livestock, which implies checking the health status of the buyer's animals and the animal purchased.

Continued on page 13

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Continued from page 11

Quarantine in a remote area, specifically designed for this purpose, is always a necessary precautionary measure.

Professionals and visitors should be met in an area equipped with a foot dip or boot washing facilities.

With vehicles, trucks for animal carcase disposal pose the greatest risk of contamination. Therefore, a secure place should be provided for carcases to be stored away from the farm premises. Other vehicles (those of livestock dealers, inseminators, etc) should not move onto the farm or have access to the animals.

● **Installation of sanitary barriers and biosecurity on site:**
It should be emphasised that attention should be paid to cleansing the area just in front of the entrances, cleansing and disinfection of water supply installations, disinfection of entrances and drainage around the barns, as well as their drying during the depopulation period.

● **Immediately after disinfection, any recontamination should be avoided by:**
• Providing foot dips at entrances.
• Providing a functional washbasin and a foot dip (or an outdoor tap) for visitors, and clean boots and dedicated clothing in each of the barns.
• Cleansing and disinfecting the tractors and trailers used for manure removal.

● **Limitation of contaminant spread inside the livestock farm**
Animals at risk should be protected and isolated. Neonates are a priority and being born in a calving box limits the infection. They should remain isolated from the older calves: placing them in an individual box until they are two weeks old is the best solution, and then they should be collected in small groups of the same age in individual boxes.

If it is not possible to provide individual accommodation, the isolation of calves of up to three days of age in a well-isolated nursery with its own equipment (foot dip, special clothing) is a good measure.

● **Strict rules of hygiene and management of the rearing process should be administered:**
• Cleansing of the barns (collecting the litter and cleaning).
• Disinfection of the barns with a disinfectant with oocysticidal, bactericidal, fungicidal and virucidal activity (Prophyl S).
• Regular disinfection of the used equipment (boots, clothes, small equipment) by means of spraying or soaking.
• If the animals are reared by the same person, then the diseased should be looked after last to avoid spread.

● **Depopulation period:**
The stage of disinfection should be followed by a depopulation period during which any presence of animals in the disinfected barn should be excluded. This period allows for the disinfectant to continue its action and especially, for the soil and the floor to dry.

In cattle breeding, these attempts to disinfect are made when the animals are brought out to pasture, so that the depopulation period is as long as possible.

Raising animal defences

Early intake of a quality colostrum is essential. It allows the strengthening of defences of calves through the intake of maternal antibodies from the dam. Specific protection may be transmitted by vaccinated mothers against viruses (rota, corona) and certain strains of E. coli. There is, to date, no vaccine against cryptosporidiosis but it is important to note that, after an infection, the recovered animals are immune.

Therapy

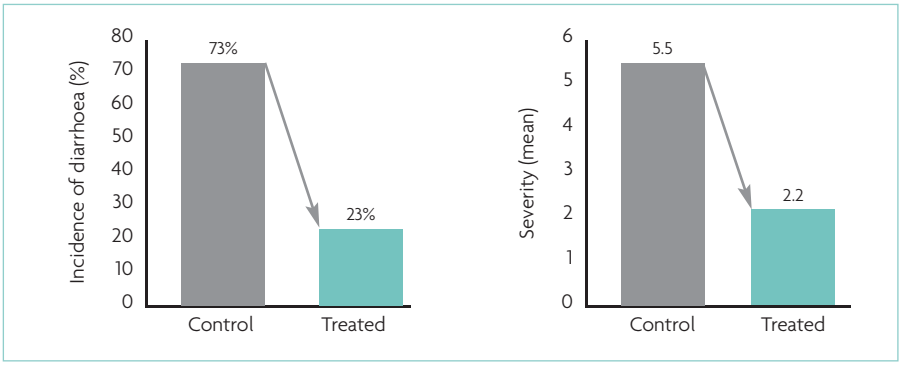
Therapeutic agents and treatment strategies for cryptosporidiosis have been pursued for over 40 years since cryptosporidium was first identified in humans.

Several molecules have been evaluated but, up to now, only two have been assessed with satisfactory results in veterinary medicine: halofuginone and paromomycin sulphate.

The suitability of the prophylactic use of halofuginone lactate (Stenorol Crypto) to reduce oocyst excretion is consistent but concerning diarrhoea-treatment, only Paromomycin sulphate (Parofor Crypto) shows efficacy. Parofor Crypto was successfully used in calves where it reduced the incidence and severity of diarrhoea. ■

References are available from the author on request

Fig. 2. Study in a dairy farm in Germany with a confirmed history of cryptosporidiosis. Paromomycin 20% oral solution (Parofor Crypto) was administered orally at a dosage of 50mg/kg once per day for seven consecutive days in the treated group.



Productivity on the farm starts deep within the digestive system. And while many factors can impact a cow's rumen health, Novus researchers have identified a unique combination of essential oils to help improve rumen fermentation and better utilize nutrients.

These foundational improvements become obvious in the form of higher milk volume and better-quality meat.

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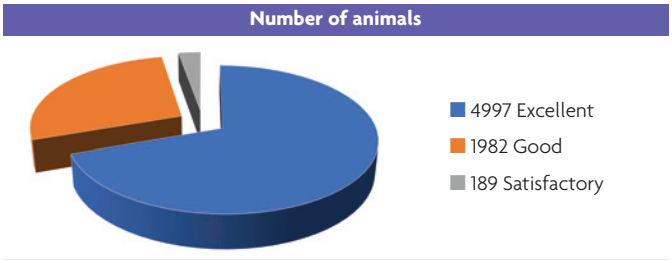
Optionsfor ketosis control



Multicentre trial conducted by 299 veterinarians in 7,168 animals for anorexia and inappetence. Supplementation of MeboLiv AFS resulted in restoration of appetite in 97% cases by enhancing production of digestive enzymes.

Reduce the risk of ketosis in high-yielding dairy cows

The high milk yield that is required by today's dairy cows places great demands on energy metabolism to meet the high demand for energy through feeding after calving. It is crucial that energy balance, blood sugar levels and appetite are quickly restored.

r2agro.com

Ketoglyk has a high content of absorbable energy, raising the blood glucose level. It has a good palatability and will be eaten by the cow voluntarily, as a dressing on top of the feed. Furthermore, Ketoglyk contains calcium propionate, which provides easily absorbable energy and calcium.

Ketosis can result in big production losses in the form of reduced milk yield, metritis, displaced abomasum and a subsequent impaired reproduction. Adding Ketoglyk helps to reduce that risk.

Ketoglyk is a complementary feed for dairy cows based on the concept of adding easily absorbed energy in the first weeks after calving to reduce the risk of ketosis and weight loss.

A novel approach to reducing ketosis and hypocalcaemia

A strong relationship between hypocalcaemia and ketosis has been demonstrated in various papers. Recently confirmed in six commercial farms, cows showing sign of hypocalcaemia [Ca]<2.15 mmol/L had a 5.5 times higher probability of ketosis than normo-calcaemic cows – independent of parity.

vilofoss.com

Older studies found the relationship between hypocalcaemia and ketosis to be as high as 8.9 times. Hypercalcaemia is therefore one of the major causes of ketosis.

It is consequently also expected that reducing hypocalcaemia reduces ketosis.

X-Zelit is a product that can be supplemented in the close-up cows' feed. It mimics the low calcium approach and thus primes the cows' calcium absorption mechanism in the periparturient period.

One of the first things farmers using X-Zelit observe is a lower incidence of ketosis. This is probably driven by a higher feed intake in fresh cows having received X-Zelit in the prepartum period.

To determine if the ketosis is due to hypocalcaemia, Vilofoss suggest supplementing X-Zelit for a period and observe how it reduces the ketosis incidence.

Management of ketosis in lactating dairy cattle

Ketosis is a metabolic disorder and a state of severe negative energy balance in cows during the early post-calving period.

indianherbs.org

Peri-parturient cows cannot consume enough dry matter to meet their body maintenance requirements and the increased nutrient demands of the udder. As a result, the cow must mobilise body fat and protein to meet these requirements in order to maintain a high level of milk production.

Reducing severity and duration of negative energy balance is crucial to prevent ketosis. This can be achieved by supplementation of metabolic stimulant and regularisation of hepatic metabolism of nutrients.

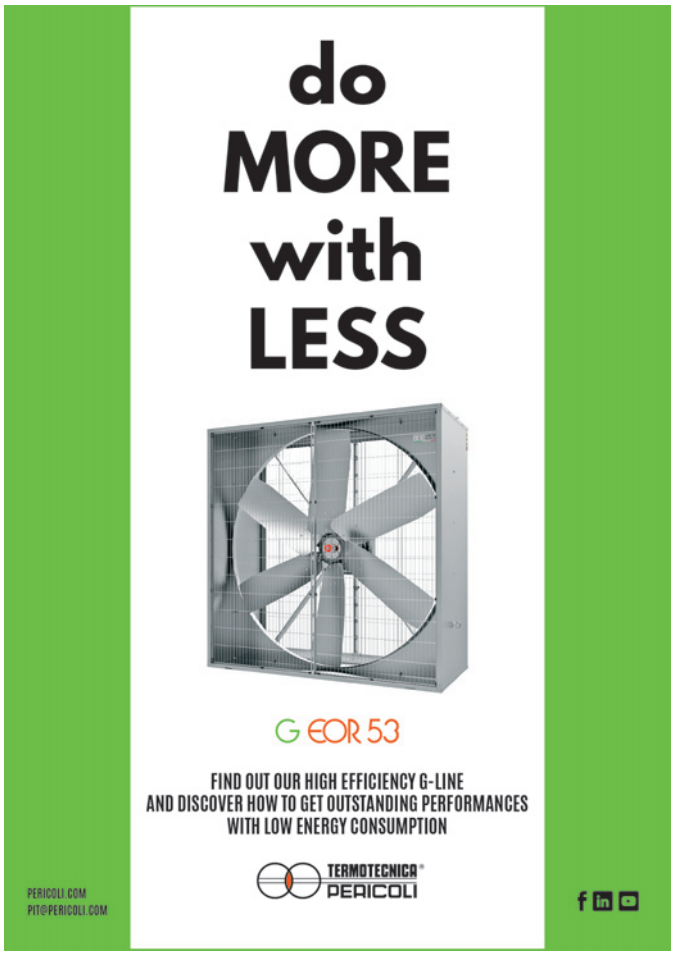
MeboLiv AFS is a phytogenic metabolic stimulant, liver tonic and production optimiser. MeboLiv AFS helps improve gluconeogenesis so as to restore energy deficit, to correct negative energy balance and to minimise the incidence of ketosis.

MeboLiv AFS supplementation increases production of VFAs, it helps in the orchestration of energy metabolism in early lactation and to achieve improved health, milk production and fertility.

Supplementation of MeboLiv AFS for six weeks during the pre-calving period and six weeks during the post-calving period helps to prevent impaired metabolism, optimises availability of glucose for maximising milk production and avoids energy deficit/ketosis.

Table 1. Studies on the effect of MeboLiv AFS in prevention of ketosis in cows with hepatic insufficiency (Amin & Chakrabarti, March, 2000. Phytomedica, Vol 21 (1 & 2), 49-60).

Group 1: Seven pre-calving ketotic cows supplemented. MeboLiv (30ml once daily x 14 days)	Six cows out of seven showed clinical improvement after 14 days of treatment. Cows did not show any ketotic feature up to two weeks of post-calving when treated with MeboLiv AFS, no recurrence observed.
Group 2: Seven pre-calving ketotic cows supplemented. Propylene glycol (100ml bd x 14 days)	Clinical signs of ketosis and ketonuria observed in three out of seven cows after treatment with propylene glycol within one week post treatment.



Optionsfor

The perfect solution for controlling ketosis in dairy cows

Ketosis is one of the costliest metabolic disorders and occurs commonly due to a lack of sufficient glucose precursors for energy production or from a reduced gluconeogenic capacity of the liver.

livisto.global

An early measurement of ketone bodies, together with good supportive management consisting of providing glucose precursors and a boost of energy (phosphorus supply), are essential for a good recovery of the cows into their normal energy balance and performance.

Vigophos from Livisto is a combination of butafosfan (organic phosphorus) and cyanocobalamin (vitamin B12) that assures the restoration of the energy balance of the cows and reduces the presence of metabolic diseases related to ketosis.

The administration of 5ml/100kg bw/day of Vigophos (equivalent to 25ml/cow/day) has the following beneficial effects:

- Improvement of the metabolism status with a decrease in NEFAs and BHB levels.
- Reduction of the odds of developing subclinical ketosis.
- Reduction of developing other metabolic diseases associated with ketosis (displaced abomasum, post-partum problems).
- Increase of milk production by increasing the availability of glucose in the mammary gland.
- Increased appetite, thanks to the anorexigenic action of cyanoco-balamin.

Providing essential microbial support to livestock

For 30 years, Chr. Hansen has been working with probiotics for animals. The bacteria in their Bovamine Dairy probiotic and multi-species probiotic have long histories of providing essential microbial support to livestock. Now, these products have been taken to the next level with Bovamine Dairy Plus.

chr-hansen.com

Bovamine Dairy Plus takes the best of both products and offers four species of beneficial bacteria: unique strains of Lactobacillus animalis, Propionibacterium freudenreichii, Bacillus subtilis, and Bacillus licheniformis. This combination of organisms provides digestive support and overall gastrointestinal (GI) tract stability.

Daily feeding of an effective probiotic is an excellent choice to ensure that dairy cattle function normally, that is, to produce milk, to grow calves, and to defend themselves from stressful things in their environment.

All of that starts with their capacity to get nutrients from their feed, to absorb those nutrients throughout a healthy digestive system, and to reduce the energy-robbing, milk-reducing impact of challenges to their GI tract.

The four strains used in Bovamine Dairy Plus are the most extensively-researched animal probiotic strains.

More than 700 research trials have been conducted, and more than 100 abstracts and 65 peer-reviewed articles have been published.

Optimise performance and health with supplemental methionine

During episodes of negative energy balance, such as transition and early lactation, ketosis is a common disease. Fortifying the metabolisable methionine content of diets with rumen-protected methionine products such as Smartamine M or MetaSmart helps support the onset of lactation by mitigating common metabolic health challenges such as ketosis.

adisseo.com

A review by McArt et al. reported that the incidence of subclinical ketosis during early lactation affected 40-60% of cows with the incidence of clinical ketosis as high as 15%.

Ketosis is often associated with other post-partum diseases, a decrease in milk yield, and poorer reproductive performance.

The estimated cost of subclinical ketosis is $67 USD per case per year. With clinical ketosis, the cost climbs to an estimated $232 USD per case per year.

Feeding rumen-protected methionine sources pre- and post-partum has been shown to positively impact dry matter intake, milk and components, and metabolic health with a lower incidence of ketosis

This sets cows up for healthy and profitable lactations. Typical feeding guidelines are 5g of supplemental methionine in the close-up ration and 8-10g immediately postpartum.

Increase fresh cow feed intake to prevent ketosis

BIO-CHLOR from Arm & Hammer Animal and Food Production is a consistently formulated, palatable anion source that delivers the negative DCAD required to support postpartum dry matter intake and prevent ketosis.

ahfoodchain.com.

Fresh cows are often at risk of ketosis, a common metabolic disorder stemming from negative energy balance. As cows mobilise body fat for early lactation milk production, ketone bodies are produced as metabolites. Cows normally use ketone bodies as energy sources.

However, excessive levels in the blood can lead to subclinical or clinical ketosis, causing off-feed, lethargy and low milk production. Ketosis also compromises peak milk and reproductive function. Research shows dairy producers can reduce the incidence and severity of postpartum ketosis by encouraging dry matter intake.

A proven method of increasing feed intake in early lactation is to feed cows a prepartum diet with negative dietary cation-anion difference (DCAD). BIO-CHLOR delivers negative DCAD and metabolisable protein (MP) to maintain transition cow health while boosting start-up milk.

Several trials demonstrate that feeding BIO-CHLOR prepartum prevents ketosis by reducing the level of blood ketones postpartum.

Feeding rates vary depending on the amount required to meet the desired negative DCAD level.

A stable rumen environment is critical for the dairy cow

A stable rumen environment is critical for the health and performance of the dairy cow. This stability promotes the growth and activity of fibre-digesting microbes, which are key to the functioning of the rumen and provision of energy for body condition, pregnancy and lactation.

alltech.com

After calving, dry matter intake lags and animals mobilise body reserves to try to keep up with the additional demand for energy. This leads to a negative energy balance (NEB), which can lead to conditions such as ketosis and can have adverse implications for the health of the cow. Improving rumen function can increase energy released from the diet and help to reduce NEB.

Many factors can impair the stability of the rumen and nutrient supply to the beneficial microbes within it and, while the basic rules of feeding apply, feeding a specific strain of Saccharomyces cerevisiae (Yea-Sacc, Alltech Inc) can aid in helping desirable, fibre-digesting microbes to proliferate and efficiently colonise feed particles, resulting in lower rumen lactate concentrations and higher overall pH.

Optimise the cow's metabolism with bioavailable choline

A typical metabolic disorder in transition dairy cows is ketosis. Incomplete oxidation of NEFA in the liver results in the formation of ketones (for example BHBA), which will appear in the blood, and also in urine and milk.

orffa.com

High ketone levels result in clinical disease but when ketone levels are only slightly elevated, subclinical ketosis results in reduced milk yield with economically important production losses.

Prevalence of (subclinical) ketosis, can be reduced with the preventive use of protected choline chloride, reducing costs caused by this metabolic disease.

Choline is important in the synthesis of VLDL and for the methylation of other compounds, such as carnitine.

A good choline supply is required for the export of fats from the liver and for a good working of the liver in general. Choline production might be inadequate, and administration of bioavailable choline can optimise metabolism.

Because rumen microbiota degrades all unprotected choline chloride, good protection is needed to ensure bioavailability.

Supplementary good rumen protected choline chloride (Excential Rumenpass CH, Orffa) prevents metabolic disorders like ketosis, reduces blood and milk ketone levels and increases milk yields.

In nutritional strategies to lower problems in transition cows, this product certainly deserves its place.

Restoring the energy balance and stimulating the appetite

Early lactation is a difficult period for dairy cows while they transition from the demands of late gestation to those of early lactation.

tecnozoo.it

Those unable to adapt to this period of negative energy balance can experience metabolic disorders known as ketosis or subclinical ketosis. This means a decrease in appetite, weight loss, and a decrease in milk production.

The economic losses due to ketosis and subclinical ketosis are very severe, so it is important to intervene rapidly to restore the energy balance and stimulate the appetite of the animal.

Tecnozoo's products to support dairy cows in this delicate period include:

- **Energy Metabolic Bolo**

Complementary feed in bolus form to provide energy very quickly and stimulate the appetite.

- **Mix Ferment EnergyG**

Liquid complementary feed containing lactic acid and probiotics to stimulate the appetite and to increase the ingestion of dry matter. It also contains propylene glycol to be antiketogenic by increasing plasma glucose concentrations.

- **Energy Drink A+B**

Drench to provide readily available energy sources and oligo-elements to restore the negative energy balance. It contains probiotics to increase the digestibility of the diet and dry matter intake.

- **Chetostop**

This combines the beneficial effects of adding probiotics with the addition of vitamin components, choline and carnitine to support the energy metabolism of the animal and to improve liver activity, thanks to lipolytic function.

Helping the just-calved cow to meet its energy requirements

Phodé considers 'Better-Being' in animal farming as the cornerstone to optimum performance. Helping the just-calved cow to meet its energy requirement in early lactation is part of the Better-Being way, a step forward to improve animal welfare. Indeed one of the pillars is to keep the animal in good health.

phode.com

The lack of energy supply through voluntary consumption of feed is well-known and leads to ketosis. Phodé proposes Glytran, a sensorial feed additive rich in USP-food grade glycerin. This free-flowing powder highly concentrated in guaranteed purity of glucose precursor is fed 21 days before calving up to 21-30 days of lactation within the TMR or in the top-dressing. Higher blood glucose and lower urine ketone contents were significantly observed in cows fed Glytran compared to the control in a trial at Penn State University.

In addition, milk yield tended to be higher (52 vs 46kg/d on week six of lactation) in Glytran-fed cows after the supplementation for three weeks post-partum.

This suggests a beneficial effect on long-term lactation performance.

In another study, an effect on fecundity performance was also observed. Glytran shows that the Better-Being way at a critical stage, such as peri-partum, succeeds in achieving improved performance.

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Application of feeding strategies with automated systems

There is an undeniable connection between cow milk production performance and feeding strategies. Parameters such as feed frequency, animal grouping, feed and mixing quality will make the difference between achieving average production and having an exceptional herd.

by Carolina Hennings, Product Manager for Automated Feeding Systems, GEA. www.gea.com

This article looks at how feeding automation on a farm can help producers to implement their desired feeding strategies to achieve their production goals.

Farms equipped with an automated feeding system would classically have the following elements:

- A kitchen area where bunkers, auger, mineral and other containers are placed. The mixing process takes place in a stationary mixer or inside the feeding wagon. The feeding wagon has the main task of transporting the mixed feed to the different animal groups.
- Depending on the size and logistics of the farm, a feeding system configuration is selected.
- The feeding process is controlled by a central process control where all the necessary information to apply the desired feed strategy is stored. The information such as feedstuff, rations, feeding groups, locations and feed frequency is introduced by the user in the feed management software. This action takes place every day in the same manner.

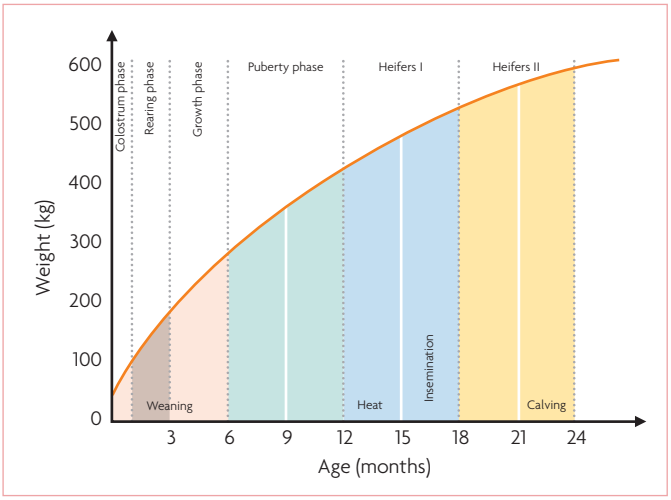
Different areas can be improved with implementation of automation in the feeding strategies.

Heifer feed management

Heifers are the cows of the future. In the past, research has shown that feed management has an impact on lifetime productivity. According to a study from Gardner, Smith and Park animals fed with a precision feeding plan grew faster compared to a control group. This was reflected in 22.2 months at the time of calving versus 24.6 months in the control group. A parallel study showed that the investments in a ration and forage plus supplementation cost were similar.

The implementation of precision feeding practices requires significant resources in terms of feed, time and installations and represents 50% of the cost of breeding a heifer and the larger investment will not return until the time of calving.

Fig. 1. Expected growth rate of young stock.



Animal grouping for optimal performance

Depending on the size of the farm the animals can be divided into different groups according to their nutritional needs. In a conventional setting the number of groups has a direct relationship with the amount of working hours since each group will receive their own ration. The more groups a farm has, the more time it will take to feed the animals.

This context makes animal grouping an impractical strategy when feeding conventionally. On the other hand, with an automated feeding system, the labour factor is minimised to filling up the equipment in the kitchen.

Accordingly, in GEA's experience, this task takes approximately 30 minutes regardless of how many groups the user has.

This allows the user to divide the animals into different lactation stages, dry cows and young stock groups.

All the groups get their own feeding plan. This allows the cows in production to achieve their milk production targets, dry cows to prepare for the next lactation and heifers to grow at their expected rates.

According to Penn State University it is recommended that heifer groups have a similar age and maximum weight variation of 90kg before breeding. After breeding the variation can be increased up to 136kg between the animals per group.

On this subject, the GEA automated feeding system is designed to prepare small mix batches that facilitates feeding the different groups.

Frequent feeding promotes feed intake, rumen health and reduces animal competition

Another recommended feeding strategy is to increase the number of times that the animals are fed during the day.

As a ruminant, the cow needs to be able to provide a good environment for the rumen's micro-organisms.

The ideal pH in the rumen is around 5.5/6.0. Ruminal micro-organisms do not adapt well to changes in the pH level and an efficient way to maintain the pH in the rumen is to provide feed all day long.

Continued on page 20

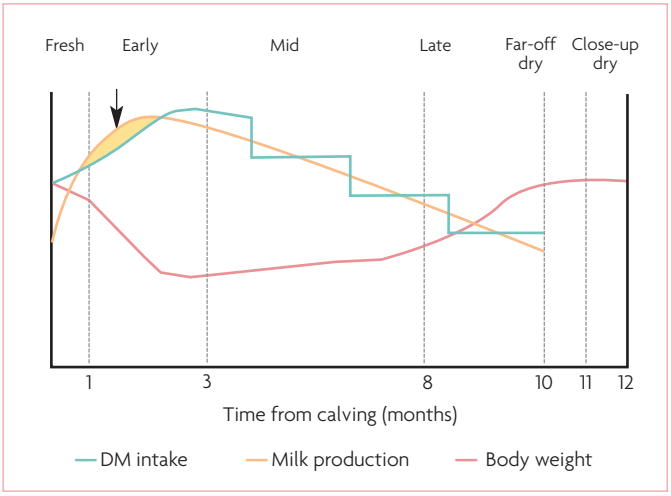


Fig. 2. Lactation curve, dry matter intake and body weight during the lactation phase.

Continued from page 19

Cows also have a tendency to sort against low particles, therefore eating an unbalanced diet that will negatively influence the rumen pH. Several papers show that increasing the frequency of feeding will reduce the variation of pH during the day.

Once the mix ration is distributed to the animals the degradation of the nutritional value starts.

In addition, the cows that do not have access to the feed bunk at delivery time will not be able to maintain a proper feed and nutrient intake, and will not be able to maintain their production. It is a common practice to push-up the feed to allow all the cows to have access but this will not ensure the quality of the ration provided to the cows.

According to DeVries et al, 2009, cows had more equal access to feed throughout the day when the ration was distributed more frequently.

Lower ranked cows were also not moved as much and as often meaning that they were able to feed more often and have better access to feed. Cows also tend to distribute their feeding time more evenly during the day when fed more frequently.

As mentioned previously, in a conventional setting this would be a labour intensive activity. When feeding automation is implemented in the farm the feed frequency is going to be limited to the number of animals in a group. The aim is to get enough volume in a mixing batch to have a homogeneous mix.

Feed quality and good mixing

Feed preservation in a conventional setting is a challenging topic due to the fact that a mixed ration will be exposed to temperature and air for hours increasing the feeding degradation, especially during the summertime.

As soon as the forage is taken out of the silo, degradation starts. This process can be slowed down when feed is stored in an intermediate container such as a bunker.

Then the feedstuff will be mixed as needed during the day. In this context, having a kitchen area provides a significant advantage.

The quality of the mixing is going to determine whether the cows ingest the correct amount and proportion of nutrients for milk production, reproduction and health. Using an automated feeding system provides great flexibility to the user on how to mix the feedstuff considering the quality of the cut, preferred order and mixing one or more times in a batch.

To optimise and speed up the mixing process, it is recommended that the forage is cut in the field.

In addition, the order the feedstuff is added to the ration will help with good mixing. As common practice, GEA automated feeding users mix in the following order:

- Dry forages.
- Grains.
- Concentrates.
- Minerals and vitamins.
- Ensiled forages.
- Molasses and water at the end.

Use of reports to improve feeding practices

Depending on the farm setting as TMR, PMR or PMR and grazing the user has different key performance indicators.

One of the main advantages of an automated feeding system for implementing a feeding strategy is the recording of the activities. In this sense, the daily activities such as amount of feed distribution per group, mixing time and feed consumption will be reported for later analysis.

This information, combined with the milk production reports and/or weight gain reports from the heifers, provides feed efficiency information that can be used to do real time changes in the feeding plan.

Finally, feeding automation applied to the complete herd provides feed consistency, precision and substantial labour savings according to your feeding strategy. ■

References are available from the author on request

Plant extracts promote growth and rumen development in calves

Calves are the future of the herd and, in dairy production, a newborn calf is the result of a genetic improvement within a dairy cow lineage. To get the best out of the genetic improvement and ensure the future of your dairy herd, it is important to pay attention to the critical first weeks of life.

by Sébastien Constantin, Bioactives Business Development Manager, and Gabriela Acetoze, Ruminant Technical Manager, Pancosma, Switzerland.
www.pancosma.com

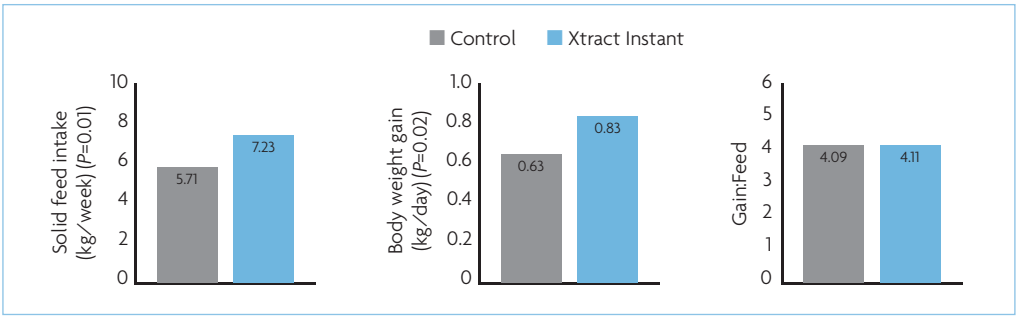


Fig. 2. Calves supplemented with plant extracts show increased average daily weight gain and higher feed intake.

Under current husbandry conditions, calves experience many stress factors during their first weeks of life, such as separation from the mother, dietary changes, transportation and exposure to a variety of infectious agents. Diarrhoea is the main cause of mortality in the first 30 days of age, followed by respiratory diseases, mainly pneumonia (National Animal Health Monitoring System 2016).

As a consequence of these challenging situations, animals reduce their intake and their growth is negatively impacted due to a decrease in nutrient absorption. Moreover, medication costs lead to additional economic losses.

During this challenging period, the animal's immune system is weakened, the gut barrier function may be impaired and the microbial gut flora imbalanced. Until now, antimicrobial growth promoters (AGPs) were largely used to protect calves against these challenges. However, many countries have banned the use of antibiotics as AGPs to prevent the occurrence of bacteria resistance and to ensure the future efficacy of veterinary and human medicine. Therefore, finding alternatives to AGPs is necessary to secure the optimal growth and health of neonatal calves.

Plant extracts as an alternative to AGPs

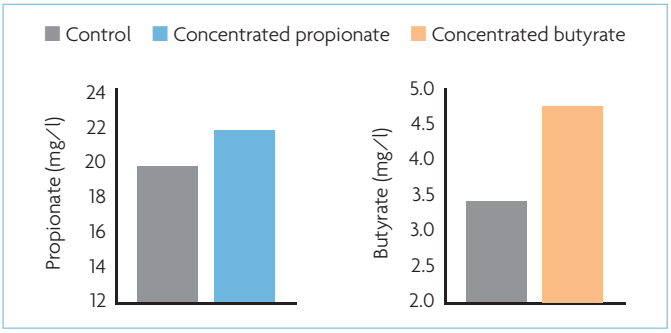
As a new alternative to AGPs, plant extracts have been shown to preserve gut integrity and improve animal resilience. They can trigger specific receptors inducing a host response.

Pancosma, an internationally-renowned Swiss company and pioneer in the development of products based on plant extracts, has identified a blend of compounds made from cinnamon, oregano and chili peppers that has beneficial properties for improving feed intake and digestion.

For newborn calves, their management during early life can have long term effects on the lactation performance of dairy cows.

Dairy calves are weaned when reaching 13% of their mature bodyweight, approximately around eight weeks of age. During this specific period, however, feed efficiency should not be the main focus; parameters such as bodyweight gain, feed intake and rumen development will be key to determining the success of the herd later on. Supplementation with plant extracts can be provided using milk replacers but also in the starter feed for the transition from liquid to solid feed.

Fig. 1. Ruminal concentration of volatile fatty acids (VFAs).



Improved performance and supported feed intake

A study was performed in Germany to test the effect on performance and the rumen parameters of weaning calves by adding a blend of compounds made from cinnamon, oregano and chili peppers to the milk replacer and starter feed.

Calves fed with plant extracts demonstrated an increase in final bodyweight of 4.3kg when compared to the control ($P<0.1$). In the same study, results showed a significantly higher concentrate intake (+26.4%; $P<0.05$) for the entire duration of the trial. Moreover, calves fed with plant extracts had a higher ruminal concentration of propionate and butyrate of +10.3% and +39.0% respectively (see Fig. 1). The ruminal concentration of acetate was similar between the two groups.

Propionate and butyrate are known to be promoters of rumen papillae development. This suggests that calves supplemented with a blend of compounds from cinnamon, oregano and chili peppers are more prone to earlier rumen development.

A second experiment was conducted to assess the effect of a blend of compounds made from cinnamon, oregano and chili peppers on the performance of milk-fed calves. Plant extracts were added to milk replacers. Calves that were supplemented with plant extracts showed increased average daily weight gain and higher feed intake (Fig. 2) compared to calves in the control group. Feed efficiency was not affected by treatment.

Conclusion

Heifer calves are the future of the performance of the dairy herd and so it is important to pay special attention to ensure optimal growth performance and health status.

AGPs are currently used to protect calves from digestive and respiratory diseases. However, plant extracts may represent a safe alternative to AGPs. Supplementation with plant extracts may lead to an increase in average daily weight gain, which also has implications in decreasing animal rearing costs. In addition, the increase in starter feed intake may enhance rumen development and subsequent overall animal performance. ■

Biosecurity: principles, fundamentals and structure

Biosecurity is a general term that includes three major aspects: bio-exclusion, the prevention of any outside agent from entering a production animal operation; bio-management, the activities implemented to prevent agents from spreading within a facility (including the use of vaccines); and bio-containment, the protocols that prevent bacteria and viruses from spreading outside of the facility, even when their presence is unknown.

Bio-containment is probably the most difficult aspect to implement, and the one that is most often forgotten (Fig. 1).

by Dr Ricardo Munoz, Neogen Europe. www.neogen.com/uk

The first component of cleaning is the chemical action, which is the product being and its chemical effect on the surfaces and the environment used (detergents and disinfectants). The second is the time taken to clean, which allows the chemical to have more exposure to the surface being cleaned. The third is the mechanical action, which is the product surface contact and penetration as well as the forces applied for its incorporation and distribution or coverage.

The fourth component is the temperature of the water. Warm water will enhance the strength of surfactants, allowing the chemical and mechanical actions to be more effective in reducing the presence of biofilm. Finally, the quality of water used has an effect, depending on the water's own hardness and/or bacterial contamination (Fig. 2).

The final objective of a biosecurity programme should be to achieve lower to zero economical losses due to infectious disease exposure or spread within a population.

The disease(s) to list as a priority will depend on the local/regional endemic status and risk factors associated to the operations.

Biosecurity is integrated with three major components (Fig. 3). The first is the network of physical barriers and other lines of separation defined based on work flow, production flow, animal ages, susceptibility risk assessment and animals in need of quarantine, etc.

The second component is the range of cleaners, disinfectants and other products used to reduce any potential biological threat to the production facility.

The third is the use of logic and common sense. We need to keep in mind the bigger picture regarding the final objective, which is not usually included in written protocols.

Protocols are not always adapted to changing conditions when a production unit faces unique circumstances.

Biofilm and organic matter

One of the biggest challenges to biosecurity is the presence of biofilm and organic matter. These could become the substrate for bacteria growth and the development of microbiological challenges. Biofilm is the number one risk because it cannot be seen.

Biofilm accumulation becomes critical when it limits the effect that disinfectants have on a surface. Dry cleaning takes out dust and gross organic matter, and then a wet cleaning removes more organic matter and the biofilm.

If the biofilm is allowed to remain, it negatively impacts the performance of disinfectants, allowing surfaces (such as farrowing crate panels and the plastic surfaces on hatcheries) to become future challenges.

Biofilm is a layer made of polymeric extracellular secretion and micro-organisms that coats a surface. It occurs in an animal production environment due to, for instance, secretions accumulating on a matrix layer over time.

It acts as a mechanical barrier that lessens the effectiveness of disinfectants. Acid cleaners have the ability to penetrate the layer of slime, so disinfectants could be more efficient and demonstrate better effect on surfaces that have been prepared for disinfection.

Cleaning is the most important step. Before disinfection, we need to do the best dry and wet cleaning in order to reduce 90% of organic contamination and biofilm that could lessen the impact of any disinfectant.

The difference between sanitation and disinfection results over an inner hard surface is the amount of bacteria or viruses reduction that one could achieve.

These results are expressed in logarithmic (logs) values. Sanitation reduces microbiological material by 99% (2 logs), and disinfection reduces it by 99.99% (4 logs). After a good dry and wet cleaning, we finalise the process with a disinfectant in order to achieve the best decontamination possible in animal production facilities.

Further challenges

Another one of the biggest challenges comes from the surface types being cleaned. Some surfaces are more continuous, with less porosity and are more easily affected by cleaners and disinfectants. Another challenge is presented by water with a high content of minerals, such as manganese, iron and calcium, adding deposits of salt.

The mineral content of the water may interact negatively with the chemistry of products. Yet another challenge comes with the delivery of the cleaning product itself: proper equipment and correct pressure.

These aspects and others, such as droplet size and coverage area, are easy to evaluate and to adjust as needed. Besides using a suitable cleaning product, we need to have a reliable mechanical programme in place: one that uses the appropriate equipment and trained personnel to facilitate the incorporation of the chemistry into the surface.

Viruses and bacteria have different levels of sensitivity or resistance to

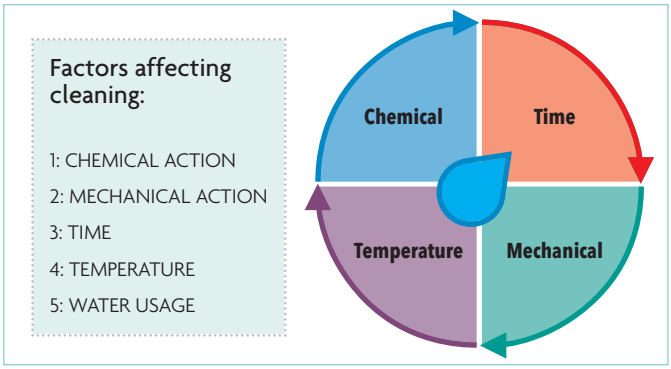
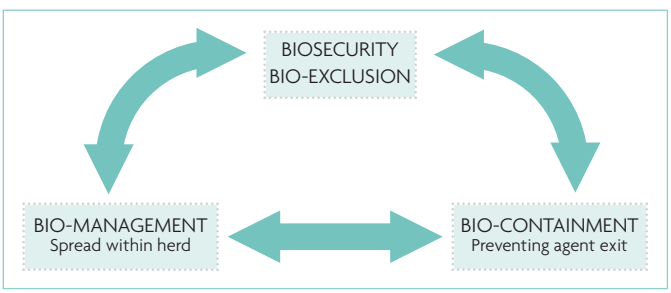


Fig. 2. The five components affecting cleaning (Dr Herbert Sinner).

Fig. 1. Three major aspects of biosecurity (Dr Butch Baker and Dr Tim Snider).



cleaners and disinfectants. Viruses with lipid envelopes are more sensitive, because they can be destroyed with the action of their surfactants of their detergents.

Gram-positive bacteria are more sensitive than Gram-negative bacteria, which have a structure that is naturally more resistant to disinfectants. Endospores and mycobacteria are also more resistant.

Peptidoglycan is one of the wall cell components of bacteria. This component is easily affected by disinfectants. Gram-positive bacteria are more easily destroyed because 90% of the dry weight of its cell wall is peptidoglycan, compared with Gram-negative bacteria which is just 10%. Disinfection is easier against Gram-positive bacteria.

Viruses can have two different types of external structures. Some are lipid, which means they are more susceptible to disinfectants. Other viruses are considered 'naked' and are more resistant. One example comes from viruses in swine and poultry that are more resistant, like circovirus. These viruses become more prevalent in production systems.

The Environmental Protective Agency (EPA) is the organisation that regulates and sets disinfection standards for bacteria. If you want to have any claim of activity that you are trying to address with a disinfectant, you need to achieve a reduction of 6 log of a specific bacteria. For viruses, the number needs to be 4 log, and the number is a minimum of 3 log for cystic forms.

Structure

We have addressed the surfaces of the entire production facility, but we should not forget about water lines inside the buildings, which are sometimes more than 10-15 years old. The extra challenge of biofilm, and other accumulations that can affect the quality and taste of water, can be found inside the water lines.

This potentially reduces optimum water consumption in animals. When water consumption is optimal, it assures better feed conversion for the herd.

Water line accumulation, and the byproducts formed by it, also pose a risk because they can lead to bacterial contamination in the farm and also the pressure for water access. Water intake is an important part of production. We need to remember that production animals should drink water at least twice the volume of the feed they eat.

If access to water is limited on a farm because of the quality of the water's taste or the bacteria contamination the animals' feed conversion is affected, limiting genetic production. If water lines are not cleaned appropriately, it may limit production performance because of potential bacteria contamination. Biosecurity does not stop at visible hard surfaces, but continues into water lines that are not disinfected by application of standard surface disinfectants.

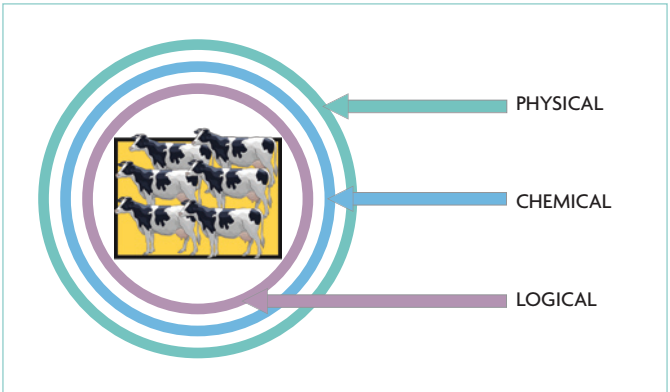


Fig. 3. Three major components of biosecurity (Dr Gregory Martin, Pennsylvania State University).

Five steps to cleaning and disinfection

When we talk about taking proper steps to clean, we need to talk about the first five steps in the process of cleaning and disinfection.

The cleaning section is the first major critical component. We dry clean to remove organic matter and minimise dust. Then, before applying detergent, we presoak the surface. Without the appropriate level of surface humidity, we cannot obtain better efficacy of the wetting agents in the detergent formulation.

We never go into the shower and apply soap and shampoo before turning the water on, so the same common sense and logic applies. When cleaning, we need to presoak and then descale, taking out the accumulation of the scale.

The next step is to rinse and remove the detergent. Sometimes an additional rinsing and second application of detergent are necessary (combining acid first, then alkaline).

After that, the next step is to dry the surface, allowing for a natural air dry, so that the surface does not retain any water that can affect the dilution of the disinfectant; and the final step is to disinfect.

The heavy work of cleaning has been done first, removing at least 90% of contamination. Disinfection is important, but it is only the cap on the entire cleaning and disinfection process.

A quick hygiene evaluation of any critical surfaces, with the purpose of verifying how well the cleaning process was performed, is possible with the use of AccuPoint Advanced to measure adenosine triphosphate (ATP).

Before applying disinfectant, you can use AccuPoint Advanced to evaluate how well the surface is prepared for disinfection, allowing for the maximum virus and bacteria elimination; efficacy of cleaning.

Monitoring and verification have become one of the key elements to move biosecurity programmes from a descriptive format to a more systematic programme.

In such a programme, protocols could generate metrics rather than just qualitative-descriptive assessments. As other farm processes such as vaccinations and intestinal integrity are evaluated, it is necessary and critical to start implementing numbers behind biosecurity protocols that could be evaluated in a continuous way.

Consistent levels of the main active ingredients in products are something that should be routinely verified to evaluate average/range of chemical concentration through pH strips.

Qualitative or semi-quantitative tests could help to achieve optimum dilutions and approximate end product in PPM at use.

All In All Out systems

There are different types of cleaning and disinfection programmes: the ideal is All In All Out (AIAO). In this type of animal production system once the production cycle finishes, all the animals are removed from the facility. In this way it is possible to remove all the organic matter (dry cleaning) and proceed to the wet cleaning and disinfection.

Following these steps, the organic matter and the biofilm will not interfere with the efficacy of the disinfectants. However, that is not always possible, so there are different approaches, such as Semi-All in All Out for a building, a barn or AIAO room or aerospace. The success of these different scenarios depends on the definition of production flows, people/equipment flow, animal age, etc.

Animal production managers could structure the internal lines of separation with the support of biosecurity tools such as the Danish bench, foot baths, etc, to be able to reduce and eliminate the potential infectious disease exposure and/or spread within the production site (Fig. 4). It is difficult, but it is not impossible, and we can do it with descriptive protocols and monitoring of those protocols. ■

References are available from the author on request

Fig. 4. Biosecurity lines of separation on the farm.

CONCEPTUAL BIOSECURITY:
- Physical separation of production units.

STRUCTURAL BIOSECURITY:
- Design and architecture of each unit based on disease prevention strategies.
- Establishing external (- - -) and internal (- - -) lines of separation.

PROCEDURAL BIOSECURITY:
- Practising biosecurity programme.
- Sanitation and disinfection programmes.
- Continuous education and training.

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Antibiotic resistant Pseudomonas Sp. in fresh milk

Fresh dairy products can be considered a reservoir of Pseudomonas Spp. resistome that is potentially transferable to man. Milk and fresh dairy cheese products represent one of the few hubs where commensal and opportunistic pseudomonads frequently co-habit together with food microbiota and hazard pathogens.

Recent work has highlighted that non-pathogenic strains (Pseudomonas fluorescens and P. putida) are associated with some human diseases but are still poorly considered in comparison to the pathogen P. aeruginosa. In addition, the presence of antibiotic resistance genes, that can be acquired and transmitted by horizontal genetic transfer, further increases their risk.

This Italian review (**Foods 8 372**) starts by considering the physiological traits of these spoilage bacteria from fresh dairy products and aims to shed light on the resistome of these cheese related pseudomonads and their genomic background.

Effect of encapsulated choline chloride on milk performance and feed intake of dairy cows in the transition period

Last year Norel developed a coated (rumen-protected) choline chloride called Bychol. This product was tested in a trial done in the experimental dairy farm Blanca de los Pirineos in the northeast of Spain in a collaborative work with Institute of Agrifood Research and Technology (IRTA). The results were presented at the Virtual Annual Meeting 2020 of the American Dairy Science Association (ADSA).

The aim of this study was to evaluate the effect of dietary supplementation of coated choline chloride (Chol) on the performance of dairy cows in the transition period.

Sixty Holstein cows (606±84kg BW; 21 primiparous (PMC) and 39 multiparous (MPC) cows) were randomly distributed in two groups (n=30) and exposed for 60 days to two treatments following a complete randomised design.

Treatments consisted of supplementation with 60g/d of Chol (CLN) three weeks before and after calving, or no supplementation in the group control (CTR).

Cows were fed a TMR during the dry period (12.2% CP, 57.3% NDF, 1.30 Mcal of NEl/kg; DM basis) and a TMR during the fresh period (15.3% CP, 32.2% NDF, 1.69 Mcal of NEl/kg; DM basis) twice daily. On a daily basis, dry matter intake, milk yield, and milk fat and protein content were determined individually.

Feed intake and milk yield were affected by an interaction (P<0.01) among treatment, week, and parity, which resulted in lower DMI but high milk yield in MPC on CLN compared with MPC on CTR during some days of early lactation.

Milk fat content (%) and yield (kg/d) were affected by an interaction (P<0.01) among treatment, week, and parity, with MPC on CLN having greater milk fat content and yield than MPC on CTR during a few days of early lactation.

Milk protein yield (kg/d) was affected by an interaction (P<0.01) among treatment, week and parity, with MPC on CLN having greater milk protein yield the last week of the trial. As result, ECM was affected by an interaction among treatment, week, and parity.

It was concluded that the supplementation with Bychol during the transition period has potential to improve milk yield, milk fat content, milk fat yield, and ECM, but also decreases DMI during some days during early lactation in MPC, but not in PMC, without affecting feed efficiency.

norel.net

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Brazilian dairy farm Fazenda Trevisan produces and processes their own milk directly for the region; this end-to-end solution is possible thanks to sustainable GEA technology. Right from the start, Osmar and Carmen Trevisan searched for a way to improve efficiency, enhance animal well-being and enable the sustainable processing of animal waste on their dairy farm. Convinced by GEA's holistic solution, the family farm initially invested in a GEA free stall barn including its system technology for intelligent manure management some years ago. The farm's latest project, a new production line for milk processing, guarantees low energy consumption, minimises the carbon footprint and adds a guarantee of origin. GEA was again selected as a partner for this project. With GEA milking technology components and Holstein dairy cattle, the family farm initially produced 1,500 litres of milk a day. The Trevisan farm now produces 13,000 litres of milk daily with a herd numbering 900 animals, with 370 lactation cows at their new location in Farroupilha in the state of Rio Grande do Sul in southern Brazil.

gea.com

Value added soy for newborn calves

Hamlet Protein, a market leader in specialty proteins for young animal nutrition, recently participated in the renowned on-line event series organised by US Soybean Export Council (USSEC). The webinar was aimed at increasing awareness on value added soy protein products among nutritionists. Hamlet Protein speakers addressed young animal nutrition, with a specific focus on ruminants and poultry.

Young animals such as calves need a feed that supports their under-developed digestive system in early life. Just as feed is the single most important factor in animal production, protein is the most important feed ingredient for securing growth. High quality proteins are the key to formulating an easily digestible feed with a minimum of anti-nutritional factors.

The two-day event drew an international group of industry professional and academia. It focused on sustainable soy value added ingredients and presented a broad range of speakers from across the industry.

Christine Brøkner, NPD Manager at Hamlet Protein, presented on 'Value Added Soy Ingredients as High-Quality Protein for Newborn Calves.' Key elements of her presentation included the need to ensure smooth transition from calf to ruminant and stimulate growth; the role of functional fibre products in pre-weaned calf diets and how low anti-nutritional factors (ANF) and allergens are a precondition for effective newborn calves nutrition.

Hamlet Protein produces soy-based protein ingredients for young cattle feed at two production plants in Denmark and the US. The company services customers around the world through a network of own sales offices and distributors.

hamletprotein.com

Adisseo acquires FRAmelco group

Adisseo has signed an agreement to acquire FRAmelco Group, a Dutch feed additive company.

This transaction is part of Adisseo's strategy to boost specialties growth to become one of the worldwide leaders of specialty feed ingredients in animal nutrition.

This acquisition will reinforce Adisseo's position in the promising Health by Nutrition market segment.

FRAmelco Group, a family owned multinational group headquartered in The Netherlands, operates three plants located in The Netherlands, Spain and Thailand.

The business generates gross sales of about €30 million per year.

Most FRAmelco products are made of glycerides (short and medium chain fatty acids) to maintain animals in good health and to improve animal performance, and lysolecithins to improve feed digestibility.

FRAmelco's industrial footprint, its product range, its technologies, the species addressed, and its target markets are highly complementary to Adisseo's.

This acquisition will allow the combined business to implement integrated solutions and offer even more value to customers who want to reduce antibiotic usage and enhance animal resilience.

adisseo.com

New strategic initiative

As the world's population grows, demand for animal protein will continue to rise. Over time, this need for ever-increasing quantities of animal protein, which is already placing tremendous pressure on our planet's finite natural resources, will lead to significant environmental strain, and take our food systems well beyond the planet's boundaries.

The need to provide enough animal protein for a growing population, while reducing the environmental costs of farming will require smart science and innovative solutions. To address this challenge, DSM Animal Nutrition and Health has launched its cutting edge new strategic initiative: We Make it Possible. Its mission is to lead a robust and achievable transformation worldwide in sustainable animal protein production, and to accelerate solutions that will foster a brighter future.

"DSM is purpose-led and performance driven, and we know that the agriculture industry can transform itself from within," DSM's Animal Nutrition and Health President Ivo Lansbergen, told International Dairy Topics.

"For too long, sustainability has been someone else's problem, a problem for tomorrow. But it is not an impossible challenge. We believe we can make animal farming sustainable. Our need is to be providing a decent living for farmers and affordable proteins to the world population, all while reducing the footprint of animal farming. We Make it Possible is a commitment to tangible and actionable solutions that cater to the customers we care most about: people and planet earth.

"Sustainability is in our DNA. We want to demonstrate our new vision, both within DSM and beyond, how we see the future of the farming industry and the role we want to play. This strategic initiative reflects our commitment not only to be part of the value chain but to be a change agent, steering the global conversations, connecting the various stakeholders of the farming ecosystem, thinking ahead, generating ideas and new ways of working. If not now, when?"

Aligned with the UN's Sustainable Development Goals, the strategic initiative is driven by six sustainability platforms that will address the major challenges facing the animal farming industry:

- Improving the lifetime performance of farm animals.
- Improving the quality of food (meat, milk, fish, eggs), while reducing food loss and waste.
- Reducing emissions from livestock.
- Making efficient use of natural resources.
- Reducing the reliance on marine resources.
- Helping tackle anti-microbial resistance.

dsm.com

APPOINTMENTS

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Feed efficiency assessment

A 150 cow dairy farm in Staffordshire, UK, has seen milk yield increase by 225 litres a day following the implementation of key recommendations from an Alltech Navigate feed efficiency assessment.

The Alltech Navigate assessment identified that increasing water trough space per cow could help boost water intake, which in turn would improve feed intake, efficiency and utilisation.

"We have since increased the number of water troughs within our sheds meaning trough space per cow has risen from 6cm to the recommended 10cm, and also moved cows around to achieve a lighter stocking density," Stuart Barrow, told International Dairy Topics.

"I am impressed by the difference we have seen. The suggested changes were all relatively low-cost to implement and milk yields have increased by an average of 1.5 litres per cow per day.

"Milk solids have also increased, which was an unexpected benefit, as often an increase in yield can be associated with a reduction in solids. This will only help with future plans we have for the farm business."

Since Alltech Navigate was launched less than a year ago, more than 20,200 cows have benefited from the pioneering advice service.

Andrew Linscott, Alltech technical sales manager, explains that the assessment is a simple three-step process which firstly looks at the critical pinch points across the whole feed process, before analysing the financial opportunities behind these pinch points, and providing actionable recommendations to better utilise invested inputs.

"We recognise that every farm business is different with its own unique set of challenges and opportunities. We therefore spend at least two hours on-farm carrying out the initial farm assessment, which we can do unaccompanied so farmers can continue with their day, and we will then take farmers through our findings and recommended course of action.

"At Stuart's farm, the increase in milk production to 1.5 litres scales up to £21,352 per year when milk prices are at 26 pence per litre, which is significant.

"Seeing results like this not only assures on-farm production profitability, but also plays a wider role in helping to reduce carbon footprint intensity and improve sustainability."

alltech.com

Aromas for mineral based products

Both minerals and vitamins are considered nutrients, although their function does not involve supplying energy. Minerals are necessary for the physiological growth and maintenance of animals.

If we focus on grazing animals, their mineral intake will depend on the drinking water and the composition of concentrates and forages, which varies at the same time depending on species, soil, climatology, manuring, etc. For this reason, many producers choose to complement their diets with vitamin-mineral supplements to make sure their essential requirements are covered.

The application of aromas is increasing in this kind of product, especially in premixes and mineral blocks for ruminants.

Manufacturers find their products to be perceived as more attractive by both animals and humans when aromas are applied to them. However, they behave as aromatic absorbents due to their composition and producers often struggle with the aroma addition; they fail to achieve the desired smell and intensity in their final products.

With the objective of helping their clients, Norel have recently carried out a series of tests with mineral salts.

The goal was to determine both the products and the inclusion ratio that should be used to guarantee the expected aromatic intensity and duration.

Thanks to these trials Norel are ready to offer a selection of aromas to provide a more attractive profile to mineral products.

In their tests, all selected aromas were able to persist in mineral salts for more than nine months.

norel.net

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The silage must be covered immediately after the structure has been filled. Otherwise, oxygen will penetrate back into the silage, which will impair the fermentation, thus reducing the silage quality. It is always recommended to use an oxygen barrier plastic system.

These systems use plastics which offer a complete barrier to oxygen ingression, which regular plastic sheeting does not. If it is not feasible to use such as system, use a plastic that is at least 5mm thick. Cover the entire bunker and pay particular attention to the slope at the front of the bunker, or around the drive-over piles, as these areas are particularly prone to spoilage.

An oxygen barrier system.

Oxygen barrier systems are typically weighed down using specialised top covers and sandbags and do not require the use of tyres.

When using regular plastic covers, some of which also offer UV protection, tyre-to-tyre placement is a popular way to keep the plastic in place. There has been a move to use truck sidewall tyres as these are heavier. Wrapped bales are also used to weigh down the plastic, but this is not recommended due to safety issues when removing silage from the bunker/silo.

Plastic covers should be inspected regularly. Check the top surface for tears or animal damage and repairs can be made with tape. Ensure edges and seams are weighed down to ensure the plastic is not dislodged in windy conditions.

Tyre-to-tyre placement with a regular plastic cover.

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Livestock farmers are being urged to have a comprehensive understanding of the environmental impact of slurry if the agricultural sector is going to be anywhere near reaching its net zero emissions target by 2040. Andrew Sincock, commercial director at Agriton UK, explains that a proactive approach to slurry management, coupled with the willingness to adopt change, is going to be key in achieving the sector's aspirations. As an example, many dairy farmers will use lime as a bedding powder to help prevent mastitis and other pathogenic diseases. But the reaction between the ammonium in slurry and the lime can lead to the release of large volumes of carbon dioxide and nitrogen. "There is evidence to suggest that 1000kg of lime can react with ammonium in the slurry to release up to 440kg of carbon dioxide, and 280kg of nitrogen, in the form of ammonia," he says. These emission rates are significant. However, they can be reduced by simply using an alternative bedding powder, such as Vulkamin. This is a natural antiseptic that can be used as a direct replacement for lime. It does not react with slurry and acts quickly to raise the pH of the environment killing harmful pathogens and bacteria.

agriton.co.uk

Strong start to 2020

Anpario plc, the international producer and distributor of natural animal feed additives for animal health, nutrition and biosecurity, has seen sales rise 13% to £16.2m in the first half of 2020.

The company saw strong sales growth, particularly in the Americas, Asia and Europe and among its phytogenics and acid-based eubiotic products. Gross profits rose by 20% helped by the contribution from the liquid bottling plant, commissioned in July 2019, enabling the Group to bring previously toll-manufactured products in-house.

"I am delighted with this strong sales and profit performance, the period was extremely challenging as we faced the unprecedented impact of the Covid-19 pandemic," Anpario chief executive Richard Edwards, told International Dairy Topics.

"Looking forward, we will continue the online and direct marketing tactics that produced such a strong first half performance and we remain confident of continuing the profitable development of the Group."

Latin America continued its strong performance with sales growth of 16% compared with the same period last year. Brazil delivered sales growth of 38% driven by strong volumes in Orego-Stim and Salkil.

US growth picked up in the first half delivering a 13% improvement in sales. The agriculture market has been affected by both Covid-19 and the continuing US-China trade dispute. In Asia sales were ahead by 28% compared to the same period last year. This includes China where sales were flat but gross profit advanced 14%.

After a strong performance in the Middle East and Africa, the region saw a decline in sales compared to the same period last year. The Middle East has been severely impacted by the Covid-19 pandemic as a result of cancelled religious celebrations and pilgrimages and a fall in tourism. Anpario has however seen good growth in the region for its pellet binder, Mastercube and also new business gained with its Optomega omega-3 product for dairy cow fertility.

anpario.com

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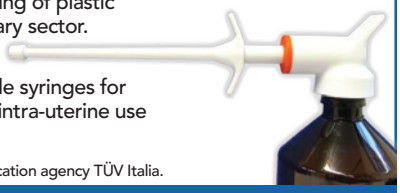

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Sustainable food solutions

Ireland's leading independent manufacturer of animal nutritional feed additives, Inform Nutrition Ireland Ltd, has announced plans to become a world leader in providing sustainable solutions to help combat the global food security challenge and protect the planet for future generations.

The Cork company has launched a Sustainability Policy committing to focus on the research, development and production of 100% traceable green ingredient premixes and additives to feed the animals that will feed the future. Simultaneously they will develop innovative new processes to ensure the least possible harm to the environment.

The plans are being made in response to global food security challenges and the need to reduce agricultural greenhouse gas emissions to fulfil the Paris Agreement.

It is estimated that by 2050, the global food and drinks industry will need to produce 70% more food with less land, water and energy, while simultaneously reducing environmental impacts, including methane emissions, by half.

Inform Nutrition's unique range of existing premixes and feed additives already improve animal health, performance and welfare and support sustainable farming.

The company also recently introduced a new green feed additive, KERVA, to the agri-market. KERVA, which is researched, developed and produced by Inform Nutrition, is the only feed preservative of its kind that is manufactured in Ireland. Not only is it better for the environment because it uses natural ingredients, but it also enhances grain nutritionally and increases protein content by 30%, reducing the need for additional protein in an animal's diet.

KERVA, which is made specifically for Irish conditions, improves animal health and food production and its use will also help Irish farmers lower their carbon footprint by reducing their reliance on importing such feed additives from overseas.

Inform Nutrition's ongoing work with Teagasc means the company is also committed to reducing methane emissions through the sustainable development of products that improve animal gut health. The team is continuously researching and developing new additives that will help the farming community reduce its environmental impact.

As part of its new policy, Inform Nutrition has established a sustainability task force to set sustainability goals for the company.

The task force also delivers in-house events and training to drive attention and awareness around how staff can individually or collectively enact pro-environmental change among colleagues and customers.

informnutrition.com

Lallemand's new offices in Vietnam

Lallemand Animal Nutrition has opened an office in Ho Chi Minh City, Vietnam. Lallemand Vietnam will distribute the Lallemand portfolio for ruminants, pork, poultry, and aquaculture throughout Vietnam.

This includes feed additives for all species, silage inoculants, bioremediation solutions for aquaculture as well as animal environment products. The sales operations will be managed by Mrs Phuong Trinh, Sales Director for Lallemand Animal Nutrition Vietnam.

"Lallemand Animal Nutrition solutions have been present in the Vietnamese market for more than a decade, and the establishment of Lallemand Vietnam is a natural evolution for us," Paul-Antoine Croizé, Business Area Director Southeast Asia and Managing Director, told International Dairy Topics.

"With 95 million inhabitants, Vietnam is a dynamic animal production market, ranking in the top 10 markets worldwide for pork production, and strong in exports. This really holds great potential for our company.

"Today, we are a team of six in Vietnam, with extensive sales and technical expertise in the ruminant, shrimp, poultry and swine markets, and with anticipated growth over the coming months."

lallemandanimalnutrition.com

Dairy farmers may be reluctant to invest their hard-earned cash in automating milking processes during the current coronavirus crisis but balancing the disruption of labour across the industry and staffing shortages due to self-isolation and social distancing rules with traditional manual milking is a challenge. The aim is to find innovative solutions that improve animal welfare, increase efficiency and deliver high quality milk in a resource-conserving operation in order to achieve long-term sustainability. Embracing technology from suppliers like GEA, a leading provider of farming technology solutions, can transform milking parlours, simultaneously improving dairy cow welfare as well as reducing labour costs which can help offset the perception that automation is expensive, especially for farmers who may have struggled with over-supply during the lockdown which saw demand plummet from the hospitality sector. GEA is offering a helping hand to UK farmers with affordable robotic milking solutions, at 0% finance over five years, that can eliminate labour intensive tasks while enhancing the process for the cow, allowing farmers to focus on managing their business. The well-being of cows ultimately determines the quality of the milk, and GEA's DairyRobot R9500 can operate during the relaxed processes in the barn with or without pre-and post-selection to suit the farmers needs and farm layout. DairyRobot R9500 provides consistent accurate attachment and is simple in operational design. Everything is offered 'in-liner', which includes stimulation, cleaning, fore-stripping, milking and post-milking teat disinfection, bringing a new level of intelligent milking to a farm.

gea.com

Evonik launches its own GAA-product

Evonik has launched GuanAMINO, its own guanidinoacetic acid-product (GAA) used to enhance energy metabolism in livestock production.

GuanAMINO provides farm animals with the natural creatine precursor GAA, which supplies creatine in the best way to animals, improving their performance, ensuring optimal nutrient utilisation and therefore return over feed costs.

"GuanAMINO is the best supplemental creatine source due to its outstanding stability in feed processing and high bioavailability to the animal. Adding GuanAMINO to the feed closes the gap in creatine supply, thereby increasing the efficiency and effectiveness of nutrition and optimising production costs of farm animals," Dr Torben Madsen, Head of Product Line Sustainable Healthy Nutrition at Evonik Animal Nutrition, told International Dairy Topics.

Creatine is vital for vertebrates as it contributes to ensuring that high energy demanding cells (particularly muscles) are supplied sufficiently. With the addition of GuanAMINO to animal feed, the feed conversion in livestock production can be improved significantly.

In the body, creatine is formed through methylation of GAA, which itself is formed from the amino acids glycine and arginine.

However, in fast-growing animals it is estimated that only around two-thirds of the required daily need for creatine is covered by the body's own synthesis.

The rest must be supplied via addition to the feed.

GuanAMINO is granulated, virtually dust-free, free-flowing and has handling characteristics which make for easy usage in daily operations.

evonik.com

internationalnews

Pandemic-proof the dairy industry

Dairy farmers could soon benefit from a new project which aims to make the industry more resilient to threats such as Covid-19.

The project, Smart-ET is funded by EIT Food and will develop digital tools working with farmers and dairy sellers to help them adapt their business models to rapid changes in consumer's demand in case of extreme events which disrupt their normal ways of working.

These digital tools will allow economic agents in the dairy system to react to changing conditions and issue stock 'alerts' that will help reduce wastage and the economic damage caused by destroying otherwise good dairy products.

eitfood.eu

New single dose calf pneumonia vaccine

MSD Animal Health's early life intranasal calf pneumonia vaccine – Bovilis intranasal RSP Live – is now available in single dose vials, allowing users greater practical flexibility to vaccinate individual animals as and when needed.

The intranasal vaccine can be administered to calves from as young as a week of age and reduces the clinical signs of respiratory disease and viral shedding from infection with Bovine Respiratory Syncytial Virus (BRSV) and Parainfluenza-3 Virus (Pi3V).

No other UK-licensed BRD vaccine can be administered earlier in life. The vaccine also delivers the fastest on-farm protection, with an onset of immunity after administration of just five days for BRSV and seven days for Pi3V. Duration of immunity is 12 weeks for both viruses.

"Having this early life calf pneumonia vaccine available in single dose vials will give farmers more practical leeway to be able to vaccinate vulnerable young calves from as young as a week of age, rather than delaying administration until a batch of calves are available. We know that early-age protection of young calves through intranasal vaccination can help prevent pneumonia and positively impact a beef or dairy calf's productive future," Dr Kat Baxter-Smith, MSD Animal Health livestock veterinary adviser, told International Dairy Topics.

The new single dose vials are supplied in packs of five, complementing the five dose vials already available.

msd-animal-health.com

The next level in efficiency

Nowadays challenges in managing a profitable and at the same time sustainable dairy cattle farm, lift the Industry to a whole new level of knowledge and expertise. Today's legislation forces farmers to deal with new issues like emission of methane and nitrogen, phosphate duties, mandatory grazing and more.

Combine this with the stricter rules regarding cow health and milk quality and the increasing demand for biological products, and farming becomes a challenge. The expected international population growth of two billion people in the year 2050 and the Paris climate agreement will challenge the industry even more.

Research for individual feed efficiency for dairy animals is one of the major topics and challenges today and will be for many years to come. The Hokofarm Group have more than 30 years of experience and knowledge in the field on feed efficency. They are very proud to be a part of all the global research programmes from leading facilities and universities all over the world.

To optimise feed efficiency, Hokofarm Group has launched a new product: RIC2Discover, the golden standard for individual feed intake research. The RIC feed trough continuously weighs the contained feed and feed time of the animal. It can be used for restricted and ad-libitum feeding.

When a cow approaches one of the feed weigh troughs, the system identifies the animal and data recording starts. The system measures the eating period and continuous feed intake. The management software registers all the cow individual data on the feed and water intake and eating time.

The system can also be extended with concentrate feed stations, weighing station and automatic selection. It also offers the option to link to a milking system, heat detection and many other subjects. The software is accessible via pc or mobile device, so information and operation are in the palm of your hand.

hokofarmgroup.com

DSM's acquisition of Erber Group

Royal DSM has completed its acquisition of Erber Group for an enterprise value of €980 million.

Erber Group's specialty animal nutrition and health business Biomin specialises primarily in mycotoxin risk management and gut health performance management, and the Romer Labs business focuses on food and feed safety diagnostic solutions. Both expand DSM's range of higher value-add specialty solutions.

The acquisition of Erber Group's Biomin further strengthens DSM's expertise and reputation as a leading provider of animal health and nutrition solutions for farm productivity and sustainability, with an emphasis on emissions reduction, feed consumption efficiency, and better use of water and land. It is very much aligned with DSM's focus to make animal farming more sustainable from both an ecological and economical perspective.

dsm.com

Diary

2021

Eurotier
9-12th February
Hannover, Germany
www.eurotier.com

Livestock Philippines
26-28th May
Manila, Philippines
www.livestockphilippines.com

Indo Livestock
23-25th June
Jakarta, Indonesia
www.indolivestock.merebo.com

Ildex Vietnam
21-23rd July
Ho Chi Minh City, Vietnam
www.ildex.com

Livestock Malaysia
24-26th August
Malacca, Malaysia
www.livestockmalaysia.com

Agrilivestock Cambodia
2-4th September
Phnom Penh, Cambodia
www.agrilivestock.net

SPACE
14-17th September
Rennes, France
www.space.fr

VIV Asia
22-24th September
Bangkok, Thailand
www.vivasia.nl

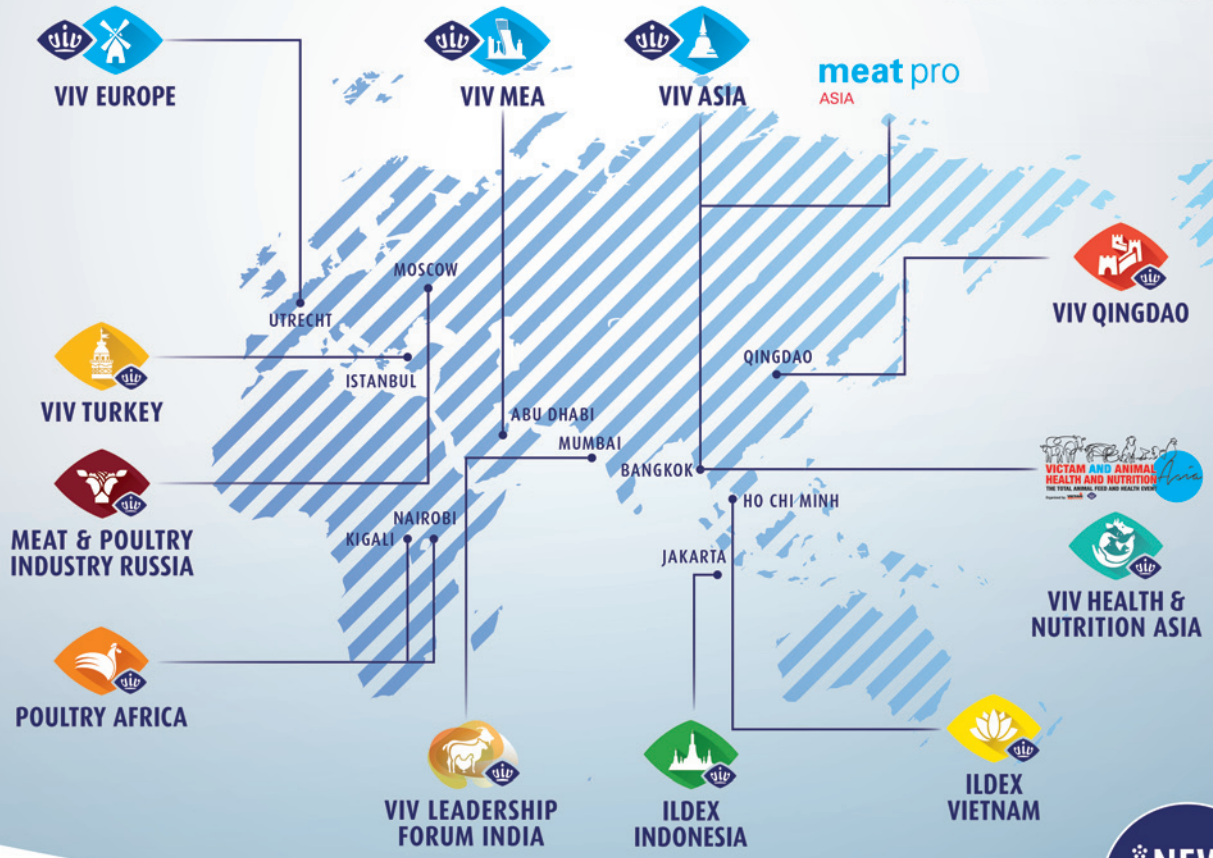
World Buiatrics Congress
26-30th September
Madrid, Spain
www.wbc-madrid2020.com

World Dairy Expo
28th September - 2nd October
Madison, WI, USA
www.worlddairyexpo.com

Vietstock
13-15th October
Ho Chi Minh, Vietnam
www.vietstock.org

THE BUSINESS NETWORK LINKING PROFESSIONALS FROM FEED TO FOOD

VIV WORLDWIDE



*NEW DATES

MEAT & POULTRY INDUSTRY RUSSIA 2021
MOSCOW | MAY 25-27

VIV TURKEY 2021
ISTANBUL | JUNE 10-12

ILDEX VIETNAM 2021*
HO CHI MINH | JULY 21-23

POULTRY AFRICA 2021
KIGALI | SEPTEMBER 1-2

VIV QINGDAO 2021
QINGDAO | SEPTEMBER 15-17

MEAT PRO ASIA 2021*
BANGKOK | SEPTEMBER 22-24

VIV ASIA 2021*
BANGKOK | SEPTEMBER 22-24

VIV MEA 2021
ABU DHABI | NOVEMBER 22-24

ILDEX INDONESIA 2021*
JAKARTA | NOVEMBER 24-26

VICTAM AND ANIMAL HEALTH AND NUTRITION ASIA 2022
BANGKOK | JANUARY 18-20

VIV EUROPE 2022
UTRECHT | MAY 31-2 JUNE

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Because the health of the udder is the health of the farm.

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To learn more about mastitis treatment and prevention, contact your Boehringer Ingelheim representative.

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