

# International Dairy Topics

Volume 17 Number 1 (2018)

Practical information for progressive dairy professionals

## **NUTRITION**

Fatty acids in feeding programmes for better health

## **MINERALS**

Improving the immune response in lactating cows

## **HEAT STRESS**

A new holistic concept to fight thermal stress

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# chewing<sup>the</sup>cud

Every farmer fears having his product implicated in a human food poisoning story. This is especially the case if the involvement has arisen from a journalist or TV reporter jumping to conclusions.

There is a lot of science that can come to your defence, but many of the tests take time and time is something that the journalist or reporter does not have!

Today we have the technology to differentiate between substrains of a particular food poisoning pathogen. This was demonstrated in a recent incidence of salmonella food poisoning. Although it was shown that the chickens on the farm and the victims of the food poisoning were infected by the same serotype of salmonella, these were of two distinct subtypes of that particular salmonella serotype. This proved that the farm was not the source of the food poisoning outbreak.

One of the problems one sees around the world is that the microbiological investigation of a food poisoning episode is not taken as far as it could be. In the example just cited, the testing could have

stopped with the confirmation of serotype, but then the outcome would have been a devastating one for the farmer involved.

Another problem around the world is the lack of communication regarding the latest developments in testing technologies from the researchers to the farmers and their advisors so that they know just what is, or is not, possible.

Another issue arising out of this type of research is that it need not only be used to help the farmer.

For example, all isolates of various foodborne pathogens in the USA are fully typed and placed on a central computer that regularly analyses the database to look for similar isolates. When these are found they are further investigated with the result being that more diffuse or widespread outbreaks are identified. Historically, these outbreaks would never have been discovered.

Surely, this use of technology is a good thing as we are learning more about food poisoning outbreaks.

Others would argue it is providing officialdom with too much information to harass and persecute our farmers with!

## Cover Picture:

Tuck in to a feast of topics!  
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**Venue** Sapporo Convention Center (Sapporo, Japan)

President: **Motoshi Tajima** (Rakuno Gakuen University)

Early  
Registration  
Deadline  
**30 April,  
2018**

## Registration Fees

Registration Category		Early ~30 Apr., 2018	Standard 1May~31 Jul., 2018	On-site
Participants from countries on List*	A	50,000 JPY	70,000 JPY	90,000 JPY
	B	37,500 JPY	52,500 JPY	67,500 JPY
	C	25,000 JPY	35,000 JPY	45,000 JPY
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\*For Country list A-C, please check WBD2018 Sapporo official website.

\*\*To qualify for the student/post-doc registration fee, proof of full-time enrolment at a recognized university or college at both the time of registration and during the congress must be presented.

All Fees are quoted in Japanese Yen (JPY)

## Keynote speakers

<p><b>Antimicrobial resistance</b></p> <p><b>Dr. Christophe Beloin</b> Group leader, Department of Microbiology, Institut Pasteur France</p> 	<p><b>Antimicrobial resistance</b></p> <p><b>Prof. Dr. Theo J.G.M. Lam</b> Manager, R/D, GD Animal Health, Professor, Department of Farm Animal Health, Utrecht University The Netherlands</p> 	<p><b>Bovine welfare and cattle comfort</b></p> <p><b>Dr. Ed. Pajor</b> Professor, Anderson-Chisholm Chair in Animal Care and Welfare, Production Animal Health/Faculty of Veterinary Medicine, University of Calgary Canada</p> 	<p><b>Buffaloes, camelids and wild ruminants</b></p> <p><b>Dr. Mohammed Shamsuddin</b> Technical Officer, Nuclear Sciences and Applications/Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, International Atomic Energy Agency Austria</p> 
<p><b>BVD</b></p> <p><b>Prof. Joe Brownlie</b> Honorary Research Fellow, University of Bristol Veterinary School, Emeritus Professor of Veterinary Pathology, Royal Veterinary College UK</p> 	<p><b>Diagnostic imaging</b></p> <p><b>Mr. Karl Nuss</b> Section Head, Farm Animal Surgery, Farm Animal Department, Vetsuisse Faculty, University of Zurich Switzerland</p> 	<p><b>E-learning and continuing education</b></p> <p><b>Dr. Martin Fischer</b> Director, Assoc. Dean for Clinical Education, Institute for Medical Education University Hospital, LMU Munich Germany</p> 	<p><b>Epidemiology</b></p> <p><b>Prof. Mark Stevenson</b> Professor, Veterinary Epidemiology, Faculty of Veterinary and Agricultural Sciences, The University of Melbourne Australia</p> 
<p><b>Herd health</b></p> <p><b>Prof. Dr. Jos.P.T.M.Noordhuizen</b> Professor in dairy herd health &amp; productivity management, Veterinary Science, Charles Sturt University, Wagga Wagga, NSW, Australia France</p> 	<p><b>Hoof health and lameness</b></p> <p><b>Prof. Christer Bergsten</b> Professor, Biosystems and technology, Swedish University of Agricultural Sciences Sweden</p> 	<p><b>Immunology and vaccines</b></p> <p><b>Dr. Geraldine Taylor</b> Honorary Fellow, The Pirbright Institute UK</p> 	<p><b>Infectious diseases: bacteriology</b></p> <p><b>Dr. Richard J Whittington</b> Professor, Farm Animal Health, Sydney School of Veterinary Science, University of Sydney Australia</p> 
<p><b>Infectious diseases: virology</b></p> <p><b>Dr. Paul M. Coussens</b> Professor and Director, Molecular Pathogenesis Laboratory, Department of Animal Science, Michigan State University USA</p> 	<p><b>Internal medicine</b></p> <p><b>Dr. Walter Grünberg</b> Research associate, Clinic for Cattle, University of Veterinary Medicine Hannover Germany</p> 	<p><b>Nutrition and metabolic diseases</b></p> <p><b>Prof. Garrett Oetzel</b> Professor, Food Animal Production Medicine Section, Department of Medical Sciences, School of Veterinary Medicine, University of Wisconsin-Madison USA</p> 	<p><b>Parasitology</b></p> <p><b>Dr. Massaro Ueti</b> Veterinary Medical officer, US Department of Agriculture, USDA-ARS USA</p> 
<p><b>Public health and food safety</b></p> <p><b>Prof. Martin Blaser</b> Muriel &amp; George Singer Professor of Translational Medicine, Medicine, New York University Langone Medical Center USA</p> 	<p><b>Reproduction</b></p> <p><b>Dr. José Eduardo P. Santos</b> Research Foundation Professor, Department of Animal Sciences, University of Florida USA</p> 	<p><b>Surgery</b></p> <p><b>Prof. Dr. Adrian Steiner</b> Clinic head, Farm Animal Clinic, Vetsuisse Faculty, University of Bern Switzerland</p> 	<p><b>Tropical animal diseases</b></p> <p><b>Dr. Keith John Sumption</b> Executive Secretary, European Commission for the Control of Foot-and-Mouth Disease (EuFMD), Animal Health Service, Animal Production and Health Division, Food-and-Agriculture Organization of the United Nations Italy</p> 
<p><b>Udder health</b></p> <p><b>Prof. Pamela Ruegg</b> Professor, Department of Dairy Science, University of Wisconsin-Madison USA</p> 	<p><b>Udder health</b></p> <p><b>Mr. Peter Edmondson</b> Owner, Udderwise LTD UK</p> 	<p><b>Young stock</b></p> <p><b>Dr. John Frederick Mee</b> Principal Veterinary Research Scientist, Animal and Bioscience, TEAGASC Ireland</p> 	



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# worldfocus

An executive summary of key international issues

## Bangkok

### Steady as we go!

This coming March will see the fifth edition of Dairy Focus Asia again returning to Bangkok in Thailand. This conference is the forum which includes speakers from the cutting edge of our sector who fine tune the methods of applying the latest technical developments from research. Among key issues to be addressed will be the post AGP era, sustainability, mycotoxins, fibre digestion, antibiotic stewardship and managing the microbiota. With over 90 speakers at Pig, Poultry & Dairy Focus Asia you can not afford to miss this thought-provoking conference and great networking opportunity for the technical side of dairy production in Asia.

## Associations

### Are they really an asset?

Recently, I was reflecting on where the dairy industry is heading in 2018 and turned to Google for inspiration. The first site I went to surprised me, as when I clicked the events link all I found was 'no events listed for 2016' and there were no events shown after that date. The second site was the opposite – it was so complicated that I quickly left, vowing never to go back to it until I had gained a PhD in 'computers as a management tool'. From these two brief visits I wondered if I had seen a snapshot of national and local industry associations. Do they range from those being run on an ad hoc basis, because this is how it has always been, to those being run by a web designer who forgets his target audience?

## USA

### Environmentalists' mischief likely to cause major problems!

The National Cattlemen's Beef Association has begun a media campaign against having to comply with laws that are only meant to apply to highly toxic sites, such as those associated with chemical spills. Unfortunately, in April 2017, the actions of a circuit court put nearly 200,000 farms and ranches under the regulatory reporting authorities enshrined in the legislation. The new requirements could go into effect from 22nd January 2018. According to a Nebraska cattleman, "this is just another example of radical environmental groups using the courts to wildly distort the original Congressional intent behind legislation." We understand that this situation also applies to dairy and pig farms.

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# Dairy Focus Asia 2018

## Day 1

Keynote session jointly held with Pig & Poultry Focus Asia 2018

9:45	Opening ceremony	
10:00	Putting science into biosecurity	Ricardo Munoz, Neogen – Animal Safety, USA
10:30	Managing the unknown? Mycotoxin risk assessment in feed production	Yong Wee Liao, Romer Labs, Austria
11:00	Turning big data into smart data – Vision from a field veterinarian	Maarten de Gussum, Vetworks, Belgium
11:30	Prudent use of antibiotics – Livestock's contribution to One World, One Health	Alex Eggen, Director AEVC, The Netherlands
12:00	Lunch	
13:00	Can we trust feedstuffs for the dairy?	Paolo Fantinati, Biomin, Italy
13:30	Understanding the breakdown of fibre in the rumen	Nicola Walker, AB Vista, UK
13:55	Yeast solutions to alleviate heat stress	Christine Julien, Phileo-Lesaffre, France
14:20	Improving intake, fiber digestion and feed efficiency	Taweel Hassan, Nutriad, The Netherlands
14:45	Break	
15:15	Improving milk quality and parlour efficiency	Eric Mathias, GEA Farm Technologies, Inc., China
15:45	New dietary strategy for sustainable dairy production	Inhyuk (Eric) Kwon, EASY BIO, Inc., Korea
16:10	TBC	Tanja Calitz, Agrana
16:35	Alternative to antibiotics	Mohanji Saxena, Ayurved, India

## Day 2

8:30	Controlling oxidative stress; increasing farm profitability	Cristiano Ossensi, Tecnozoo, Italy
9:00	Modulation of rumen pH	Arthur Kroismayr, Agrocon Consulting, Austria
9:25	Phytogenic flavonoids influence gene expression in liver cells	Jaydip Sarkar, Dr. Eckel Animal Nutrition (Thailand) Co. Ltd., India
9:50	Essential oils can improve protein efficiency	Romain Coulon, Techna France Nutrition, France
10:15	Break	
10:45	Improving calf gut health	Astrid Koppenol, Impextraco, Belgium
11:15	Phytogenic strategies to improve farm profits	Manish Mukherjee, Ayurved, India
11:40	Teat hygiene for preventing mastitis	Stefaan Goudezeune, CID LINES, Belgium
12:05	Lunch	
13:00	Mycotoxin risk management from harvest to feed formulation	Tran Si-Trung, Olmix, Vietnam
13:30	Nutritional strategies in ruminants – skeletal health	Chandr Shakhar, DSM, India
13:55	A new approach to DDGS Value: NDF Digestibility	Kevin Herrick, POET Nutrition, USA
14:20	Tannins to improve efficiency of rumen metabolism	Bernardo Valenti, University of Catania & Silvateam, Italy
14:45	Break	
15:15	Subclinical ketosis in moderate yield dairy cows	Antoine Bertho, Nutriscipes, Vietnam

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# Fatty acids in feeding programmes for dairy COWS

Research on individual fatty acids, the component parts of what we commonly refer to as 'fat', has increased recently and with it our understanding of the necessity to consider the type of 'fat' supplement we offer dairy cows in more detail.

by Dr Richard Kirkland,  
Global Technical Manager,  
Volac Wilmar Feed Ingredients.  
[www.volacwilmar.com](http://www.volacwilmar.com)

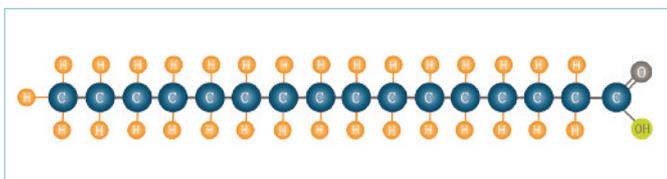
What is becoming clear is that fat supplements cannot simply be considered as a source of energy, but that individual fatty acids can elicit markedly different production and metabolic responses in dairy cows. Hence the mix of fatty acids in a particular fat supplement is the key factor to consider when evaluating which fat product to add to a dairy diet.

The dairy sector has previously transitioned from crude protein to amino acids and it is now time to stop feeding 'fat' and start thinking about these individual fatty acids. Volac Wilmar has recently launched a nutritional platform designed to provide improved guidelines on the use of fatty acids in dairy nutrition.

## What are fatty acids?

The basic structure of a fatty acid is presented in Fig. 1, using the example of palmitic acid (C16:0). Fatty acids differ in relation to the length of the carbon (C) chain (ranging from two to over 20 C atoms) and the number of hydrogen (H) atoms surrounding the C atoms which determines whether the fatty acid is saturated (high melting point; solid)

Fig. 1. Structure of palmitic acid (C16:0).



Fatty acid	Name	Category
C16:0	Palmitic acid	Saturated
C18:0	Stearic acid	Saturated
C18:1	Oleic acid	Unsaturated
C18:2	Linoleic acid	Unsaturated
C18:3	Linolenic acid	Unsaturated

Table 1. Major fatty acids found in ruminant diets.

or unsaturated (low melting point; liquid).

Only five fatty acids are typically found in appreciable quantities in feed ingredients offered to ruminant animals (Table 1), though dietary fatty acids are changed substantially in the rumen as a consequence of biohydrogenation. In particular, ruminal biohydrogenation ensures that fatty acids leaving the rumen are predominantly saturated with around one third palmitic and two thirds stearic fatty acids. Hence, delivery of unsaturated fatty acids post-rumen in appreciable quantities requires fatty acids to be offered in 'rumen-protected' form.

When we consider commercial fat supplements, palmitic, stearic and oleic are typically the most abundant fatty acids in these fat sources.

## Digestibility

Digestibility is a key factor influencing the nutritional value of a fat supplement and major differences in digestibility between individual fatty acids have been identified.

Using meta-analysis, Boerman et al. (2015) reported a reduction in total fatty acid digestibility with increasing fatty acid flow to the

duodenum, with digestibility of C18:0 demonstrated as the major fatty acid contributing to this decline (Fig. 2).

In contrast, digestibility of C16:0 was relatively constant with increasing C16:0 flow to the duodenum, indicating the importance of maintaining a high C16:0 : C18:0 ratio if fat supplements are to be efficiently digested and absorbed by the animal. Oleic acid is regarded as an effective amphiphilic agent, promoting formation of the micellar structures essential for digestion of fat in ruminants.

## Production and metabolic effects

Recent years have seen considerable research effort directed toward evaluation of production and metabolic responses to dietary supplementation with individual fatty acids, in particular C16:0, C18:0 and C18:1.

Meta-analyses data from studies with post-peak dairy cows supple-

mented with 'high-C16:0' supplements (>80% C16:0) were reported by de Souza et al. (2016) at Michigan State University, USA.

High-C16 products, supplemented at an average 1.8% of diet dry matter, had no significant effect on dry matter intake or milk yield, but increased ( $P<0.01$ ) milk fat from 3.58-3.81% and milk fat yield from 1.49-1.59kg/day. When these data were subsequently analysed by meta-regression, a significant ( $P<0.01$ ) positive linear relationship between increasing C16:0 intake and milk fat yield was observed.

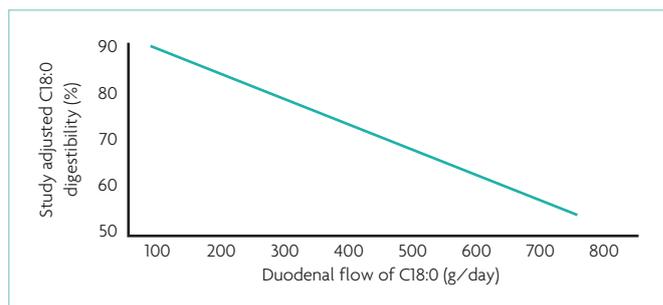
The effects of altering the ratio of C16:0, C18:0 and C18:1 fatty acids were evaluated in further work at Michigan State by de Souza et al, 2017. Mid-lactation dairy cows were offered one of four treatments in a Latin square design, with fat supplements added at 1.5% of dry matter:

- Treatment 1: Control: no supplemental fat.
- Treatment 2: High-C16:0 supplement (approximately 80% C16:0).
- Treatment 3: Blend of C16:0 and C18:0 supplement (approximately 40% each).
- Treatment 4: Blend of C16:0 (45%) and C18:1 (35%; in rumen-protected, calcium salt form).

In line with the meta-analysis data, C16:0 maintained, while C18:0 supplementation reduced ( $P<0.01$ ) total fatty acid digestibility compared to the other treatments (Fig. 3). These data also support the beneficial effects of C18:1 on total fat digestibility, with increasing dietary supply of this fatty acid

*Continued on page 9*

Fig. 2. Relationship between study-adjusted C18:0 intestinal digestibility and duodenal flow of C18:0.





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	Treatment				Significance
	1	2	3	4	
Milk yield (kg/d)	44.6 <sup>b</sup>	46.9 <sup>a</sup>	46.3 <sup>a</sup>	46.5 <sup>a</sup>	P=0.01
Milk fat (%)	3.62 <sup>ab</sup>	3.69 <sup>a</sup>	3.60 <sup>ab</sup>	3.53 <sup>b</sup>	P=0.01
Milk fat yield (kg/d)	1.60 <sup>b</sup>	1.70 <sup>a</sup>	1.64 <sup>b</sup>	1.64 <sup>b</sup>	P<0.05
Liveweight gain (kg/d)	0.82 <sup>b</sup>	0.84 <sup>b</sup>	0.70 <sup>b</sup>	1.05 <sup>a</sup>	P<0.05
BCS change	0.07 <sup>b</sup>	0.07 <sup>b</sup>	0.04 <sup>b</sup>	0.11 <sup>a</sup>	P<0.05
Plasma insulin (µg/l)	0.84 <sup>b</sup>	0.85 <sup>b</sup>	0.87 <sup>b</sup>	0.94 <sup>a</sup>	P=0.01

**Table 2. Production data for cows offered different fatty acid supplements.**

Continued from page 7 (supplied in rumen-protected form as a calcium salt) resulting in a significant (P=0.01) improvement in total fatty acid digestibility compared to the other treatments.

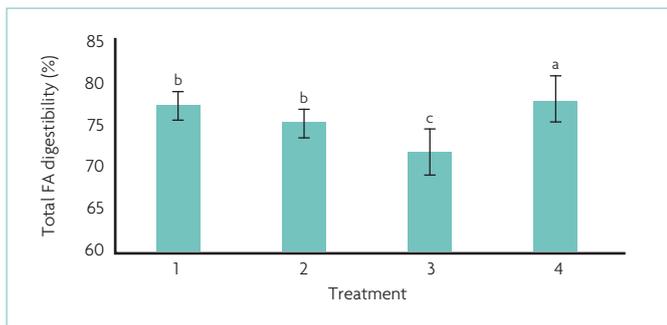
The key production data from this original study are presented in Table 2.

All fatty acid supplements had beneficial effects on milk yield (mean increase 1.9kg/cow/day).

However, major differences between treatments were recorded with milk fat production; the high C16:0 fatty acid supplement

increased milk fat components in line with data reported in the previous meta-analysis.

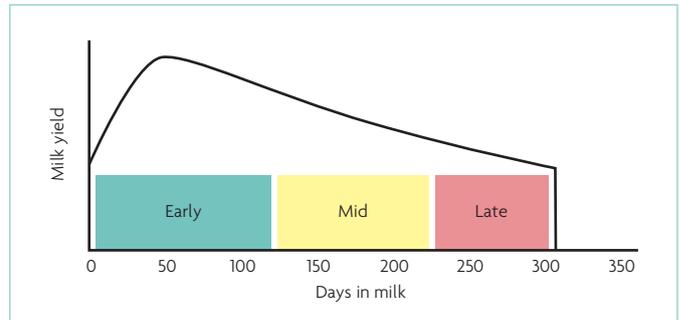
More novel findings from this study are the effects of the C18:1-containing fatty acid supplement on live weight and body condition score (BCS), with cows offered this supplement recording significant (P<0.05) gains in both these parameters compared to the other treatments. Part of these effects may relate to increased insulin, an antilipolytic hormone, recorded in response to supplementation with C18:1.



**Fig. 3. Digestibility of total fatty acids (FA) with different fatty acid supplementation. Different letters above the bars indicate significant differences between the treatments (P=0.01).**

**Table 3. Below, a summary of the key effects and supplementation periods for fatty acids.**

Fatty acid	Primary effects	Key period for supplementation
C16:0	Induces insulin resistance to increase partitioning of nutrients to milk to improve milk fat production.	Most beneficial in mid to late lactation to partition nutrients to milk production.
C18:0	Digestibility decreases with increasing intake of C18:0. If present in supplement, aim for higher ratio of C16:0 : C18:0.	High levels pass to the duodenum from basal diets. No specific supplementation requirements.
C18:1	Improves digestibility of total diet fat and increases insulin to increase partition of nutrients to improve body condition. Also promotes egg and early embryo development to improve fertility.	Most beneficial in early lactation to partition nutrients to body fat stores, and to improve fertility.
C18:2 (omega-6)	Induces parturition, though high levels can reduce fertility through stimulation of prostaglandin (PGF <sub>2α</sub> ) production.	Common fatty acid in many feed ingredients; generally little C18:2 needed for supplementation.
C18:3 (omega-3)	Reduces prostaglandin (PGF <sub>2α</sub> ) to maintain the corpus luteum on the ovary and production of progesterone to improve embryo survival and fertility.	Often low in dairy diets, especially those containing low levels of green forage. Most beneficial in early lactation to support embryo survival and development.



**Fig. 4. Potential changes to C16:0 : C18:1 ratio through lactation for optimal performance. ■ Early: Low ratio to balance partition of nutrients between milk and body reserves. ■ Mid: High ratio to partition nutrients towards production of milk and milk fat. ■ Late: Consider continued fat supplementation (high ratio) to prevent cows becoming too fat.**

### Lipid mediators

Effects of fatty acids may also be mediated through effects of lipid intermediaries such as sphingolipid ceramides. Ceramides reduce insulin sensitivity (Rico et al., 2015), enhancing the mobilisation of non-esterified fatty acids (NEFA) from adipose tissue and increased milk production.

Palmitic acid is substrate for de novo synthesis of ceramide (McFadden, 2017), indicating a link between increasing supplementation of this fatty acid and mechanisms to partition energy toward milk production.

### Fatty acid nutrition in practice

These new research data highlight the importance of considering 'fat' supplements on the basis of fatty acids, specifically in relation to the balance of C16:0 and C18:1.

Increased C16:0 leads to increased partitioning of energy to milk, primarily through increased milk fat production, whereas C18:1 fatty

acids direct energy toward body fat reserves.

This enables us to recommend specific adjustments in the C16:0 : C18:1 ratio through lactation to account for production and body condition considerations (Fig. 4).

Early lactation cows have a pre-disposed genetic drive to produce milk, achieved at the expense of body fat loss. In this respect, adding further C16:0 to the diet is likely to exacerbate this natural homeorhetic partitioning of nutrients away from body reserves to milk, with the consequent risk of metabolic diseases.

In contrast, the insulin-stimulating effects of C18:1 indicate that this fatty acid is particularly desirable in early lactation to increase partitioning to body fat stores and reduce extent of body condition loss.

Improvements in total fat digestibility observed with C18:1 will provide an additional energy boost from the basal ration and realise an improvement in egg quality and early embryo development to improve fertility (Aardema et al., 2011).

### Transitioning from 'fat' to fatty acids

Volac Wilmar has leveraged its current knowledge and that arising from these new data to launch a nutritional platform to improve the understanding and rationing of the primary fatty acids in dairy diets (Table 3).

However, the majority of diet formulation systems pay little attention to detailed fatty acid nutrition, representing a challenge to nutritionists to implement the findings at a practical on-farm level.

Similarly, it raises the bar for developers of nutrition models to devise more-detailed systems to account for the fatty acid balance of basal diets and specific 'fat' supplements. ■

References are available from the author on request

# Metal glycinates improve immune response in lactating dairy cows

Production levels of milk and meat are rapidly increasing. Through breeding, nutrition and management milk production per cow has been on the rise for decades. However, there is also more attention on animal welfare, the use of antibiotics and milk quality.

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In dairy cattle (sub-clinical) mastitis is a big challenge as it influences all of the challenges, the milk production decreases, welfare of the cow is reduced, for clinical cases antibiotics are used for treatment and finally the quality of the milk reduces due to higher somatic cell counts and residues of antibiotics in the milk. To be able to manage and help prevent the effects of mastitis there is a need to understand the cow's immune system and the best way to support this.

For many decades the role of trace minerals in ruminants has been studied. The research however, has been mainly focused on the growth and production of animals. More recent research has provided a growing insight into the influence of some trace minerals on the immune response and therefore the overall health of ruminants.

Micronutrients, for which a positive effect on immunity in

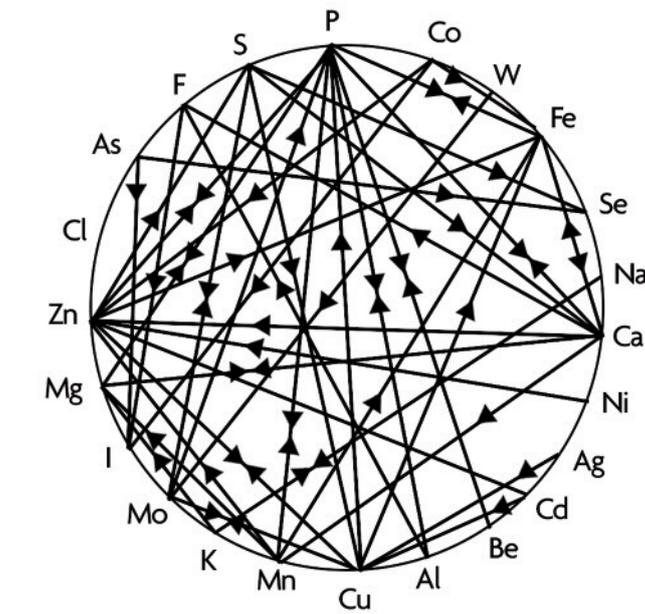


Fig. 1. Mineral wheel showing known antagonistic relationships between minerals (Watts, 1990).

general and mastitis in particular has been shown, have a function in the anti-oxidant system: zinc, copper, vitamin E and selenium. Others important to mention are manganese and vitamin A.

## Zinc

The importance of zinc for the human immune system is well-

studied and on many different levels. Zinc is known to be essential for multiplying cells and cell metabolism, next to its role in the anti-oxidant function of cells. This is important for the first defence against pathogens: the skin and tissues, but also the non-specific immunity (efficiency of neutrophils to kill pathogens) and the specific immunity (fast production of

specific antibodies). In addition, Andrieu (2008) showed the importance of zinc for the structural integrity of tissues, like keratin production to protect infection in mammary glands.

Zinc levels in feedstuffs are generally lower than the minimum requirement which makes supplementation essential and often improving performance or health.

## Copper

The role of copper in immunity is less clear, but its antioxidant function helps to protect cells as part of the enzyme copper-zinc superoxide dismutase in the mammalian cytosol.

However, Spears and Weiss (2008) also showed that the ability of neutrophils to kill pathogens is reduced when ruminants are deficient in copper.

An additional limitation for copper is the antagonists often present in ruminant feeds, like molybdenum, sulphur and iron, limiting its bioavailability.

## Manganese

Manganese is generally more present in feedstuffs for ruminants, limiting the effect of supplementation (less deficiency), but is essential to protect mammalian cells through manganese-zinc superoxide dismutase in the mitochondria as well as

Fig. 2. Haptoglobin blood levels in beef steers during receiving phase.

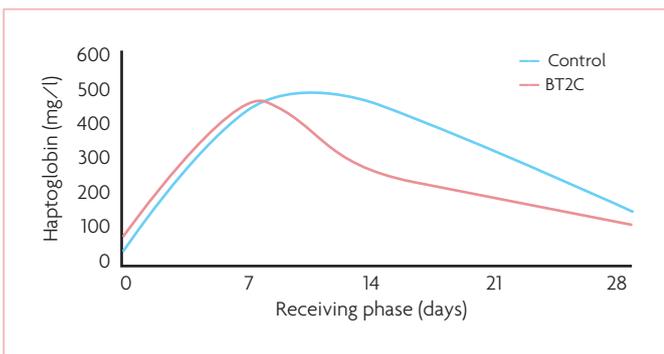
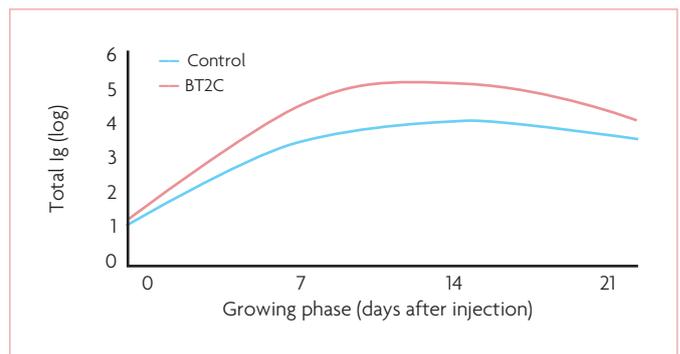


Fig. 3. Immunoglobulin (Ig) levels in the blood of beef steers after injection with pig red blood cells.



part of enzymes with function in the immune response.

### Fulfilling ruminant's mineral requirements

Normally it is no problem to supply enough minerals, but supplying enough minerals that are bioavailable for a dairy cow is much more challenging.

Ruminant diets, even of high performing lactating dairy cows, have high fibre levels. Fibre is needed to sustain rumen microflora to support performance and is digested very efficiently in comparison to non-ruminants.

However, non-digested fibre can bind minerals and this may influence bioavailability of the minerals. Many complexes are formed with fibrous fractions and part of them are not again soluble (digestible) afterwards, also at low pH in the abomasum.

There are many interactions known between minerals for absorption and metabolism (both synergies and antagonisms) and still new interactions are being found.

Only the antagonistic relationships between minerals are displayed in Fig. 1, and it is already very complex. It shows the complexity of supplementing enough but also not too much of most minerals, to have limited antagonistic effects.

The negative effects of interaction with feed components and competition for absorption on bioavailability can be reduced by combining the mineral with an organic ligand.

Inorganic mineral forms (sulphates) are very weakly bound and are therefore free to interact, while organically bound minerals are not reactive.

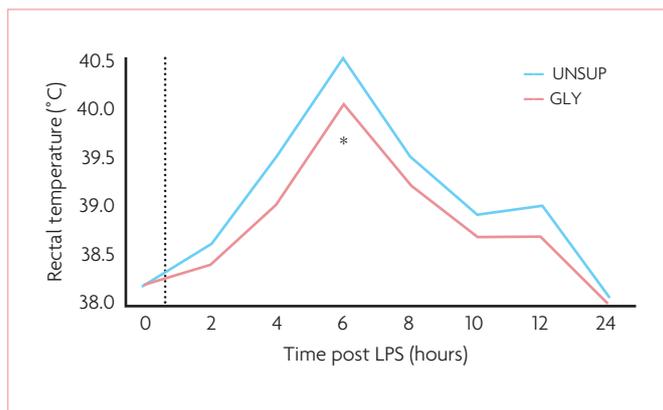
The stability of the organic bond is essential to prevent interactions and competition, demonstrating the added value of an organic mineral source. Variable chemical structures and stability between sources may explain the variable effects in ruminants.

In different trials, the high stability of a specific metal glycinate (minerals bound to the amino acid glycine), B-TRAXIM 2C, has been shown and more uniquely also the chemical structure.

Spears et al. (2004) already showed for zinc the improved bioavailability of this specific glycinate in Angus beef steers, compared to non-supplemented animals, or supplementation with inorganic or other organic sources.

Hansen et al. (2008) showed for copper that this specific glycinate could improve the mineral status in beef steers fed high dietary sulphur and molybdenum, compared to copper sulphate.

The improvement of mineral



**Fig. 4. Rectal temperature of dairy cows after lipopolysaccharide (LPS) challenge.**

status was even greater when molybdenum levels were increased, showing the benefits of this source when known antagonists are present in the diet.

### Improving immunity with specific metal glycines

Fry et al. (2009) compared the effects of supplementation with two sources of zinc (specific metal-glycinates (BT2C), or zinc sulphate (CTRL)) in a trial with 102 beef steers. The sources were supplemented at 30ppm on top of a receiving and a growing diet containing respectively 22 and 25ppm of zinc.

During the receiving phase (28 days) more than 75% of the animals needed treatment related to respiratory diseases.

Haptoglobin is an acute phase protein, known to increase in case of infection and therefore used as an indicator for infection levels.

Haptoglobin levels were measured at day 0, 7, 14 and 28 in the receiving phase. Starting from day 14, the haptoglobin levels were reduced for the BT2C animals, compared to the CTRL animals (Fig. 2).

This indicates a decrease of infection level for the BT2C group. The observation was also confirmed by a reduced number of animals treated in the BT2C group during this trial.

In the growing phase, steers from each treatment were injected with pig red blood cells to induce an

immune reaction. Their immunoglobulin (Ig) level was measured at days 7, 14 and 21 post-injection.

The Ig level indicates the intensity and quality of the immune response.

Animals with higher Ig levels will therefore have a better protection against this infection. BT2C steers showed higher levels of total Ig following the injection than CTRL steers (Fig. 3), this indicates a better immune response for the BT2C group.

It was therefore concluded that supplementation with 30ppm of zinc from a specific metal glycinate reduces infection levels and improves immune response of beef cattle, compared to zinc sulphate.

### Improved immune response in lactating dairy cows with metal glycines

After the findings in beef, Wall et al. (2016) looked at the effects of supplementation with specific metal glycines on the immune response of lactating dairy cows.

For this, 12 mid-lactation dairy cows were either fed an unsupplemented diet (UNSUP), or the same diet with 30, 30 and 8ppm of zinc, manganese and copper, respectively, added as metal glycines from B-TRAXIM 2C (GLY).

After 30 days, the copper levels in the serum of the GLY cows were increased significantly, as an indicator for mineral bioavailability.

The neutrophils showed a lower

phagocytic index (number of bacteria ingested per phagocyte), but with a trend for a higher intracellular kill, indicating a change in neutrophil function.

On day 30, all dairy cows were challenged by an injection of lipopolysaccharides (LPS) from *Escherichia coli* into the teat canal, simulating a mastitis infection. All cows showed a marked increase in clinical scores (going up to 4 out of 5 quickly, results not shown), without any effect of treatment.

All cows showed a marked increase in body temperature in the first 24 hours post challenge (Fig. 4), but the GLY cows had a significantly lower body temperature.

Before, during and after the LPS challenge a trend for decreased somatic cell count (SCC) was observed in the GLY cows, with p-values <0.15 (Table 1).

After earlier results in beef cattle, it has now been shown that supplementation with mineral glycines influences the immune response also in lactating dairy cows.

The decreased body temperature after an LPS challenge, combined with the lower SCC in dairy cows supplemented with mineral glycines, indicates that mineral-glycinate supplementation may improve their ability to fight off infection.

This has implications for mammary health in general and mastitis problems in particular.

### Summary and conclusion

Selecting the best source for effective mineral supplementation in ruminants is essential to support optimal performance in high demanding production systems: maintaining high health status and welfare, while increasing the production of high quality milk, with increasing scrutiny on the use of antibiotics.

Using a specific source of metal glycines has shown to improve bioavailable minerals at the same supplementation levels, with increasing benefits when known antagonists are present.

Both in beef and dairy cattle improved immune responses have been shown in challenged animals, with less veterinary treatments and higher total Ig levels in challenged beef and lower SCC and body temperature in challenged dairy.

This indicates that supplementation with the right mineral source can support the immune system in ruminants and more specifically reduce the impact of (clinical) mastitis on the performance of dairy cows. ■

**Table 1. Somatic cell count (SCC) in milk before and after lipopolysaccharide challenge.**

SCC in log <sub>10</sub>	UNSUP	GLY	p-value
72-0 hours, pre LPS challenge	5.28	4.66	0.07
0-12 hours, post LPS challenge	7.00	6.75	0.14
24 hours to 7 days, post LPS challenge	6.40	6.20	0.09

References are available from the author on request

# Fighting heat stress in dairy cows with a new holistic concept

Heat-related stress occurs when an animal is no longer capable of naturally eliminating excess body heat. Heat build-up is caused by external temperatures and a high level of relative humidity, which overtakes the physiological capacity of thermoregulation in mammals – also known as evapotranspiration.

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This temperature-relative humidity ratio is expressed via the THI index which assesses thermal stress levels. For example, a THI of 72 corresponds to a temperature of 22°C at 100% of relative humidity. Economic losses due to thermal stress are difficult to calculate. However, findings of a study carried out in American cows showed that even when preventative measures were taken against thermal stress (management, equipment), losses still amounted to US\$100/cow year with 80% of these losses related to production and 20% due to a

health expense increase. It has also been shown that thermal stress during gestation had a negative impact on lactation and therefore subsequent milk yield.

Owing to their higher metabolism, dairy cows are more prone to thermal constraints with a THI lower than that seen in humans (Fig. 1). Thermal stress is considered to be moderate when THI in dairy cows is above 72, while in humans it would be above 80. The Thermal Comfort Zone for a lactating cow varies between 0 and 20°C. As an

example, a temperature of 25°C with 50% of humidity corresponds to a THI of 72. Dairy cows are therefore very sensitive to heat stress.

## Negative effects of thermal stress for dairy production

Thermal stress reduces milk yield and its components (drop in milk fat levels) and negatively impacts both reproduction and

**Fig. 1. Index temperature/relative humidity in dairy cows and humans.**

- **Stress threshold for lactating cows.**  
Respiration rate may exceed 60BPM. Milk losses begin – 2.5lbs/cow/day. Reproductive losses are detectable and rectal temperature exceeds 101.3°F. Caution for people depending on age, exposure and activity.
- **Mild to moderate stress for lactating cows.**  
Respiration rates may exceed 75BPM. Milk losses – 6lbs/cow/day. Rectal temperatures will exceed 102.2°F. Extreme caution for people depending on age, exposure and activity.
- **Moderate to severe stress for lactating cows.**  
Respiration rates exceed 85BPM. Milk losses – 8.7lbs/cow/day. Rectal temperatures will exceed 104°F. Danger for people depending on age, exposure and activity.
- **Severe stress and life threatening conditions for lactating cows.**  
Respiration rates are 120-140BPM. Rectal temperatures will exceed 106°F. Extreme danger of heat exhaustion and/or heat stroke for people when working in these conditions.

Temperature		Dairy cow Temperature Humidity Index (THI)																		
		Relative humidity (%)																		
°F	°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
72	22.0	64	65	65	65	66	66	67	67	67	68	68	69	69	69	70	70	70	71	71
74	23.5	65	66	66	67	67	67	68	68	69	69	70	70	70	71	71	72	72	73	73
76	24.5	66	67	67	68	68	69	69	70	70	71	71	72	72	73	73	74	74	75	75
78	25.5	67	68	68	69	69	70	70	71	71	72	73	73	74	74	75	75	76	76	77
80	26.5	68	69	69	70	70	71	72	72	73	73	74	75	75	76	76	77	78	78	79
82	28.0	69	69	70	71	71	72	73	73	74	75	75	76	77	77	78	79	79	80	81
84	29.0	70	70	71	72	73	73	74	75	75	76	77	78	78	79	80	80	81	82	83
86	30.0	71	71	72	73	74	74	75	76	77	78	78	79	80	81	81	82	83	84	84
88	31.0	72	72	73	74	75	76	76	77	78	79	80	81	81	82	83	84	85	86	86
90	32.0	72	73	74	75	76	77	78	79	79	80	81	82	83	84	85	86	86	87	88
92	33.5	73	74	75	76	77	78	79	80	81	82	83	84	85	85	86	87	88	89	90
94	34.5	74	75	76	77	78	79	80	81	92	83	84	86	86	87	88	89	90	91	92
96	35.5	75	76	77	78	79	80	81	82	83	85	86	87	88	89	90	91	92	93	94
98	36.5	76	77	78	80	80	82	83	83	85	86	87	88	89	91	92	92	93	94	95
100	38.0	77	78	79	81	82	83	84	85	86	87	88	90	91	92	93	94	95	96	98
102	39.0	78	79	80	82	83	84	85	86	87	89	90	91	92	94	95	96	97	98	100
104	40.0	79	80	81	83	84	85	86	88	89	90	91	93	94	95	97	98	99	100	101
106	41.0	80	81	82	84	85	87	88	89	90	91	93	94	95	97	98	99	101	102	103
108	42.0	81	82	83	85	86	88	89	90	92	93	94	96	97	98	100	101	103	104	105
110	43.0	81	83	84	86	87	89	90	91	93	95	96	97	99	100	101	103	104	106	107

Human Heat Index										
Relative humidity (%)										
40	45	50	55	60	65	70	75	80	85	90
80	80	81	81	82	82	83	84	84	85	86
81	82	83	84	84	85	86	88	89	90	91
83	84	85	86	88	89	90	92	94	96	98
85	87	88	89	91	93	95	97	100	102	105
88	89	91	93	95	98	100	103	105	109	113
91	93	95	97	100	103	105	109	113	117	112
94	96	99	101	105	108	112	116	121	126	131
97	100	103	106	110	114	119	124	129	135	
101	104	108	112	116	121	126	132			
105	109	113	117	123	128	134				
109	114	118	124	129	136					
114	119	124	130	137						
119	124	131	137							
124	130	137								
130	137									
136										

immunity. External signs indicating thermal stress are easy to observe in the herd: accelerated respiratory rate, open mouth and mucous ptialism.

The survival response of a dairy cow facing heat stress is a lower dry matter intake. Indeed, fermentation in the rumen induces an exothermic reaction. This incremental heat therefore needs to be evacuated in addition to the thermoregulation due to high external temperatures.

There is also a positive correlation between the increase in ruminal temperature (thermoregulation defect) and a higher risk of acidosis. Causes of rumen acidosis are as follows: decrease in the quantity of organic matter digested, reduction in the production of saliva rich in buffer substances (specific glands stimulated during mastication) and a drop in the quantity of sodium bicarbonate available in the blood due to intense breathing.

Moreover, there is an imbalance of the ruminal flora at the expense of cellulolytic flora. Feed efficiency is also affected.

Heat stress therefore induces the same pathologies as a chronic clinical/subclinical acidosis: health condition is compromised, lameness, fertility disorders and higher culling rate.

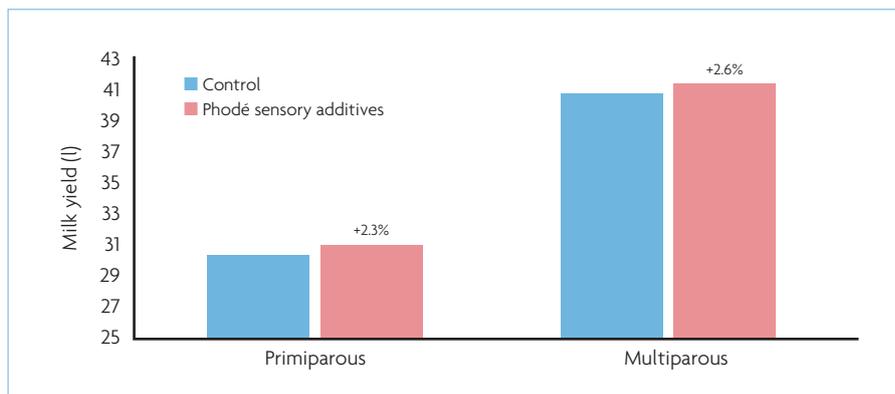
### Preventing the acidosis risk

Equipment such as fans or misting systems are systematically used in dairy farms confronted with yearly heat stress.

Unfortunately, these tools are not sufficient to preserve the dairy yield potential as there is a double rumen-related impact: on the one hand, a lower dry matter intake and on the other hand, a lower feed efficiency. Feed ration must therefore be adjusted during high-risk periods to reduce these impacts.

### Sensory additives to promote Better-Being

A 'Better-Being' of animals is key for profitable operations. Phodé has been using a holistic approach for more than 20 years by developing unique sensory solutions to enhance health and Better-Being of dairy cows. Thorough knowledge of the brain's ecosystems as well as plant-based active



**Fig. 2. Evolution of milk production during period of heat stress.**

ingredients working on the latter have led Phodé to develop VeO, a one-of-a-kind solution mainly composed of a specific extract from the Rutaceae family that neuromodulates the signalling stress message in the nerve system. As a result, dairy cows perceive less environmental heat stress and behave normally, in other words, fewer changes in feed intake or behaviour.

Phodé has also been working on the third brain – the microbiota – via its Oleobiotec range based on essential oils and spices.

Their scientific studies have not only shown the bio-regulating action of ruminal fermentation and the production of volatile fatty acids stemming from this but also the powerful effect that a specific mix of spices could have on buffer substances in the saliva.

### Field evidence

Phodé tested the combination of these two sensory solutions among heat-stressed dairy cows.

The trial took place on a farm in Portugal and included 296 lactating cows. Two study arms were formed according to lactation ranks and stages: mid-lactation primiparous cows and early-lactation multiparous cows.

Daily milk production, feed intake, number of animals, as well as lactation stages, were recorded. Over the test period, mean temperature at 5:00am was 17°C and that at 3:00pm was 32°C. However, it was observed that mean temperatures were higher during the supplementation period compared with that of controls. Before supplementation, cows consumed an average of 22.7kg of dry

matter. We also noted changes in feed intake during supplementation. Cows in both groups had a greater intake in the morning when the temperature at 5:00am was higher.

The neuro-sensory VeO solution is adaptogen, meaning that the treated cows regulate their feed intake according to real-time environmental conditions.

In this trial, we noticed that the cows would anticipate peak afternoon temperatures, especially when morning temperatures were high, by adapting their feed intake accordingly. Exothermic fermentations therefore mainly occurred at times when the outside temperature was still bearable.

On the contrary, supplementation had no effect whatsoever on the afternoon ration consumption since temperatures were already too high for the cow to want to risk increasing its body temperature even more.

These behavioural results matched those recorded in previous studies led by Phodé with similar effects on feed intake regulation. A linear regression model taking into account all recorded parameters was established to assess the effect of each parameter on the evolution of milk production.

It appears that using Phodé's two sensory additives increased milk production by 0.79L/j and 0.92L/j in primiparous and multiparous cows respectively. This therefore represents 32% and 35% respectively of these variations in milk production.

### Conclusion

The two sensory additives described in the article have proven they can maintain productivity in dairy cows during heat stress; all the more when temperatures are higher during supplementation in both groups. Phodé sensory solutions have also been tested under other stress factors as they are various and cumulative on farm.

It appears that they offer a unique way to improve welfare, overall health condition and performance in production and reproduction. ■

**Table 1. Description of primiparous and multiparous groups.**

Mean values	Primiparous	Multiparous
Number of animals	76	53
Days in milk	150.3	56.5
Dairy production (L)	30.3	40.4
Dry matter intake (kg)	22.7	





## Unique products offer improved quality and effectiveness

Intra Hoof-fit Gel was the first antibiotic-free product worldwide to receive the official registration from the Veterinary Medicine Directorate (VMD) for treatment of digital dermatitis (Mortellaro).

[intracare.nl](http://intracare.nl)

This emphasises the quality and effectiveness of the unique products produced by Intracare in the Netherlands.

Official tests by the Dutch Animal Health Centre proved that Intra Hoof-fit Gel is 1.57 times more effective at treating the infection than antibiotic spray. Professional hoof trimmers prefer to work with Intra Hoof-fit Gel. The product works well and is safe to work with.

Intra Repiderma is a skin care product in an aerosol spray.

The active ingredients are

chelated minerals which, in contrast to traditional minerals, can be absorbed much more easily by the skin. Because of this, Intra Repiderma is not only active 'on' the skin, but also 'under and within' the skin (epidermis and dermis).

This process is further intensified with Intra Repiderma because the chelated minerals are micronised using the latest technologies. In this micronisation process (nanotechnology), the minerals are ground to minuscule particles of 3µm maximum, using specialist equipment.

This is 25,000 times smaller than a grain of sand. Consequently, the particles are able to penetrate deeply into the skin in a short space of time, so it can also perform its task there.

Intra Hoof-fit Gel is available in a 330ml package and Intra Repiderma is available in a 250ml aerosol can.

## Treating infected hooves with a quick ready-to-use spray

Hoof injuries are a major concern in dairy production with a high prevalence and severe economic losses – milk yield might decrease up to 20% and there may also be loss of body condition, infertility and mastitis.

[livisto.com](http://livisto.com)

Poor nutrition may influence hoof growth and integrity, so mineral deficiencies must be properly controlled when hoof problems occur. Initial wounds may be treated with disinfectants, but if they get infected antibiotics may be necessary for an appropriate healing.

Orondo Spray is a ready-to-

use coloured spray based on chlortetracycline, an antibiotic from the group of tetracyclines.

Chlortetracycline acts against micro-organisms by inhibiting its protein synthesis, which prevents them from growing and causing infection.

Orondo Spray offers a wide range of possibilities. It can be used in superficial and surgical wounds, foot rot, and other pododermatological injuries such as digital dermatitis.

Its ready-to-use spray formula offers a quick and comfortable application method. And the fact that it is coloured allows easy recognition of treated animals.



## Protecting hooves against the harmful house environment

Hoof care products usually have an antibacterial effect, which disinfects sores such as digital dermatitis in the hoof area. This method has a limited effect, as after the cow has been put through a hoof bath, it returns to the harmful environment where the bacterial level is very high.

[vilofoss.com](http://vilofoss.com)

The risk of re-infection is high in these situations. To achieve the full effect of disinfecting a sore, it must be kept clean afterwards, which is not always possible in modern housing systems.

Stalosan Hoof was developed to form scabs and to neutralise tissue-decomposing waste products such as ammonia and hydrogen sulphide on the cow's skin. Stalosan Hoof protects sores and skin against the harmful hoof environment in

the housing unit. This relieves the pressure on the cow's skin and improves the conditions for sore healing.

Stalosan Hoof works in a different way to other hoof care products and hoof disinfectants because, to put it simply, the purpose is not to kill something, but to leave the wound in peace to heal by desiccating and cutting off outside influences.

The product is extremely desiccating and forms a membrane of minerals and salts on and around the wound. Desiccation neutralises the bacterial growth in wounds, thus advancing wound healing and wound crust formation, whereas the membrane is cut off and protected.

Furthermore, Stalosan Hoof has a low pH; normally pH is high in a barn environment because of ammonia.

Stalosan Hoof is marketed in 15, 200 and 1,000 litre containers.



## Ensuring a rapid recovery from lameness

Lameness is the third most costly disease affecting dairy cows. It decreases feed intake and mobility, thus reducing milk yield and profitability. By fitting a Cowslip to the healthy claw of a lame cow, the sore claw is raised and weight is transferred off the affected area.

[cowslips.com](http://cowslips.com)

This alleviates pain, prevents further injury and allows a rapid recovery. Feed intake and milk yield levels will return to normal.

Cowslips are available in four sizes:

- Cowslips Original: Manufactured in 100% PVC with a unique non-slip raised latticed sole, of sufficient height to elevate a diseased digit

off the ground. Used on Jerseys, Guernseys, Ayrshires and Heifers.

- Cowslips Plus: These are longer and wider than the original, with a length of 130mm. The sole is tapered with a deeper heel, designed to wear more evenly, reduce stress at the heel and take weight off the flexor tendons. Used on Holsteins, Friesians.

- Cowslips XL: These are wider than the Plus shoe and half an inch longer. They have been ergonomically engineered with a rounded moccasin toe for extra comfort and fit. Used on North American Holsteins and for large/abnormal claws.

- Cowslips Doc: These are 5mm wider and 14mm longer than the XL shoe, developed in response to market demand. They are used when extra width and length is required.





## Clean and disinfect in one go for outstanding operating safety

If your cows' hooves are prone to disease, your business will soon be standing on shaky ground. GEA offer a way of keeping the health of your animals firmly under control.

[gea.com](http://gea.com)

This is easier and more effective than you might think: the best way to correct hygiene management is shown by their hygiene bath

PediCuRx – an effective combination of exclusive foot bath technology and powerful hygiene products.

With the automatic PediCuRx system you can program the 2-in-1 hoof hygiene bath to suit your farm. The system ensures that all of the processes run optimally, from filling the baths to cleaning the installation. A big advantage is the automatic dispensing of the hygiene products. The control unit ensures

that the solution is changed regularly at the end of a defined time. Only the troughs themselves in the PediCuRx system are extra long – so that the bath can take its optimum effect. Everything else is extra short: the preparation time, fluid change and cleaning.

Now the farm has a constantly fresh and powerful foot bath with less expense. For example, the inflatable seal offers a rapid closing solution, without any mechanical components, and ensures a high level of operating safety.

The fluid drains out over the whole width of the bath without any edges to hold back the fluid or corners to attract dirt. The basis for the safety and durability of the installation is the extremely robust plastic the baths are made from and that is resistant to the chemicals used.

## Powerful blend of biocides and hoof hardeners for total hoof protection

Often caused by wet conditions and poor hygiene, digital dermatitis in dairy cows, is associated with serious discomfort and painful lesions around the hoof. Digital dermatitis can often lead to lameness if not treated properly and is a serious animal welfare issue worldwide.

[quatchem.com](http://quatchem.com)

Lameness limits the cow's ability to stand long enough to feed, breed and milk, resulting in significant financial losses to dairy farmers, with a single case of lameness costing farmers up to £180 (>€200).

Formalin, traditionally used to

prevent and treat hoof disease, can be painful on raw lesions, increasing stress levels in cattle. Formalin is increasingly being banned from farms, due to its hazardous nature.

It is toxic to human users by inhalation, if swallowed or through skin contact and studies suggest that it may cause cancer. Farmers around the world therefore now seek an alternative product.

In response, Quat-Chem developed a formalin-free product to improve hoof health in cattle, whilst protecting human users from the dangers of formalin. Hoofshield provides a 'complete lameness prevention programme' and consists of

a powerful blend of synergistic biocides and hoof hardeners, formulated with surfactants for effective cleaning and dirt penetration.

Hoofshield is highly concentrated, offering substantial cost benefits to the farmer. A UK dairy farmer noted: "Products I have used in the past have caused burns and irritation. Hoofshield is noticeably milder, and I am already seeing a difference in overall hoof health."



## Positive impact on the condition of hooves

Hoof pathologies are a major problem in dairy housing and can lead to significant loss of money and production for dairy farmers.

The French Livestock Institute recently monitored three farms equipped with Bioret Agri's Magellan Groove flooring and its positive impact on the condition of cows' hooves.

[bioret-agri.com](http://bioret-agri.com)

After only six months of use, veterinarians observed that nearly 80% of the cows had healed from previous hoof injuries (sole contusions, ulcers and even digital dermatitis).

Veterinarians explain that these outstanding results are due to the

design of the Magellan rubber with its small and large drainage grooves allowing urine to drain quickly.

The urine is stored in the Magellan's large longitudinal channels and guided toward the pit with the passage of the scraper thanks to rubber fingers attached to its blade. In the meantime, cows' hooves are elevated and no longer immersed in urine making them drier, harder and healthier.

Veterinarians also explain that by providing a drier hoof, the Magellan has a slightly abrasive quality that permits normal hoof growth.

Tests results clearly show that cows on Magellan rubber flooring require trimming every six months, while the requirement on standard

rubber mats is every 3-4 months. Thanks to its non-slip surface design and excellent adherence to the rubber, cows are sure-footed and actually run on the rubber.

With the Magellan Groove, the

French family-owned company, Bioret Agri, introduces active alley flooring with unique grooving and drainage concepts that ensure better cow comfort, safety and healthier cows.



## Good for your cows and for the environment

Traditional hoof bath solutions, when used for long periods of time, have been responsible for contamination of soil and ground water. The BouMatic StepSept line is an environmentally friendly and comprehensive hoof care solution for today's dairy.

[boumatic.com](http://boumatic.com)

StepSept CSE-200 is an enhancing additive that dramatically improves the effectiveness of conventional hoof bath solutions.

It acidifies the solution which creates a germicidal effect on hoof pathogens. StepSept CSE-200 resists the neutralising effect of organic matter on the acid in the hoof bath due to a pH buffer, so it works longer treating more cows per gallon. It also employs a unique secondary germicidal formula effective against spirochete bacteria, the suspected cause of hairy hoof warts.

StepSept PB-50 is a hoof cleaner used before your primary treatment hoof bath. It contains high levels of penetrating surfactants to loosen dirt before the cow enters the treatment bath. Less contamination in the treatment bath helps extend the life of the hoof bath solution.

StepSept FB-T100 is a topically applied treatment solution. A two

germicide pathogen killing system with acidified copper sulphate plus a unique, secondary germicide for fast results.

StepSept pH Down extends the life of your copper sulphate hoof bath by reducing and keeping the pH level below four in heavy organic soil loads.

This powerful product can handle 500 cows before a hoof bath change and allows for a 50% reduction in copper sulphate usage.

The BouMatic StepSept hoof bath solutions help you to maintain healthy hooves and a healthy bottom line.



## Lameness is a major challenge in dairy herds around the world

Digital dermatitis (DD) is an infectious condition that spreads quickly and can reduce milk yield by at least one litre per cow per day. Provita Animal Health have developed a range of hoof care products and a hoof care programme for producers.

[provita.co.uk](http://provita.co.uk)

Formaldehyde and copper sulphate are the most commonly used non-antibiotic foot baths. However, concerns due to formaldehyde being a carcinogen and copper being a biohazard means their long-term use is questionable.

A recent study by the Royal Veterinary College, University of London, found that Provita Hoofsure Endurance significantly

reduced the frequency of infected hooves with DD and was 19% more effective than formaldehyde.

A study by the University of



## Antibiotic-free hoof care provides maximum effectiveness

Kanter's Hoofgel is an antibiotic-free hoofcare product that is ideal to keep the hoof and surrounding skin in an optimal condition. Due to the unique composition the gel has optimal adhesion for maximum effectiveness and protection.

The gel is suitable for individual application after hoof trimming and with immediate bacterial infections.

[kanters.nl](http://kanters.nl)

It is based on copper and zinc chelates. Copper has an antibacterial effect and provides support for the hooves.

Zinc is added to promote the recovery of horn, skin and epithelium and it also has an antibacterial effect. Therefore, both minerals complement each other.

The chelates are added to penetrate deep into the wound, they also work as a dirt-repellent and are

effective at any temperature. Kanter's Hoofgel has the following advantages:

- Provides support in case of Mortellaro and interdigital dermatitis.
- Very strong adhesiveness.
- Antibiotic-free.
- Easily applied after hoof trimming.
- Results within five days.
- No tape necessary.

The Hoofgel needs to be used after trimming. Before applying the product the claw and the skin between the claws needs to be clean and dry (all manure needs to be removed).

When this is done apply a covering layer of Hoofgel on the claw, the lesion or between the interdigital space.

In severe cases tape the claw with Hooftape. After four days remove the tape and apply Hoofgel again.

Kentucky found that Provita Hoofsure Endurance was 7% more effective than copper sulphate.

With anti-microbial resistance a global issue, the use of antibiotics in foot baths is also not sustainable.

Hoofsure Endurance foot bath solution is a proprietary blend of organic acids, essential oils and wetting agents.

It is safe for the animal, human health and the environment and is antibiotic free.

Its highly concentrated formula means it can be

used for up to 500 cow passes in a 200 litre foot bath for cost-effective use.

Hoofsure Konquest hoof gel is highly concentrated with a potent penetrating action. It has advanced bio-adhesion properties for use with or without a hoof bandage, and is antibiotic-free. The gel remains stable in all weather conditions.

Hoofsure Combat hoof spray is a unique film-forming spray providing longer lasting activity. The film is waterproof and breathable promoting natural healing.

It can be used for spot-spraying in the parlour or during hoof trimming, and is antibiotic-free.



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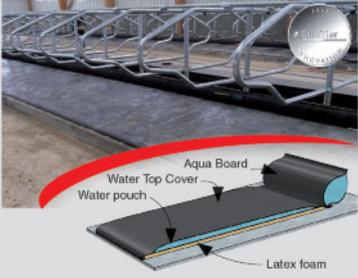
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The level and impact of heat stress on cows is influenced by a combination of ambient temperature and relative humidity. New research has shown that temperatures in excess of 20°C and 50% relative humidity<sup>2</sup> will lead to cow discomfort and reduced milk production.  
<sup>1</sup> Saint Pierre et al., 2003 - <sup>2</sup> Burgos & Collier, 2011.

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- Increased Feed efficiency : up to 7%<sup>4</sup>, +120g of milk/kg/Dry Matter Intake.
- Optimizes rumen pH (less risk of acidosis).

LEVUCCELLSC is a rumen specific live yeast *Saccharomyces cerevisiae* 1-1077, selected through collaboration with INRA (France).

<sup>3</sup> Metaanalysis De Ordanza et al, 2010 proven with one strain (1-1077), ONE recommended feeding rate (10 billion/day). <sup>4</sup> Marfola, et al, ADSA 2010.



# Animal welfare: the role of milking machines and mastitis

How many times in the past 50 years have you either heard of or read 'mastitis is one of the most costly diseases in dairy cows worldwide'? That is the most common statement made in dairy industry articles and studies and is simply accepted as reality.

by Bill Gehm, CoPulsation,  
New York, USA.  
www.CoPulsation.com

That reality has grown into a range of topics relating mastitis to cull rates, conception rates, lameness, low body score and of course udder and teat end health. The economic impact of each of these has been studied and documented to show a substantial negative impact to the bottom line of every dairy in the world.

In real terms mastitis is driving the cost of production and with current milk prices it is resulting in a cost of production exceeding farm revenue leaving dairy farmers with a serious financial challenge.

One aspect of the mastitis problem often overlooked but starting to come into focus in recent years is animal welfare.

Mastitis is fundamentally an infection which brings with it many undesirable aspects other than simply lost production and the cost of treating the infection.

## Animal welfare issues

Mastitis causes physical swelling of udder tissue creating both pain and physical harm to the udder that in many cases is permanent.

Dr Ynte Schukken, a Professor at Cornell University in the USA, stated "Reducing pain events in cows will certainly need to include a reduction in clinical mastitis cases and include an increase in pain-control medication. I also expect that the use of antibiotics as one of the main components of curative and preventative programmes will be further scrutinised" (International Dairy Topics Volume 10 Number 1).

Mastitis related pain was also a topic of the 49th annual NMC

meeting with a presentation made by Dr Ken Leslie, a professor with the University of Guelph in Canada. Dr Leslie reported on a survey of veterinarians in the UK in which they were asked to rate the severity of pain associated with mastitis on a scale of 1-10.

The veterinarians rated severe mastitis at a pain level of seven, comparable to a fracture or foot abscess.

The information presented suggests that on any given herd on any dairy there exists 5-10% of the cows experiencing an unpleasant and uncomfortable day due to the pain of either clinical or subclinical mastitis. This excludes those in discomfort from lameness and other issues associated with mastitis.

## Long term effects

The impact to the animal does not typically end after the conclusion of several days battling the infection and associated pain.

In many cases there is permanent physical harm caused to the udder

tissue resulting in a reduction in production in best cases and a complete loss of function of the affected quarter in other cases. This is visually evident in the animals with udders that are uneven and with quarters that simply milk much more slowly than others.

A visual survey of a typical dairy farm during milking time will reveal the extent that the problem exists. Note the number of cows that are three quartered or have a slack quarter prior to milking.

Further observation of the cows after machine removal will yield even more examples of problem udders with a combination of slack quarters and quarters that simply do not milk out well.

This all adds up to uneven udders that were not in that condition at the time of first milking as a heifer. The cow shown in Fig. 1 below is a typical example of an udder with one quarter that is milked out while the other remains quite full.

This not only represents an animal welfare issue from a past problem but a current one as the teats asso-

*Continued on page 20*

Fig. 1. A typical example of an udder with one quarter that is milked out, while the other remains quite full.



Fig. 2. An example of an udder on a heifer in which a prior mastitis event has caused permanent damage.

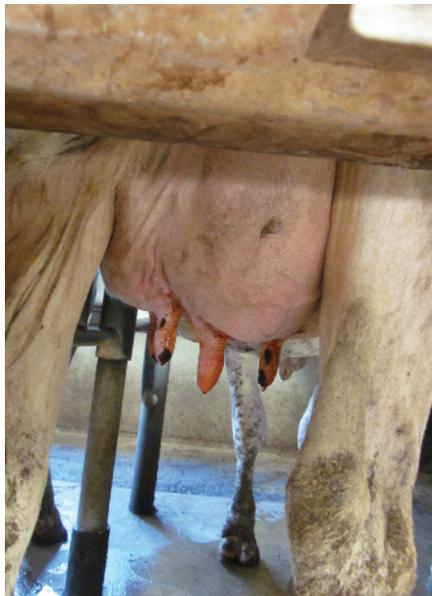
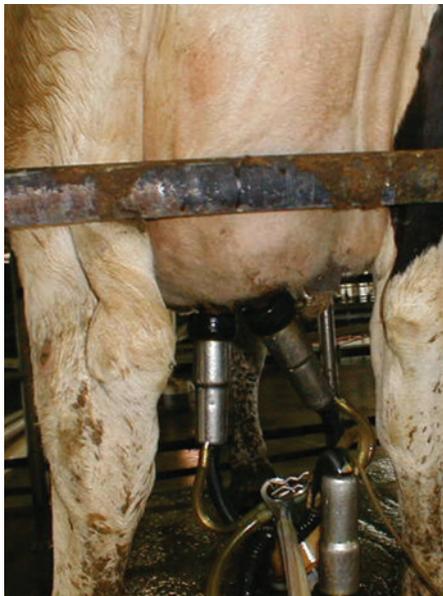


Fig. 3. The termination, or blinding, is accomplished in a variety of ways that include banding the teat to cut off blood flow.



Continued from page 19  
ciated with the empty quarter con-  
tinue to be subjected to vacuum  
while no milk is yielded.

Fig. 2 provides another example of  
an udder on a heifer in which a prior  
mastitis event has caused perma-  
nent damage. This photo was taken  
shortly after machine removal and  
is a condition commonly noted in  
typical dairy herds.

The udders of these animals often  
look reasonably normal just prior to  
milking when all quarters are full  
provided that the udder damage is  
not so severe as to have resulted in  
significant loss of function in a  
quarter.

An audit of the number of cows  
with udders of this condition fol-  
lowing milking will provide an indi-  
cation of the extent of the problem.

### A recurring problem

Mastitis is known to be a recurring  
problem and one in which many  
cows have more than one clinical  
case in a lactation or multiple lacta-  
tions. A recurrence in the same  
quarter causes further damage to  
the inflicted quarter and can often  
result in a permanent loss of func-  
tion of that quarter.

Many dairies will terminate the  
function of a quarter that experi-

ences multiple mastitis events. The  
termination, or blinding, is accom-  
plished in a variety of ways that  
include banding the teat to cut off  
blood flow (Fig. 3), cutting off the  
teat entirely from the udder or the  
use of chemicals infused into the  
quarter.

The use of chemicals to blind  
quarters was discussed by J. R.  
Middleton of Washington State  
University in the USA. That study  
evaluated both the use of chlorhex-  
idine and povidone-iodine.

The motivation for that study was  
'The Washington State University  
dairy herd experienced an outbreak  
of mastitis'.

The dairy had been using routine  
mastitis control procedures that  
simply failed. This suggests that  
even when proper procedures are  
followed that serious animal wel-  
fare issues exist and result in harm  
to udders with permanent damage  
occurring.

The problem of mastitis and asso-  
ciated udder harm is so prevalent  
that it can be seen everywhere.  
Many industry photos of udders  
often show evidence of damage  
which are seen in trade publications  
and even the promotion banner,  
literature and videos of the large  
dairy product suppliers.

Even the best in class cows at the  
World Dairy Expo are found to

exhibit the same udder issues after  
being milked leaving no doubt of  
the prevalence of the issue and the  
extent of the animal welfare issue it  
creates both in visual evidence and  
pain for the animal.

Dr Ken Leslie authored an article  
in MilkProducer on the topic of pain  
relief noting "Ask a breastfeeding  
woman who has mastitis if it is  
painful. Her answer will be an  
unequivocal 'yes'. You can only  
imagine what her response would  
be if asked about the impact of  
mastitis resulting in a loss of func-  
tion or permanent reduction in a  
breast. From a consumer perspec-  
tive, the pain associated with masti-  
tis is an obvious animal welfare  
concern."

### How to address the issue?

The impact of having 10% of the  
herd on any given day experiencing  
some level of discomfort becomes  
more than an animal welfare con-  
cern, it represents a very serious  
problem.

The additional consideration of  
many animals having permanent  
physical harm inflicted as a direct  
result of mastitis and poor milking  
performance creates an animal wel-  
fare disaster in waiting for the  
industry.

The question is what will the  
industry do to address this issue?

It should be obvious that the man-  
agement practices of the past 50  
years are not working to address the  
problem.

The trend of rising slaughter and  
death rates in response to demands  
for declining bulk SCC levels is not a  
solution but an animal welfare issue  
of its own.

No rational person can claim to  
have resolved the mastitis 'problem'  
by having simply managed it with  
data, treatment and culling, result-  
ing in cows with dramatically  
reduced life expectancies.

Perhaps the industry should focus  
on the machine to animal interface  
and explore the direct impact mil-  
king machines have on the pushing of  
bacteria up the teat canal and the  
impact they have on the teat tissue  
during the milking process.

A good place to start is to simply  
place your fingers into a working  
liner for the duration of time  
required to milk an animal and ask  
yourself if the experience is pleas-  
ant and if it is simply upwardly  
pinching about the end of the teat  
thereby shoving bacteria upwards.

That experience represents the  
start and end of the day for the ani-  
mals and one that needs to be con-  
sidered in addressing animal  
welfare. ■

The banner features a blue background with a white silhouette of a cow and a horse. In the top left, there is a logo for 'viv' with '40 YEARS' below it. The main text reads 'VIV EUROPE 2018' in large white letters. Below this, it says 'JAARBEURS, THE NETHERLANDS' and 'Amsterdam 9 30 min'. The dates 'JUNE 20-22' are also present. A circular logo in the center contains a horse head silhouette and the text 'SHARING DATA BETTER POULTRY VIV EUROPE 2018'. At the bottom right, it says 'WORLD EXPO FROM FEED TO FOOD'. The bottom left corner includes 'VIV EUROPE IS PART OF SFP INTERNATIONAL WEEK SMART FOOD PRODUCTION'. The website 'WWW.VIV.NET' is in the bottom center, and 'vnu exhibitions europe' is in the bottom right.

# The different effects tubing materials can have on raw milk collection

Today's dairy farmers need to be highly understanding of all the critical aspects of raw milk production, including the processing equipment and materials the milk comes into contact with.

Processors and farmers alike are well aware of the negative effects poor equipment sanitation can have on product quality, hygiene and production efficiency in milking applications.

by **Iuliana Nita, Charles Golub, Joe Guesman and Mike Tzivanis, Saint Gobain, USA.**  
[www.processsystems.saint-gobain.com](http://www.processsystems.saint-gobain.com)

Proper equipment is a large part of maintaining both a high quality milk product (safety/hygiene), as well as compliance.

As a component in milk processing (and storage) equipment, tubing plays a vital role in maintaining/upholding and transferring product safety, hygiene and quality.

To ensure proper sanitary conditions, the inner surfaces of milking equipment and pipelines, or tubing, should be cleaned daily. Regular product sampling and testing are also necessary throughout various stages of the milk collection and transfer process to ensure product quality.

Most dairy farm and processing equipment is made of stainless steel, where alkaline and acid-based detergents and sanitisers are run through the system components to flush them clean of bacteria and other particles or debris. If not properly sanitised, the unwanted build up of protein and organic material – or milk fouling (proteins, mineral deposits, and fats) – can occur.

This build up, which can occur on rubber tubing, can lead to microbial contamination if not cleaned properly. Contaminated tubing can create multiple negative effects including a breach in regulatory compliance, textural and taste issues, and reduced efficiency for processors.

In many cases, deposits that are produced from fouling may be dislodged by flowing milk, causing contamination.

Milk fouling can occur during both the collection and processing stages, which can negatively impact quality and hygiene in the finished dairy product – along with milk-brand quality and integrity.

## Tubing considerations

Chemicals leaching from the tubing composition into milk can have a negative effect on the product's organoleptic properties, but an even more damaging impact on processors' ability to achieve compliance with regulatory standards that govern the health and safety of foods and beverages for consumer consumption.

Over time, rubber tubing can lead to a build up of an unsanitary coloured residue/extractables, potentially including carbon black, which is a chemical material used in rubber and plastic products, among

others. The issue with carbon black and other such chemicals is that if they leach into milk, they could cause taste and odour issues and/or regulatory and health concerns.

For example, Figs. 1 to 4 are a series of images representing a comparison of a 72-hour chemical soak of EPDM and silicone tubing.

The tubing was soak tested using: 0.5% (v/v) nitric acid and isopropyl alcohol (IPA, 99.8%) at room temperature, both of which are known cleaning chemicals for dairy tubing.

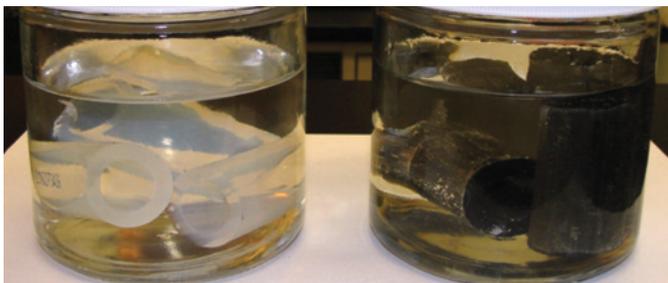
## Tubing test

The Saint-Gobain Northboro Research & Development Center – the second largest multi-disciplinary R&D center for the Saint-Gobain Group located in the United States – tested tubing samples, including rubber tubing and Saint-Gobain Tygon II silicone tubing.

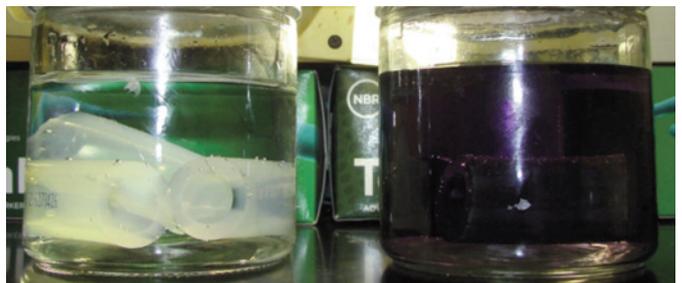
The goal was to relatively compare the amount of organic semi-volatile and non-volatile

*Continued on page 22*

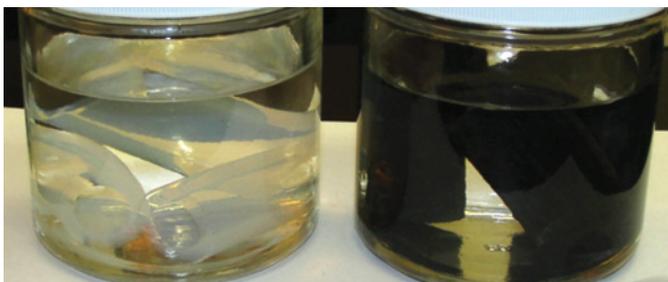
**Fig. 1. Silicone tubing (on left) and EPDM tubing (on right) in 0.5% nitric acid – day one (initial).**



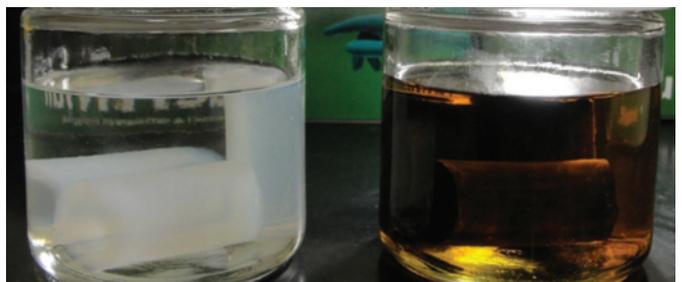
**Fig. 2. Silicone tubing (on left) and EPDM tubing (on right) in 0.5% nitric acid – 72 hours.**

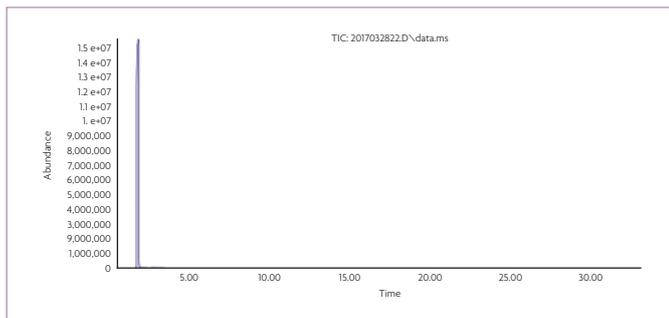


**Fig. 3. Silicone tubing (on left) and EPDM tubing (on right) in IPA – day one (initial).**

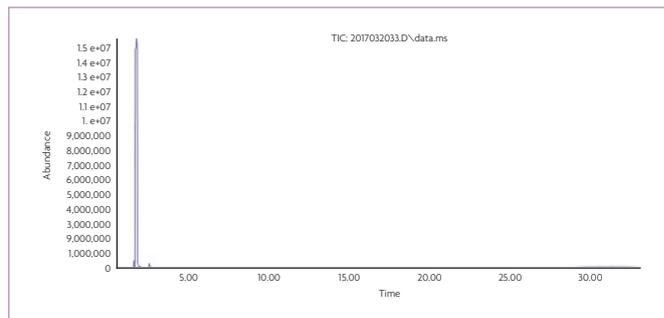


**Fig. 4. Silicone tubing (on left) and EPDM tubing (on right) in IPA – 72 hours.**

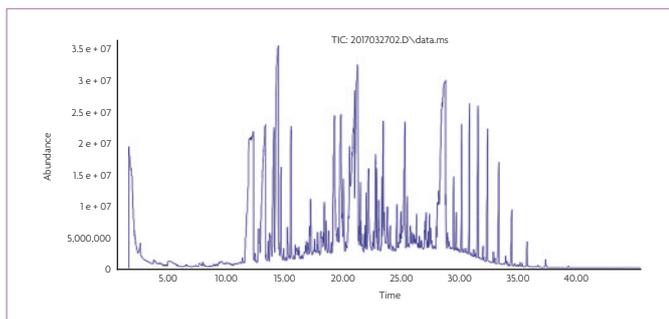




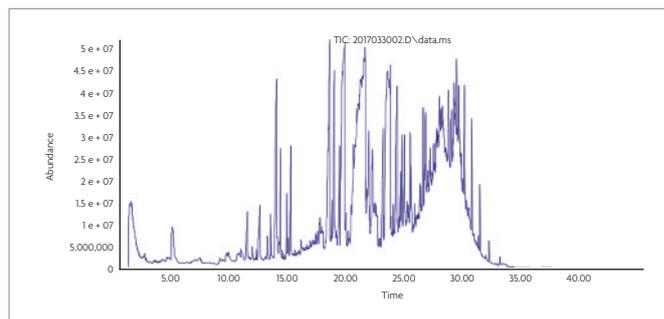
**Fig. 5. GCMS chromatogram with liquid injection of Tygon II tubing extracted 72 hours in DI water at room temperature. DI water was vacuum oven dried 100°C-72 hours. Any residue was dissolved using methanol and this methanol solution was analysed.**



**Fig. 6. GCMS chromatogram with liquid injection of Tygon II tubing extracted 72 hours in 0.5% HNO3 at room temperature. HNO3 was vacuum oven dried 100°C-72 hours. Any residue was dissolved using methanol and this methanol solution was analysed.**



**Fig. 7. GCMS chromatogram with head space of unbranded black rubber tubing extracted 72 hours in 0.5% HNO3 at room temperature. HNO3 was vacuum oven dried 100°C-72 hours.**



**Fig. 8. GCMS chromatogram with head space of unbranded black rubber tubing extracted 72 hours in DI water at room temperature. DI water was vacuum oven dried 100°C-72 hours.**

*Continued from page 22*

extractables between silicone and rubber tubing after soaking it in DI water (representing the aqueous nature of the milk) and 0.5% nitric acid solution (representing the cleaning chemicals used to clean the tubing).

Figs. 5 to 8 show the key gas chromatography (with mass spectrometer detector) results from the testing, taken from an April 2017 analytical report.

As observed in the figures, the GCMS analysis for Tygon II silicone tubing shows one silicone-related peak with each solvent; the rubber tubing extracted at least 24 distinct chemical compounds. These findings clearly demonstrate that silicone is a much cleaner tubing material vs. rubber under these testing conditions.

### Protection through selection

One effective course of action dairy farmers and processors can take to ensure product quality, safety and regulatory compliance in milking applications is to evaluate and specify appropriate tubing solutions.

It is critical in specifying proper equipment to ensure organoleptic properties are unaffected (or have limited effect) from dispensing tubing materials.

From initial collection to transfer, processing and more, tubing is a key

component in nearly every part of the milking process. This means that there are several touchpoints or opportunities for milk to become contaminated if proper tubing is not specified.

Plus, unclean milking systems foster bacteria growth, which can lead to hygiene issues and milk products with limited shelf life – not to mention potentially harmful implications for consumers.

A key consideration in the selection process should include tubing that exhibits performance properties that meet the milking equipment industry's specific needs, such as flexibility in hot and cold temperatures (for proper fitting installation and retention), resistance to

kinking, hardening, fat absorption and durability (to ensure long and reliable service life), among others.

Additionally, it is important to ensure the milk tubing has been rigorously tested and proven to perform under the various conditions that can be encountered in a milking application.

### Products that perform

Saint-Gobain's Tygon II is a high-performing silicone tubing engineered with a smooth surface and inner bore that resists sticking, encrustation and bacteria growth, while reducing the potential for particle entrapment.

Also, Tygon II does not contain the level of additives and by-products as compared to EPDM rubber that could leach into milk and alter the quality of the milk.

Tygon II silicone tubing also provides flexibility for hot and cold temperatures, along with durability for long and reliable service; it also offers resistance to kinking and tearing.

Additional products that Saint-Gobain offers to this market include Tygon S3 M-34-R milk tubing which is entirely clear, allowing for immediate visual inspection and verification of cleanliness.

Its smooth, non-porous inner surface also reduces the occurrence of buildup from butterfat, milkstones and milksoil and can help to eliminate the possibility of bacteria growth within the milk transport line.

This long lasting tubing is also extremely flexible, installs quickly and easily fits milk handling equipment. It is specially formulated to reduce the risks that can occur with the use of rubber tubing, such as cracking, ageing and improper hygiene. ■

References are available from the authors on request:

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## Introduction

Intestinal roundworms or nematodes are often an important issue in calves or heifers put out to grass, but their importance in confined heifers should not be overlooked. An understanding of the individual types of worm and their lifecycles and geographical distribution is useful.

## Roundworms of the abomasum

The major roundworms of the abomasum are *Ostertagia ostertagia*, *Trichostrongylus axei* and *Haemonchus placei*. *O. ostertagia* is also known as the brown stomach worm and is important because it can undergo arrested development of its fourth larva stage (or L4) in the abomasums of young cattle.

These arrested L4s reside in the lumens of gastric glands in the abomasal wall during the seasons of the year that would be detrimental to this worm's development outside its host, such as harsh northern winters.

When these arrested larvae emerge from the abomasal walls they tend to initiate a severe illness and abomasal pathology known as ostertagiasis type II, the signs of which are anorexia, weight loss hypoproteinaemia and severe diarrhoea. Mortality is usually high, although the prevalence can be quite low.

Ostertagiasis type I is the more classical disease picture that is seen when heifers acquire the infection at grass. This form of the disease typically appears in peak pasture season and is characterised by weight loss, diarrhoea and hypoproteinaemia.

*H. placei* is less common but is also capable of causing arrested larval development. This worm is pathogenic as a result of the blood loss it causes which, in severe infestations, can cause quite severe anaemia.

*T. axei* also damages the mucosal lining of the abomasum and this often causes hypoproteinaemia, digestive upset and diarrhoea.

*Gangylonema Spp.* also live in the abomasum and forestomach, but this worm is of no pathological significance.

## The lactocrine hypothesis

Maternal effects on development can program cell fate and dictate offspring phenotype. Such effects do not finish at birth, but extend into postnatal life via signals communicated from mother to offspring in the colostrum. This transmission of bioactive factors from mother to offspring via the colostrum as a specific consequence of nursing defines a lactocrine mechanism (*J. of An. Sci.* 95 2200-2210).

The female reproductive tract is not fully formed at birth. Data from mice and ungulates indicate that disruption to the development during natal life can have a lasting effect on the form and function of uterine tissues. Uterine growth and histogenesis start to progress in an ovary in an independent way shortly after birth.

Pig data suggests that lactocrine signals transmitted 12-48 hours after birth constitute one source of such uterotrophic support. Disruption of lactocrine signalling, for example by limited colostrum uptake, alters uterine development and this can have negative consequences for subsequent adult reproductive performance.

Substantial differences in endometrial and uterine gene expression between colostrum and replacer fed gilts was evident by the second day after birth when RNA sequencing revealed over 800 differentially expressed lactocrine sensitive genes. Lactocrine sensitive biological processes include those associated with both cell-cell and ESRI signalling and tissue development.

Evidence for the pig indicates that colostrum consumption and lactocrine are required to establish a normal uterine development program and an optimal uterine development trajectory.

### Aflatoxin M1 in Chinese milk

In this Chinese survey (*Food Control* 78 94-99) it was found that the frequency of detection of aflatoxin M1 in UHT milk samples in 2014-15 was almost half the 2010 level (11.9 vs. 20.3%) and that samples from the north of China were less likely to be contaminated than those from the south.

### Listeria monocytogenes in Indian milk

This Indian study (*Food. Paths. and Dis.* 14 132-140) was undertaken to look at the levels of *Listeria monocytogenes* in raw milk samples.

In total, 457 samples of raw milk were collected from 15 cities in Rajasthan and analysed for *L. monocytogenes* using traditional cultural and

molecular methods. Just five of the samples tested positive and, of these, three were serotype 4b and there was one each of 1/2a and 1/2c.

Further virulence potential assessment showed that all five contained inlA and inlC internalins and two strains possessed the inlB gene.

All five strains were positive for listeriolysin O (LLO) and showed phosphatidylinositol-specific phospholipase (PI-PLC) activity.

A good correlation was seen between the in vitro pathogenicity test and the chick embryo test and strains showing higher LLO and PI-PLC activity were found to be lethal to chick embryos. All strains were resistant to the majority of antibiotics and were designated as

multidrug resistant strains. However, these strains were sensitive to nine of the 22 antibiotics used in the test. The authors considered the presence of multidrug resistant *L. monocytogenes* in raw milk to be a health hazard that warrants the need for increased consumer awareness to be highlighted.

### Impact of lameness on welfare

Pain associated with injury or disease of the feet or legs is manifested as lameness and providing a comfortable environment is critical for recovery and cow welfare (*Vet. Clins. of N. Am., Food An. Prac.* 33 153-164). This review considers the five freedoms as offering a framework for the discussion of lameness and its impact on cow welfare.

Altered feeding behaviour is a cause of reduced bodily condition, smaller digital cushion and lameness.

Pain management is an important part of treating lameness, although in severe cases the option of euthanasia may warrant consideration.

Lameness interferes with an animal's ability to exhibit natural behaviour by altering lying time, social interaction, ovarian activity and oestrus intensity and rumination behaviours.

### Abrupt weaning

The benefits of feeding elevated quantities of milk to dairy calves are well known. However, there is a reluctance to adopt this approach on commercial dairy farms because of concerns about growth, health and ruminal development during weaning.

The objective of this Canadian study (*J. of Dairy Sci.* 100 5390-5399) was to characterise the effects of an abrupt (immediate) or gradual (over 12 days) weaning off milk when calves were being

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fed on an elevated plane of nutrition (1.35kg of milk replacer per day).

Although the growth rates of the gradual step down calves were depressed from day 37 to weaning, the postweaning average daily gains were greater in the calves that had the abrupt change. Total ruminal volatile fatty acids was greater in the gradual step down calves on the day of weaning and these calves also had lower faecal starch.

These results showed the benefits of using a step down strategy from an overall energy point of view due to an increased adaptation of the gastrointestinal tract preweaning.

### Inflammatory gene expression profile

Nutritional conditions in early life can have a lasting impact on health and disease risk, but the underlying mechanisms are poorly understood.

In the healthy animal, physiological and behavioural responses to stresses are coordinated in such a way as to mobilise the resources necessary to respond to the stressor and terminate the stress. Induction of pro-inflammatory gene expression in the brain is one such example that is initiated in response to both physiological and psychological stresses.

In this American work (**Brain, Behav. and Immun.** 36 115-126), the hypothesis that early life nutrition would impact the pro-inflammatory transcriptional response to a stressor was studied.

Data derived from this work identified differential pro-inflammatory transcriptional responses throughout the brain driven by perinatal diet as an important variable that might affect risk or resilience to stressors.

### Inflammatory disease and embryonic development

This review (**An. Reprod.** 14 589-600) starts by stating that inflammatory diseases are prevalent in cattle and impair fertility.

Cows affected by inflammatory disease from parturition to the day before breeding have reduced fertilisation of oocytes, reduced survival of zygotes to the morula stage, impaired development to early stages of conceptus elongation and reduced secretion of interferon during pregnancy recognition stage.

Consequently, these cows reduced pregnancies and calvings.

### Late embryonic and early foetal losses

This Egyptian study (**Theriogenology** 100 16-23) had the objective of investigating the association between the number of maternal and non-maternal factors and the risk of late embryo deaths and early total deaths in dairy herds.

Of some 3826 pregnancies identified at day 30, 850 cows had lost the pregnancy by day 70 post insemination.

Overall, Holstein x Brown Swiss crossbred cows had a lower risk of late embryonic/early foetal death than pure Holstein cows. Cows that had postpartum problems were inseminated for the

first time, produced more milk, or were inseminated at temperature humidity index of >75% had a higher risk of late embryonic/early foetal deaths, whereas no correlation was found with lactation number or difficult calving.

### Shortage elements and embryo loss

The objective of this Russian research (**Turk. J. of Vet. & An. Scis.** 41 453-459) was to investigate the impact of bioelemental status of dairy cows on intrauterine growth restriction and embryonic death in early gestation.

It was found that trace element disorders in dairy cows are one of the main reasons for intrauterine growth restriction and embryonic deaths. The main elements involved are magnesium, copper, zinc, selenium and iodine that have direct or indirect effects on growth, generation and differentiation of cells in the developing embryo. High yielding milking cows often show mineral shortages and, consequently, the development of embryopathies.

### Niacin supplementation

This Indian review (**Asian J. of Dairy and Food Res.** 36 93-99) looked at niacin supplementation in dairy cattle. Niacin (vitamin B3) is very important for metabolism in animals because it is incorporated into the co-enzymes NAD and NADP.

In the dairy cow, microbial synthesis of niacin in the rumen is an important source of this vitamin. Other sources include endogenous formation and feed.

This vitamin is involved in various energy yielding pathways for the synthesis of certain amino acids and fatty acids and so it is important for milk production. Cows fed 6g/day may not be receiving enough but when fed 12g/day can increase production by about 1.0lb per day.

### Risk factors for displaced abomasum

The objective of this study in Kosovo (**Vet. Arhiv** 87 419-430) was to identify nutritional risk factors for the occurrence of displaced abomasum in Holstein dairy cows raised in regions with highly variable nutritional management.

Risk factors which increased the incidence of displaced abomasum included increased uptake of concentrates after parturition, increased bodily condition after calving, large herd size and increased daily consumption of corn silage in the pre-partum period. An increase in the consumption of grass hay in the pre-partum transition period decreased the incidence of displaced abomasum.

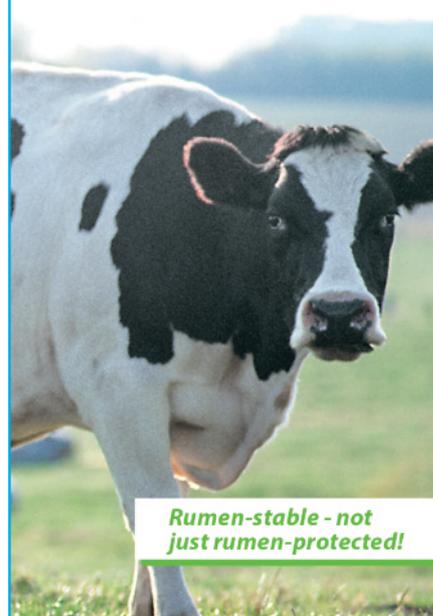
### Dietary energy allowance and dry matter intake

This Finnish work (**J. of Dairy Sci.** 100 5266-5280) suggested that whole body insulin sensitivity of dairy cows increased after parturition but the role of peripheral insulin sensitivity in the regulation of glucose partitioning seems to be minor relative to the major change in insulin secretion and clearance during the periparturient period.



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## Easing health management



Bayer has combined the convenience of mobile and digital technology with the power of 'big data' to further cattle health in a practical, yet innovative way through its updated BCS Cowditiion smartphone application.

In a significant new update, BCS Cowditiion now helps enable dairy professionals to make timelier and informed herd health management decisions by offering alerts, as well as a comprehensive dashboard of farm-specific data and aggregated data from external sources.

The 2014 release of Bayer's BCS Cowditiion app minimised visual subjectivity of body condition scoring with an innovative photo-and-line fit system, allowing for accurate and standardised assessment of individual cows, with just a smartphone. The app is already used in 14 languages, enabling dairy professionals in over 90 countries to more efficiently manage the health of their herds.

New updates to BCS Cowditiion now gives alerts for cows of sub-optimal body condition scores that

need to be attended to, and provides a comprehensive dashboard that is synchronised with the farm's existing herd management system. This dashboard also draws in 'big data' from external sources to offer dairy professionals further insights to the health condition of the herd, thanks to Bayer's partnership with Dairy Data Warehouse.

"We are committed to cattle health and we are passionate about achieving this in innovative ways," Rinse Boersma, Global Marketing Director for Dairy Cattle at Animal Health, Bayer, told International Dairy Topics.

"The new features with our BCS Cowditiion app and our partnership with Dairy Data Warehouse takes the convenience of the app to a whole new level. This offers greater opportunity for dairy professionals to efficiently monitor and manage the health of their herd, as well as the unprecedented ability to garner insights from existing herd data. Through this partnership the app can offer tailored and specialised solutions to each cow."

[bayer.com](http://bayer.com)

### BCF joins IMV Technologies



Through the integration of BCF Technology, IMV Technologies, a leader in animal reproduction technologies, continues to widen its offering to the entire reproduction management sector and particularly in imaging.

In 2017, IMV Technologies acquired ECM, a French veterinary ultrasound manufacturer and previously, in

2016, had added AlphaVision to its range, a video-assisted insemination system. Together these innovative and progressive businesses will be better positioned to deliver outstanding imaging products and services to veterinary and animal clients throughout the world.

Alan Picken, Managing Director of BCF, will lead the imaging division of IMV Technologies and become a member of the Management Board.

[imv-technologies.com](http://imv-technologies.com)

## Antibiotic alternatives



Kemin Industries recently organised a series of seminars to showcase its newly launched product Aleta in Asia Pacific. Aleta is a highly bioavailable immunomodulator that improves immunity and animal performance.

Dr Geoff Horst, research and development lead for Kemin and inventor of Aleta, was the key speaker for the presentations held in Thailand, Taiwan and Korea.

The seminars were tailored for each market to include relevant topics, introduce new technologies and recent trial results of Kemin products.

"These seminars are part of the strong commitment from Kemin to provide a highly concentrated immunomodulator molecule to improve animal performance during stressful situations. This is in line with the aspiration of livestock producers to meet consumer

demands for healthy, safe and wholesome food," Dr William Chin, Product Manager for Kemin Animal Nutrition and Health, Asia Pacific, told International Dairy Topics.

During the seminars, Dr Horst shared his expertise on phycology and emphasised how the algae beta-glucan could prime immunity, leading to improve overall herd health and productivity. This is a holistic way to manage immunosuppression from disease and stress, and can be used as part of a strategy to replace antibiotic growth promoters (AGPs). "We always hear that our business partners and customers are eager to learn new product innovations that can help address today's complex animal production challenges," added Dr Chin. "Through these roadshows, we are able to address customer concerns and recommend comprehensive approaches to solve them."

[kemin.com](http://kemin.com)

### Emerging dairy markets



Speaking at the International Dairy Federation (IDF) World Dairy Summit in Belfast, industry leaders provided a clear indication that the future for dairy is bright in emerging markets, particularly in Asia, Africa and Latin America.

Michael Hanley, Group Chief Executive, Lakeland Dairies – which operate both sides of the Irish border – said: "A substantial proportion of our revenues are generated from exports with over 200 of our products being exported to over 80 countries. A host of opportunities exist for dairy businesses in global emerging markets."

The South American dairy industry has its own special characteristics and opportunities for growth. Monica Ganley, Principal of Quarterra, the strategic agricultural advisory firm, said: "Recent cross-border M&A activity and consolidation of the industry in the region indicates that the future is bright. Politically and economically, I believe that South America is a tipping point and that the recent high growth in the dairy sector is the beginning of an exciting journey for the industry."

Dr Judith Bryans, President of the IDF and Chief Executive of Dairy UK, said: "Asia, Africa and Latin America

represent some of the most upcoming markets for dairy produce and we as an industry must endeavour to provide nutritious and sustainable dairy foods across those core markets."

[fil-idf.org](http://fil-idf.org)

### New partnership and new concept



The Förster-Technik company have developed a new intensive breeding concept under the brand '4OFIT Technology – Strong calves, strong cow'. With Elvor's HP milk replacer + feeding plan + breeding advice the close relationship between the two companies allows them to capitalise on the quality that both offer, with the common goal to improve calf performance.

[elvor.com/foerster-technik.de](http://elvor.com/foerster-technik.de)



## Calcium binder trial



A new trial at Cornell University shows low subclinical hypocalcaemia levels in dairy cows supplemented with a calcium binder.

Cornell University tested the efficiency of a calcium binder (X-Zelit from Vilofoss) for preventing hypocalcaemia. Feeding low level calcium in the prepartum diet has shown to be effective in improving the calcium level at calving. However, as this is difficult to obtain using the commonly used feeds, binding the dietary calcium using X-Zelit can mimic the low calcium approach.

Preliminary results from the trial were presented at the annual Cornell Nutrition Conference 2017. The overall conclusion was that X-Zelit markedly improved calcium status during the periparturient period.

In the trial 55 multiparous cows were assigned to either the control or experimental (X-Zelit) group. In the experimental group, 500 g/d of X-Zelit was supplemented during the last three weeks prior to calving.

The DCAD level of both rations was 14-15 mEq/100g.

The calcium level was overall higher for the X-Zelit group compared to the control group.

The values of plasma calcium were higher for the X-Zelit group during the pre- and postpartum period. It took around one week before the calcium level of the control group reached normal levels.

The higher calcium level around calving shows that the cow's own defence mechanism for preventing low calcium levels has been activated by the X-Zelit treatment. High plasma calcium level around calving is important for the health and production level of the animals.

The improved calcium status did decrease the prevalence of the subclinical hypocalcaemia. The threshold for subclinical hypocalcaemia was set to 8.5mg/dl (2.125 mmol/L).

The incidence of subclinical milk fever was much lower for the cows on X-Zelit than the control cows.

The result shows that the X-Zelit product is a highly efficient product for preventing subclinical hypocalcaemia in high yielding cows fed a typical US ration.

[x-zelit.com](http://x-zelit.com)

### Keep a silage expert in your pocket



Silage represents up to 50% of a dairy cow's diet. The optimal preservation and quality of silage can help leverage feed costs. Good silage management practices and planning (such as silo design) are key to ensuring quality silage and optimising farm revenue. This is why Lallemand Animal Nutrition has developed a mobile application, LALSIL, to support silage quality in the field. The aim of the new app is to help farmers and contractors to control silage quality in their day-to-day practice.

The app is available for iOS and Android platforms in several languages – English, French, Italian, Portuguese, Brazilian, German and Spanish.

Based on their long-term silage technical expertise and field knowledge, Lallemand Animal Nutrition developed a corn silage audit tool in 2010: the CSI (Corn Silage Investigation). Today, the program has been validated on farms with thousands of audits performed around the world by their own technical teams and partners. This allowed them to

fine-tune the audit tool and identify the need for a specific mobile application that covers all necessary information, not only when ensiling, but also concerning inoculant decision making and correct application.

Today, the LALSIL app contains five main functions, developed to become a personal assistant for successful silage management:

- The CSI audit tool: to prepare next year's harvest according to the silo audit conducted during the ongoing year (density, pH, temperature). The aim is to detect the margins of improvement on the farm and help farmers optimise their forage quality (reserved to partners).
- A Return on Investment calculator that allows to optimise feed cost based on the combination of a forage milk potential and the farm silage practices (reserved to partners).
- A module to adjust the applicator on the harvesting equipment. Both self-propelled harvesters and balers can be selected to provide the flow rate of the applicators and its range of work.
- Read a label function: to under-



QualiTru Sampling Systems continues to innovate with the introduction of a re-designed 12-channel sampling septum.

The septa are a mainstay for milk sampling in the dairy industry, from the farm to the tanker truck and finally to the processing plant. In addition, QualiTru's sampling systems are found in many beverage and food production facilities. The sterilised septa provide a simple-to-use sampling solution that dramatically improves safety and ensures that a truly representative sample is available for testing. The new 12-channel septa are a single-piece design manufactured from high density, elastomeric material that provides additional stability when inserting into and removing the septa from QualiTru sanitary ports. The updated septa also feature a permanent, thermal-aluminum label that clearly indicates which channels have been used to avoid cross-contamination.

[qualitru.com](http://qualitru.com)

stand the composition of an inoculant because the premix and bacteria concentration are key elements when comparing and assessing the effectiveness of forage additives (CFU/g of forage).

- The possibility to ask technical questions to a silage expert.

The LALSIL app is highly dynamic. More functions are being developed, such as specificity to other forages. It is available free of charge on the Apple App Store and Google Play Store.

[lallemandanimalnutrition.com/lalsil-app](http://lallemandanimalnutrition.com/lalsil-app)

### New distributor for OptiCell in Japan



Agromed Austria has signed a distribution agreement with Japan Nutrition (JNC), under which they will actively market OptiCell to the livestock industry in Japan.

"There is significant market potential for the OptiCell products in Japan and JNC is no doubt a strong local partner for the Japanese market," Helmut Grabherr, CEO of Agromed, told International Dairy Topics.

"With their established distribution network and excellent reputation in the industry, we believe JNC

can help us achieve impressive business growth in the Japanese market."

[agromed.at](http://agromed.at)

### Personality Awards 2018



The European Dairy Personality Award will be presented at the forthcoming VIV Europe, which will be held in Utrecht, The Netherlands, from 20-22nd June.

The presentation of this award has been a tradition at VIV Europe for over a decade and we are now seeking nominations for 2018.

To be considered for the International Dairy Topics/VNU European Dairy Personality Award, the person must have done something outstanding, been a figurehead or been an ambassador for their industry as well as being a good communicator and prepared to help their peers.

Please send your nomination to our editor:

[neh@positiveaction.co.uk](mailto:neh@positiveaction.co.uk)

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## Well-Being Awards 2018

 Boehringer Ingelheim's 'Ruminant Well-Being Awards', held in partnership with the World Association for Buiatrics (WAB), are now open for application.

The award ceremony will take place at the annual World Buiatrics Congress highlighting the important role played by veterinarians in the continuous improvement of animal welfare for food-producing ruminants.

The next congress will be held in Sapporo, Japan (28th August to 1st September 2018), and for the first time presents two different awards – a Ruminant Well-Being Research Award and a Ruminant Well-Being Achievement Award.

The Ruminant Well-Being Research Award will be offered to a recent PhD graduate in veterinary science, animal science or related disciplines that made an exceptional contribution to the scientific knowledge on ruminant well-being by:

- Improving our understanding of pain expression as well as the recognition of pain and other forms of suffering.
- Developing scientific methods of measuring animal well-being, with potential practical applications.

- Developing scientific based strategies that improve animal well-being.
- Identifying issues of concern and seeking solutions to challenges.
- Developing methods to change human attitudes and behaviour to ensure proper stewardship.

The second award category for Ruminant Well-Being Achievement will be offered to a practising vet or a researcher in veterinary science, animal science or related disciplines to recognise his/her achievements in advancing the well-being of ruminants.

Each award comprises a €10,000 cash prize, plus reimbursement of the recipient's travel expenses to attend the conference and ceremony. The winner of the award will be selected by an independent expert panel under the supervision of Xavier Manteca, Professor in Applied Ethology at the University of Barcelona and founder of the Farm Animal Welfare Education Centre (fawec.org). Application forms and criteria can be found on the Boehringer Ingelheim website on Farm Animal Well-Being (farmanimalwellbeing.com) as well as on the WAB website.

wbc2018.com



The German plant manufacturer Weltec Biopower recently signed the contract for a biogas plant extension of the milk powder producer Estancias del Lago (EDL) in Uruguay. From late 2018, the plant with its eight digesters will generate a rated thermal input of more than 6 Megawatt from cattle manure and fodder leftovers. The company will use the biogas for drying and steam generation purposes in the production process. EDL farms an area of about 37,000 ha growing maize, sorghum and soya as feed for their approximately 14,000 dairy cows.

weltec-biopower.de

### Biomin's new facility in China



Biomin has further expanded its capacity to serve clients in the fast-growing Chinese market and internationally with the opening of a production plant in Wuxi, Jiangsu Province, in China.

Biomin has been active in the Chinese market for nearly 20 years,

having opened its first production unit in China in 2004. The latest addition to the firm's global production network encompasses a 5,600m<sup>2</sup> building featuring offices, a warehouse and laboratory designed to provide both quality control and analytical services for customers. This investment reflects their high ambitions for the future.

biomin.net

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## Simplified genetic testing



Neogen has launched a simplified and cost-effective method of ordering testing for multiple dairy genetic traits – all from a single sample.

Neogen's new Igenity dairy genomic services combine tests for related traits into one testing solution, including packages for milk protein variants, breeding stock traits, and deleterious genetic conditions. These new packages allow dairy genetic companies, breed associations, and producers around the globe to receive more information from just one sample.

"Our experience of working with dairy genomic testing customers has shown that multiple tests are often ordered on the same sample for traits that are related. For example, dairy samples are often tested for multiple genetic traits, such as A2 beta casein and horned-polled," Dr Stewart Bauck, vice president of agrigenomics at Neogen, told International Dairy Topics.

"By combining related traits into a package, we can make the ordering process easier for our customers,

offer each test at a reduced price, and at the same time, provide much more information on the animal under investigation."

The new testing packages now available through Neogen's Gene-Seek laboratory include:

- Igenity Dairy Milk Protein Traits. Selection tool for milk protein management, including A2, kappa and AB beta casein, and beta lactoglobulin.
- Igenity Dairy Breeding Stock Traits. Broad genomic screening bundle for breeding cattle selection, including milk proteins, embryonic lethals, and horned-polled.
- Igenity Dairy Recessive Traits. Screening tool for genetic health, including brachyspina, BLAD, DUMPS, SMA, SDM, weaver syndrome, mulefoot, citrullinemia, and HCD.

Screening for a variety of traits and genetic conditions at the same time and from the same sample will allow for better management of deleterious recessives, as well as the proliferation of desirable traits in the dairy cattle population.

[neogen.com](http://neogen.com)

### Cost of dairy ration inconsistency



Failure to ensure the ration cows consume consistently matches formulation will undermine feed conversion efficiency (FCE), increase feed costs per litre and substantially reduce herd profitability, warns KW nutritionist Dr Anna Sutcliffe.

"Any day-to-day variation in ration makeup or nutrient supply can massively disrupt rumen efficiency," she told International Dairy Topics.

"Given that even a 5% reduction in FCE will add as much as 0.65ppl to total feed costs on most farms, the financial impact can be considerable." (Based on typical total feed costs of between 10-13ppl).

But the impact is not limited to FCE. Ration inconsistency can also reduce milk yield and quality, directly affecting income, plus

undermine fertility if cows regularly dip into body reserves due to inconsistent energy supply.

"Forage is one of the main challenges, with feed value shown to vary by up to 10% across a single clamp face. Feed spoilage, overcrowded feeding areas and ration sorting will also alter nutrient intake, whilst staff can have a huge impact on ration mixing accuracy.

"Anecdotal reports suggest that TMR mixing errors of 5% per ingredient are common, which is why we are seeing many farms replacing straights with a single custom blend," Anna added.

"It might seem counter-intuitive, but the improvements in accuracy and consistency, plus reduced storage losses, mean overall feed costs per litre are actually lower."

[kwalternativefeeds.co.uk](http://kwalternativefeeds.co.uk)

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## Greater intake before weaning improves first lactation performance

by **Fernando Diaz (DVM, PhD)**

The preweaning period is the most important phase in the productive lifetime of a dairy cow. Two meta-analyses published recently in the *Journal of Dairy Science* determined the relationships between early-life parameters and the performance of first-lactation (primiparous) cows. A meta-analysis is the statistical procedure for combining data from multiple studies.

The first meta-analysis included data from 2,880 Holstein calves from 37 calf research trials conducted at the University of Minnesota Southern Research and Outreach Center. The researchers (Chester-Jones et al., 2017) found that average daily gain (ADG) during the first 8 weeks of calf life significantly improved 305-days milk yield in the first lactation: for every kg of ADG at 8 weeks, milk yield improved by 579kg.

Similarly, the second meta-analysis (including 21 treatment groups) carried out by Pennsylvania State University's researchers (Gelsinger et al., 2016) found that for each additional 100g of preweaning ADG, milk, fat, and protein production during first lactation increased by 130.4, 6.1, and 4.7kg, respectively. Moreover, this work showed that calf starter intake is as important as milk intake in calf feeding programs:

- For each additional 100g/d of milk or milk replacer intake before weaning, milk, fat, and protein increased by 138.5, 8.4, and 4.7kg, respectively.

- For each additional 100g/d of calf starter intake in the preweaning period, first-lactating cows produced 127.0kg more milk, 8.4kg more fat, and 4.0kg more protein.

A greater plane of nutrition during the preweaning period also improves mammary gland development. In a recent study conducted at Cornell Research Farm, Harford, NY, the researchers (Soberon and Van Amburgh, 2017) compared two groups of calves; a low-intake group in which the calves were fed 0.89 megacalories of metabolisable energy above maintenance and a high-intake group in which the calves received 3.75 Mcal of ME above maintenance) during the first 54 days of life.



As expected, calves in the high-intake group had higher ADG than calves in the low-intake group (0.82 vs. 0.39kg). The mammary glands of calves fed for higher nutrient intake weighed 3.4 times more than that of calves fed for lower intake (337.6 vs. 75.5g). Moreover, the parenchymal mass of the mammary glands of highly fed calves weighed 5.9 times more than the mammary parenchymal mass of low-intake calves (6.48 vs. 1.1g). These results may explain the greater performance of first lactating cows with better early-life growth.

The minimum body weight of primiparous cows necessary to optimise milk yield after calving is 85% of their mature body weight. Therefore, in order to take full advantage of the greater growth before weaning, an adequate feeding program should be implemented during the rest of the heifer period (from weaning until calving).

Fernando Diaz works as a Dairy Nutrition and Management Consultant at Rosecrans Dairy Consulting, LLC. He provides consultation to dairies and feed companies including nutrition and feeding management, operational effectiveness, people capital management, and research and product development of new feedstuffs, additives and technologies for dairy cows. He can be reached at [fernando@jration.com](mailto:fernando@jration.com)

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## Mycotoxin control



Mitigating the effects of mycotoxins in dairy has become increasingly complicated over the years. More and more, fusarium mycotoxins like T2, zearalenone and deoxynivalenol are posing serious threats with their widespread incidence.

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It has been shown to reduce DON accumulation in blood and tissues of animals fed DON-contaminated feed. More than just binding a range of mycotoxins, it has proven to have much deeper effects as well.

[globalnutrition.com](http://globalnutrition.com)

### First Olmix factory in Asia



The grand opening ceremony of the first Olmix factory in Asia was held in Vietnam and attended by representatives of the Department of Livestock Production, the French Embassy, the Authority of Binh Duong Province, General Consulate of France, communication agencies and other departments.

The factory will provide approximately 15,000 tons of animal feed additives and nutraceuticals for feed mills and farms per year.

The recent opening of this new production facility represents Olmix Group's commitment to further strengthening its presence and activities in Vietnam and throughout Asia.

[olmix.com](http://olmix.com)

### Nutriad portfolio in Cambodia



Nutriad has introduced its portfolio into the Cambodian market. During a well-attended seminar in Phnom Penh the company, and its local distribution partner FLS, presented research and novel products to a group of industry professionals.

"Nutriad has a presence in all Asia Pacific countries, Cambodia being the final step of our full geographical coverage in the region," B. K. Chew, APAC Director Nutriad, told International Dairy Topics.

"At our 'Helping Nutrition Happen' seminar we launched seven products across our palatability, digestive performance and mycotoxin

management platforms. Working in partnership with FLS, we are excited to bring practical solutions and knowledge for animal nutrition and health to the Cambodian industry, that will support producers in improving efficiency."

The seminar provided an excellent platform for Nutriad to show the latest scientific findings of their feed flavour range, particularly on KRAVE and Delistart K-link.

[nutriad.com](http://nutriad.com)

### Powerful and healthy calves



Schaumann's innovative Aminotrace-Bis-Lysinates combine the trace elements copper and zinc with first limiting amino acid lysine. This ensures an optimal availability of the trace elements. Feed efficiency is improved and the immune system is supported.

In an eight week drinking-trough trial at Gut Hülsenberg, calves were divided into two groups. The daily weight gain of the control group was about 913g/day, whereas the group receiving milk replacers with Aminotrace-Bis-Lysinates showed an increase of over 4% (952 g/day) compared to the control group.

The addition of Aminotrace-Bis-Lysinates improved the feed conversion by 7.5% in the drinking period. The control group required an energy quantity of 21.5 MJ ME per kg increase, while the calves receiving the Aminotrace-Bis-Lysinates needed only 20 MJ ME per kg weight gain.

[schaumann.info](http://schaumann.info)

### VIV MEA

5-7th February  
Abu Dhabi, UAE  
[www.vivmea.nl](http://www.vivmea.nl)

### Ildex Vietnam

14-16th March  
Ho Chi Minh City, Vietnam  
[www.ildex.com](http://www.ildex.com)

### Dairy Focus Asia

21-23rd March  
Bangkok, Thailand  
[www.positiveaction.co.uk](http://www.positiveaction.co.uk)

### Victam Asia

27-29th March  
Bangkok, Thailand  
[www.victam.com](http://www.victam.com)

### Livestock Asia and Forum

19-21st April  
Kuala Lumpur, Malaysia  
[www.livestockasia.com](http://www.livestockasia.com)

### American Dairy Science Association Annual Meeting

24-27th June  
Knoxville, Tennessee, USA  
[www.adsa.org](http://www.adsa.org)

### Indo Livestock 2018

4-6th July  
Jakarta, Indonesia  
[www.indolivestock.com](http://www.indolivestock.com)

### 30th World Buiatrics Congress 2018

28 August-1st September  
Sapporo, Japan  
[www.wbc2018.com](http://www.wbc2018.com)

### SPACE

11-14th September  
Rennes, France  
[www.space.fr](http://www.space.fr)

### VIV China

17-19th September  
Nanjing, China  
[www.vivchina.nl](http://www.vivchina.nl)

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