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# DAIRY BUSINESS WORLDWIDE

A publication of *efeedlink*

OCTOBER-DECEMBER 2017



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POSITIVE OVER BREXIT,  
PROBLEMS REMAIN**

**RUSSIA'S DAIRY SECTOR  
COPING WITH EMBARGO**

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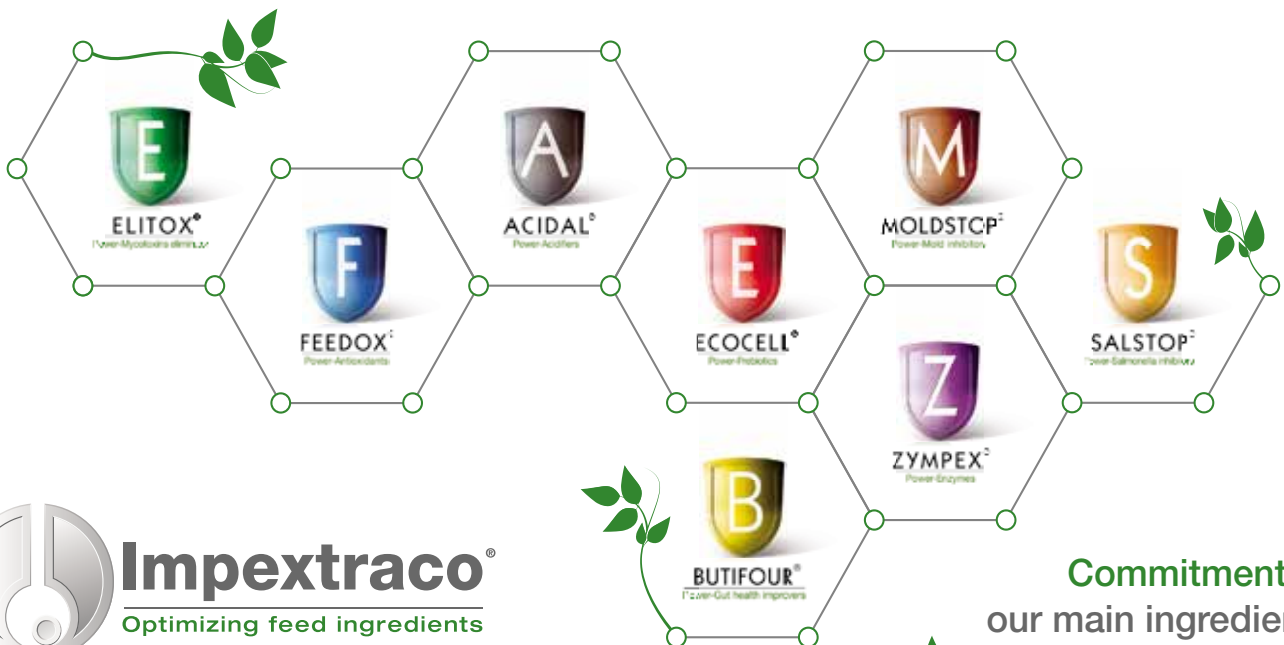
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## DAIRY BUSINESS WORLDWIDE: A PLATFORM FOR INFORMATION SHARING IN THE DAIRY INDUSTRY


Like all trade publications which are geared to people in a specific business or industry, *DAIRY Business Worldwide* covers topics which are of interest to owners, managers, marketers, buyers, farmers, nutritionists, veterinarians and businessmen involved in the dairy sector.

*DAIRY Business Worldwide* publishes articles about global events, which impact dairy industries in specific countries and regions. In this October–December 2017 edition, we study the problems affecting the UK dairy sector notwithstanding farmers who are positive about the country's divorce from the European Union. Russian embargo on food imports from Western countries and the nation's dairy industry coping with milk production are also being investigated.

In each issue of *DAIRY Business Worldwide*, we talk about the latest developments in major dairy markets worldwide. The forces transforming the Indian dairy industry and milk collection practices that hamper the growth of dairy farming in China are discussed in this issue. The current situation in the US dairy industry, which is recently hit by hurricanes, is also given attention.

Companies contributing to the industry deserve mention in *DAIRY Business Worldwide*. Developments at Fonterra, Cargill, DSM and Trouw Nutrition are reported in this edition. Additionally, knowledge sharing is an important feature in eFeedLink's publications; hence, in the following pages, technical inputs by Arm & Hammer, Adisseo, Kemin and Lallemand provide insights into the practices of enhancing dairy farming, improving milk quality and boosting profitability.

*DAIRY Business Worldwide* provides a platform where people of the dairy industry can go to talk shop, find out the latest market developments, learn what's new, and see the who's who in the dairy sector. If you have an item to share with us, please write to [editorial@efeedlink.com](mailto:editorial@efeedlink.com).

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# US HURRICANE-HIT DAIRY SECTORS: TEXAS STAYS STRONG AS FLORIDA DEALS WITH REBUILDING, POWER OUTAGES



Flooded road in Houston, Texas after Hurricane Harvey made landfall.

COASTAL areas in the US and nearby regions have recently been beleaguered by multiple hurricanes that ostensibly showed no signs of dying down.

As the storm passed, parts of Florida's agriculture industry have been left in "tatters", said US Agriculture Commissioner Adam Putnam. Rural communities there have to cope with a dire situation following the onslaught of Hurricane Irma which destroyed citrus, vegetable and sugarcane plantations, and disrupted power supply.

The situation is no better for US dairy farmers in impacted areas, although the dairy industry in Texas, which was earlier hit by Hurricane Harvey, should not be seriously affected, according to a report.

While few dairy farms in the Lone Star state directly suffered Harvey's wrath, dairy producers who feed cottonseed to their animals need to watch for short-term hiccups in seed availability and price. This is because the tropical cyclone may likely strain the supply of US cottonseed - the record harvest of which is forecasted by the USDA to reach 6.479 million tonnes this year.

Incidentally, Texas, the biggest cotton-producing state in the US, is anticipated to produce about 43% of the country's overall output, John Newton, director of Market Intelligence with the American Farm Bureau Federation, pointed out. The good news, at least, is that close to 98% of cotton in the Coastal Bend region of Texas - home to 4.3% and 5-7% of the state's total acreage and annual cotton harvest, respectively - was harvested before Harvey made landfall, Nigel Adcock of Cottonseed LLC. said. Hence, the consequences on prices should not be long-term.

Elsewhere, dairy producers in Florida are starting the tedious process of rebuilding in the aftermath of Hurricane Irma. Dairy farms in the southern region of the state - which has more than a hundred dairy farms - were hit the

hardest while a minimum of 40 tanker loads of milk had to be dumped before the storm, due to shutdown milk lines in processing facilities.

Damages, as it turns out, are not catastrophic as there is no "huge loss of animals" apart from "structural and wind damage" in several farms, Brian Chapman, industry relations manager with Florida Dairy Farmers, commented.

Still, power outage remains a problem as about 1.8 million people in Florida are left without power. At Dakin Dairy Farms, its owner was forced to dump milk which was mainly supplied to the southern part of the state. Inaccessibility to power means that consumers could not keep milk in cold temperatures.

Dakin's owner, Jerry Dakin, estimated his losses to be US\$30,000 daily and that is not counting in more than US\$250,000 in physical damages. "You got to keep those cows milking, you can't stop milking them and that's the biggest thing for dairy farmers," he told ABC Action News. "The milk that we produce now, there's no place to put it. The stores south of us don't have (electricity) or anything so the milk is going on the ground."

In addition, without electricity, fans and sprinklers could not function, thus cows risk undergoing excessive heat and humidity in the absence of working cooling systems, Colleen Larson, a regional dairy extension agent with the University of Florida, warned.

For now, Floridian producers are helping the community to soldier through what is perhaps the most challenging season of 2017 for the local dairy sector.

"Farmers have continued to function, running off of generators, and there's been a large amount of sharing of commodities and other things that are needed," Chapman said. 🌱

# CANADIAN DAIRY SUSTAINABILITY PROGRAMME ENTERS NEW PHASE



CANADIAN dairy sustainability initiative proAction has officially entered its next phase as dairy farmers are now required to keep additional records about the care and traceability of animals on the farm.

ProAction started in 2013, which aimed to build on the successful Canadian track record for milk quality and food safety, and add the verification of various sustainability metrics over the years.

“As dairy farmers, we are very proud to collectively demonstrate responsible stewardship of our animals and land, sustainably producing milk and meat that are high-quality, safe and nutritious. Treating our animals well and providing excellent care is one of the highest priorities of the Canadian dairy sector,” said David Wiens, DFC vice president and chair of the proAction committee.

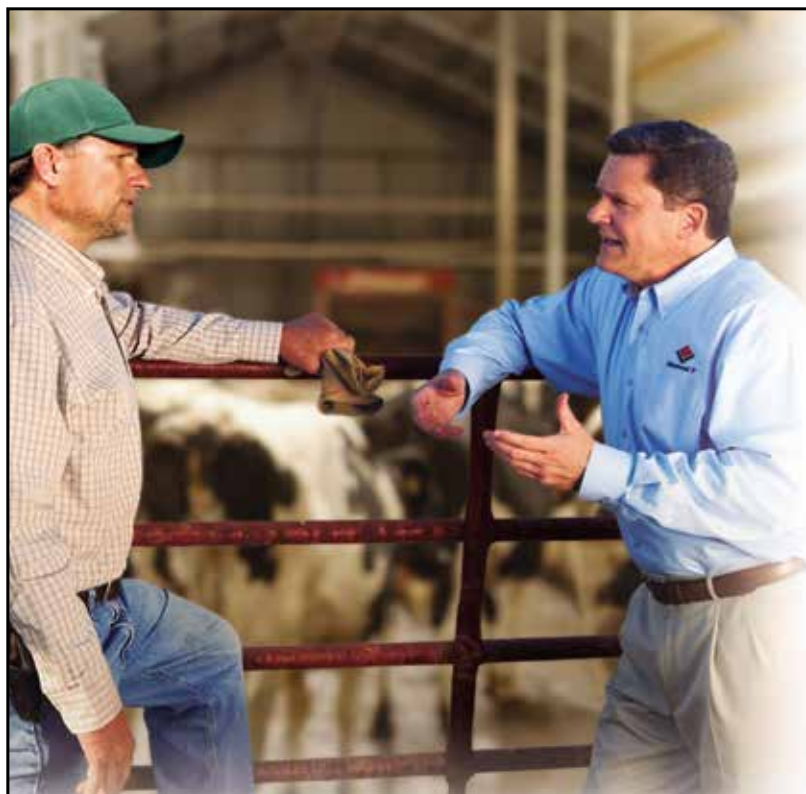
According to Dairy Farmers of Canada (DFC), the proAction initiative documents credible metrics and independently validates each farm to prove to customers that

farmers do things right. For example, Holstein Canada has already conducted cattle assessments on over 20% of farms, one of the steps of the new Animal Care module, which is based on the requirements of the Code of Practice for the Care and Handling of Dairy Cattle.

By September 2019, all farms will have undergone this official independent assessment, a validation and possess record-keeping, on top of good management practices. “These additional steps confirm that farmers measure their progress to continue to farm sustainably”, DFC said.

DFC stressed that the ability to trace the animals and their whereabouts “is key to maintaining the confidence of Canadians in our sector.”

In Canada, all cattle have been systematically ear-tagged since the federal regulations came into force in 2001. Currently, 99% of dairy farms have premises identification numbers. 🌱



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## FONTERRA HAILED AS NEW ZEALAND'S TOP CO-OP



Fonterra building in Darnum, Victoria, Australia.

FONTERRA is judged as New Zealand's top co-operative business of the year, and praised for its "stunning financial turnaround, generous social responsibility programmes and a high-profile campaign proudly proclaiming its Kiwi farmer-owned, co-operative status."

The award was presented by Cooperative Business New Zealand (CBNZ) at a function in Auckland, New Zealand.

Fonterra's farmers should take pride in the special recognition for their co-op, said the co-operative's Shareholders' Council chair Duncan Coull, who collected the award.

"Our farmer shareholders set themselves high standards, and it's their daily hard work and commitment that drives the success of the co-op. I also want to recognise the energy and contribution of our staff in helping to build a co-op that returns such value to shareholders, local communities and the New Zealand economy," Coull commented.

CBNZ CEO Craig Presland said Fonterra had achieved a stunning financial turnaround over the past 12 to 18 months.

"With its 2016/17 payout forecast to be at least 50% up on the year before, this injects an additional \$3.6 billion into the (New Zealand) economy and will benefit many fellow co-operatives significantly," Presland remarked.

He added that Fonterra has completed a comprehensive co-operative governance review and raised its profile with the public so that it is better understood as a member-owned co-operative "and not a corporate."

"Fonterra has also continued to generously support New Zealanders within the spirit of Concern for Community, a key co-operative principle. Its Milk for Schools programme, which is now in its fifth year, is the largest social responsibility programme ever driven by a Kiwi commercial business. The more than \$10 million a year initiative currently benefits more than 140,000 kids each school day," Presland said. 🌱

## GMO-FREE CLAIMS IN GERMAN DAIRY LAUNCHES OUTPACE EUROPEAN AVERAGE

THE share of GMO-free claims in dairy launches in Germany between August 2016 and July 2017 increased to 15% from 7% during the same period in the previous year.

According to global market intelligence agency Mintel, GMO-free claim activity in Germany now doubles the European average, which has remained stable at 7% of all dairy products since 2015.

Julia Büch, food and drink analyst at Mintel, covering the German market, said Germany's dairy sector has experienced a strong rise in new launches with GMO-free claims, outpacing the European average.

"GMO-free claims are becoming an important quality differentiator in particular among conventional, non-organic ranges. The rise in GMO-free claims is actively pushing public awareness of the fact that dairy products may derive from animals fed genetically modified feed", she said at Drinktec in Munich, Germany.

Most dominant in the rise of GMO-free claims across Germany's dairy category is the white milk segment, according to Mintel. In 2016, GMO-free claims in the white milk segment were present in over two out of five (44%) new launches, followed by yogurt (10%), butter (9%) and cheese (8%).

While Germany is the leading European market in terms of GMO-free product innovation, Mintel research showed that the idea of GM food faces strong resistance in Europe. Among countries surveyed by Mintel, the share of consumers opposed to genetically modified food is highest in Germany (41%), followed closely by France (40%), Italy (38%), Poland (32%) and Spain (31%).

"The rise of GMO-free claims in Germany's dairy sector follows in the footsteps of the country's booming organic market, which continues to grow as consumers are becoming increasingly conscious about the origins and quality of their food," Büch said. 🌱



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## EXORBITANT WATER USE BY NEW ZEALAND DAIRY FARMS, SAYS EXPERT



AROUND 2,000 dairy farms in New Zealand, mostly non-irrigated types, use a gargantuan amount of water equaling to the combined populations of London, New York, Tokyo, Los Angeles and Rio de Janeiro.

These farms are mainly based in dry areas of the country like Canterbury and Otago. According to agricultural economist Peter Fraser, there is a “huge gold rush” that allows several “water hungry” activities to be carried out in “water scarce areas.”

An average of around 80 cubic metres of water is used by each person, based on figures from Wellington - although water use varies nationwide. This calculates to about 58.2 million people for a figure equivalent to the amount of water dairy farms use. Additionally, there were 12,000 dairy herds in New Zealand consuming 4.8 billion cubic metres of water, said Fraser and farm consultant Dr. Alison Dewes.

In light of high water consumption, New Zealand’s Labour Party recently proposed a water tax which sparked protests by farmers.

Cost estimates of paying the tax range from \$50,000 to \$100,000. For an irrigated dairy farm, the average cost would be between \$10,000 and \$15,000, Fraser and Dr. Dewes’ analysis found.

On the other hand, data by Irrigation NZ showed the average cost for an irrigated farm in Canterbury to be bigger - between \$24,000 and \$29,000.

“When this additional cost is put in the context of the profit generated by a family farming business, it will create a significant impact, particularly for sheep and beef, arable and vegetable farmers, who have reasonably tight operating margins,” said the organisation’s chief executive, Andrew Curtis. 🌱



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# INDIAN MILK METAMORPHOSIS: POWERFUL FORCES TRANSFORMING THE WORLD'S LARGEST DAIRY MARKET



The simulative impact of rising incomes is being multiplied by the closing of rural-urban consumption disparities and rising female workforce participation. Demand for processed goods is rising far faster than milk output, supply has trouble keeping up with demand. Better quality feed ingredients can boost medium-term productivity. Better farm management, higher-quality dairy cattle species will be essential to boosting long term output.

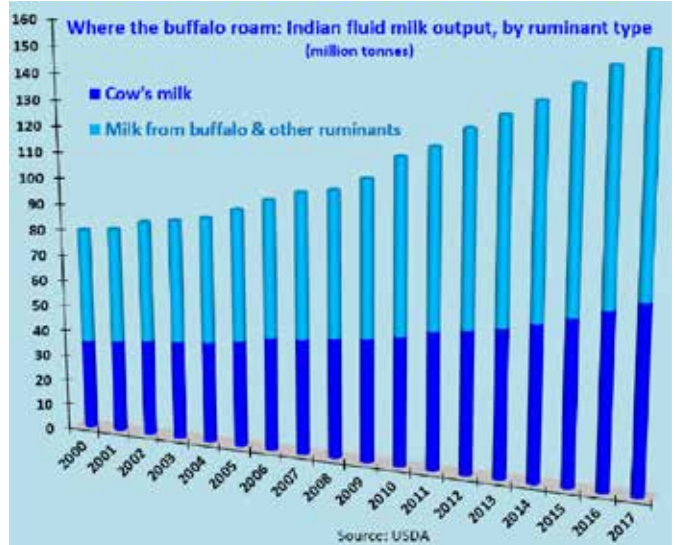
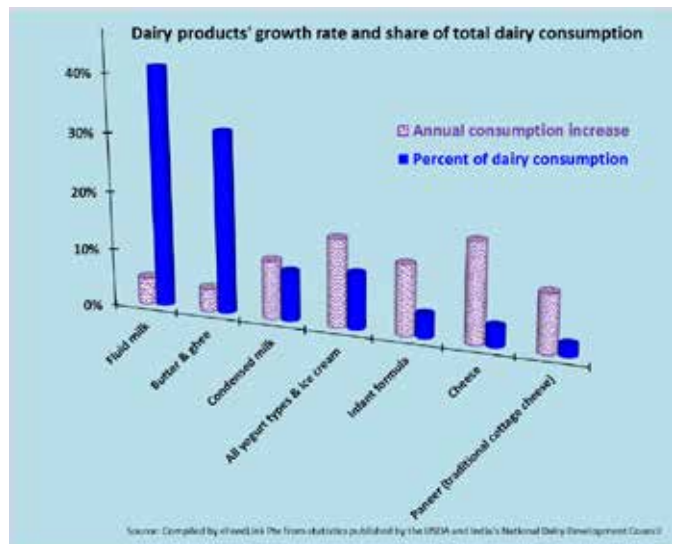
Producing more milk than the combined output of 28 European Union countries, India's vast dairy market holds potentially vast synergies involving rapid demand growth, low productivity and incredible growth opportunities. The world's leading dairy producer has seen milk output increase at a 4.1% annual rate since 2000.

Over the short-term however, the industry is experiencing a supply-side slowdown: After rising by 4.8% from 147 million tonnes in 2015 to 154 million tonnes in 2016, higher feed costs and thinner profit margins are slashing 2017's expansion closer to 3.9% and a USDA estimated 160 million tonnes. Rather than decelerating, intelligent reforms could boost the current 4% growth rate, which could even rise above this level for a decade or two.

Unique circumstances imply there are at least four decades of rapid, pent-up demand growth in this market of 1.3 billion people. Moreover, demographic changes are having a multiplier effect on the industry's income-driven expansion: A major growth factor will be the narrowing of a consumption disparity that exists between the 60% of Indians living in rural areas and their wealthier urban counterparts.

Indian government statistics indicate that the urbanized top 8.5% of the population by income spends 40 times more on dairy products than the lowest 8.5%, rural based segment. Much of this expenditure difference is due to a higher proportion of urban income spent on processed dairy products.

Milk and butter/ghee make up slightly over 40% of urban dairy demand but 90% of the much lower rural per capita dairy consumption. Going forward, processed value-added dairy products will play a key role in this rural-driven expansion, and are already doing so. Over the past decade, the USDA estimates that the annual consumption increase



for condensed milk (10%), infant formula (12%) yogurts and ice creams (15%) and cheese (17%) far exceed the annual increase in milk output.

Societal changes are also playing an important role. According to the USDA (GAIN Report #IN4089: India Dairy Products Annual), “More women are pursuing careers, especially those living in urban areas. With less time to cook meals at home, more families are buying ready-made dairy products like table butter, yogurt, paneer and other ethnic dairy desserts... such as processed cheese, flavored milk, probiotic drinks, ice cream and baby foods (infant formula).”

Rising female labor force participation has resulted in booming infant formula consumption. A study by Zenith International found that “India has the largest population of 0 to 4 year-olds in Asia.” It estimates demand for infant formula is growing by 10% to 12% annually.

Never mind the rapid rise in personal incomes: Many other changes imply that processed dairy goods’ consumption has at least four decades of rapid expansion ahead. There are dynamic, self-reinforcing interactions between rising rural processed dairy consumption, rural-to-urban migration, female labor force participation, women’s delegating of parental functions to day care centers and rising consumption of dairy-based fast foods such as pasta, milk shakes and pizza.

Unfortunately, with a population nearly equal to that of China and fraction of China’s arable land endowment, suppliers find it challenging to keep up with demand growth. Fortunately, there is considerable scope to boost productivity substantially higher.

According to USDA statistics, a top American dairy cow produces 10+ tonnes of milk annually. China, Australia, and New Zealand have dairy cow productivity ranging from 4 to 8 tonnes/year of milk. By comparison, annual Indian dairy cattle milk productivity ranges from 0.91 tonnes/year for indigenous cattle to 1.9 tonnes/year for water buffalo and 2.6 tonnes/year for crossbreed cattle. That is only 31% of China’s dairy cow productivity and 12% of what a US cow produces over that same year.

With the proportion of milk obtained from water buffalo having stayed at a constant 55% to 57% since 2000, little progress was made in improving the dairy cattle herd. While buffalo milk’s higher fat content makes it a good feedstock for processed dairy goods, low buffalo productivity (relative to modern dairy cattle breeds) counterbalances this advantage. The low productivity also makes for serious but unnecessary shortfalls of key feedstock inputs.

For example, with 61% of India’s fluid milk



**India has seen milk output increase at a 4.1% annual rate since 2000.**

**A major growth factor of the country’s dairy industry will be the narrowing of the consumption disparity between Indians in rural areas and urban populations.**

**Still, Indian dairy’s long-term structure depends on drastic trade-offs, with consolidation a burden for rural suppliers of fluid milk.**

production, America produced 1.05 million tonnes of SMP in 2016, nearly twice as much as India’s 0.54 million tonnes - even though India has 30 times more dairy cattle!

While SMP equals 115% to 125% of America’s butter production in any given year, India’s SMP output went from 7.7% of butter production in 2000 to an estimated 10.4% this year. SMP is a proxy for the production of processed dairy items ranging from infant formula to yogurt and fast-food cheese. India’s low SMP output points to supply-side deficiencies that cannot be sustained in the face of rapid, decades-long increases in processed dairy consumption.

Meeting demand for processed dairy goods without (politically explosive) mass importation will necessitate profound supply side improvements. One short-term measure requires the political will to liberalize the importation of feed ingredients: 64% of dairy cattle feed is made up of crop residues from harvests of sugar cane, wheat, rice and pulses.

A hodge-podge of second-rate inputs including millet, alfalfa, clover and sorghum make up 18% of dairy cattle rations. Pastureland grazing accounts for 12% of intake while high-quality feed ingredients such as soymeal, corn and oil cakes make up a mere 6% of rations. Thus, even without improving genetics or farm management, milk yields could be profoundly increased by merely substituting high-quality feed inputs in place of the low-quality raw inputs that make up over 80% of rations.

The problem is that all meaningful reforms will exact a steep political price. Boosting the proportion of high-quality inputs could make India a net feed crop importer and cause hardship to the country’s corn and soy farmers. Industry consolidation would substitute superior farm management techniques and modern cattle breeds in place of water buffalo -but would vastly boost rural unemployment among countless millions of water buffalo herdsmen.

Consequently, Indian dairy’s long-term structure depends on cruel trade-offs. Shall we boost dairy cattle productivity to levels taken for granted in China? That would make millions of buffalo herders redundant. Or result in a flood of feed crop imports. Do we want milk production methods to be introduced more rapidly? Consolidation would be painful for rural dwellers who supply fluid milk for a living.

Such decisions will impact more than quantity or quality of dairy products the world’s largest dairy market produces. It will determine whether Indian dairy becomes self-sufficient or import dependent, internationally competitive or suffers from some of the highest milk and cheese prices in the world. 🌱

- ERIC J. BROOKS



## UK DAIRY FARMERS OPTIMISTIC OVER BREXIT BUT BIG PROBLEMS REMAIN

**U**K dairy farmers are generally upbeat about their post-Brexit opportunities for producing and selling milk and milk products both in Britain and around the world. At the same time, there are serious concerns about on-farm labour issues and deep frustration over confused messages concerning the Brexit negotiations.

On the positive front, UK producers have a domestic marketplace of 66 million customers, a market which remains heavily dependent on imported dairy products and is therefore open and available for an increase in home-based output, subject to the terms of the final Brexit deal.

There is also widespread optimism in the UK that, once freed from the EU's slow-moving decision and regulatory processes, Britain will be able to agree on new trade agreements quickly and efficiently with a number of countries. The hope is that this will allow the UK dairy industry to secure a growing share of emerging consumer markets, especially in Asia.

Once freed from the EU's regulatory processes, the UK could be able to agree on new trade agreements quickly and efficiently, thus allowing its dairy industry to secure a growing share of emerging consumer markets overseas.

Major questions remain for dairy producers, however, especially whether or not post-Brexit businesses will be sufficiently profitable to both expand domestic sales and develop new export markets. EU-based support payments

have been a major part of UK farm incomes in recent years and it is widely believed the UK government will not be willing to maintain such levels in the long term.

Assurances have been given by UK government ministers that current support levels will be maintained until 2022, but there is a distinct lack of clarity concerning what will happen beyond then.

Concerns over labour supplies for the UK dairy industry are also an issue for producers, with a survey carried out by the National Farmers Union (NFU) of England & Wales revealing that a decline in interest from EU workers has already begun.

According to the NFU's research, UK farm staff providers had 6.7% fewer workers available to fill vacancies on British farms than they needed between January and May this year. That compared with the same firms having a worker surplus of 6.6% during the same period in 2016, prior to the UK's Brexit vote.

UK farm staff providers had 6.7% fewer workers available to operate farms between January and May 2017. That compared with the same firms having a worker surplus of 6.6% in the same period of 2016, prior to the Brexit vote.

The explanation, given to the NFU by former dairy worker Zoltan Peter from Romania, was that potential new recruits from his country are being put off the UK by the Brexit-inspired weakening of the sterling, alongside general

uncertainties over the longer-term future of EU workers being allowed to stay in the UK.

“Many people in eastern Europe don’t understand why British people voted to leave the EU and believe the country no longer wants them,” he said, adding that the currency issue was also having a big impact on recruitment.

“Where people could get six Polish zloty to the pound before the Brexit vote, it’s now under five. In reality, it means pay in the UK has fallen. The euro is just as good, however, which means eastern European are going to work for German car companies instead.”

British farming leaders have been lobbying hard for the UK government to secure EU workers’ rights, at least to cover essential farming tasks. To date, however, no EU-UK agreement has been reached, which is a problem for the UK dairy industry.

Over the last 20 years, for example, the number of UK dairy farms has contracted from 25,000 to 9,000, with those that have survived being large units which tend to rely on imported labour.

Although many of the messages coming from dairy sector analysts in the UK highlight the opportunities of Brexit, the ability of British farmers to expand production and secure new markets remains uncertain.

“Brexit presents a tremendous opportunity for the UK livestock sector, but the government needs to start acting now to help achieve progress in winning new markets around the world and retaining existing markets,” said the recently formed UK Livestock Brexit Group, which includes a strong dairy representation.

“Livestock-based production and trade is a long-term, complicated and technical subject,” commented the group’s chair, Chris Dodds, adding that while he was pleased government ministers are now talking seriously about transition periods being applied to the UK’s exit from the EU, decisions needed to be made sooner rather than later.

“Countries don’t take shortcuts with food; why would they? This takes time, however, and to be ready with markets after Brexit, we need to be working hard now.”

Leading UK farm business consultant Andersons agreed, stating in its newly published “Outlook for Agriculture” report that while there is “huge scope” for UK milk processors to compete with imported items in the post-Brexit period, farm production systems must continue to adapt if such opportunities are to be realised.

“The right farming systems are essential to establish lower-capital, lower-cost, sustainable businesses that can produce the raw material for

a supply chain in which all parts can prosper,” said Andersons. “Milk processors and producers must also work together to seize the opportunity, although there may well be casualties in the supply trade.”

While British dairy farmers are aware of the commitment and investment necessary to secure a strong post-Brexit future, the willingness of major processors to invest in the UK for the long-term has remained a hotly discussed subject at producer meetings in recent months.

In this context, however, the UK industry received a major boost in late September with the announcement that the German-owned Müller Group is to invest GBP100 million (US\$135 million) in its UK operations over the next three years.

The investment will focus on developing new generation branded and private label yogurts and desserts, backed by the vital message that these items will be made entirely from milk produced by British farmers.



Once freed from the EU’s regulatory processes, the UK could be able to agree on new trade agreements quickly and efficiently, thus allowing its dairy industry to secure a growing share of emerging consumer markets overseas.

“Müller’s approach in the UK within the yogurt, desserts, milk and ingredients sectors is to grow our capabilities so that we can reduce the UK’s dependence on imported dairy products,” said Bergen Merey, managing director of Müller Yogurt & Desserts, adding that the company wanted to help build a vibrant future for the British dairy industry.

With so many post-Brexit questions remaining unanswered in the UK, the Müller announcement is a boost for producers. Farmers will need more of the same as well as the optimism to survive the inevitable ups and downs of the ongoing Brexit negotiations. 🌱

- COLIN LEY



**Questions remain on whether post-Brexit businesses will be sufficiently profitable to expand domestic sales and develop new export markets.**

**Concerns over labour supplies are also an issue for UK dairy producers, with a survey revealing that a decline in interest from EU workers has already begun.**

**Meanwhile, the willingness of major processors to invest in the UK for the long-term remains a hotly discussed subject at recent producer meetings.**



# RUSSIA'S DAIRY SECTOR COPING WITH EMBARGO



**R**ussia is still seven million tonnes short of milk to meet its domestic needs. Thus, new tools for long-term support to farmers must be put in place to improve the situation, according to a release posted on the country's Agriculture Ministry website in August 2017.

Last year, Russia produced 30.7 million tonnes of milk - 0.2% lesser as compared to 2015 - despite the comprehensive support the federal budget is constantly providing farmers with. It is important to note that the industry is subjected to controversial trends; while production keeps growing at industrial facilities and middle-scale farms, backyard farms are constantly reducing output.

Historically, backyard farms once accounted for the largest stake of the milk industry in the Soviet Union and later, the Russia Federation. The current situation is no exception; as in this segment, the sector manufactured 13.5 million tonnes of milk in 2016, a Union of Milk Producers data (Soyuzmoloko) shows.

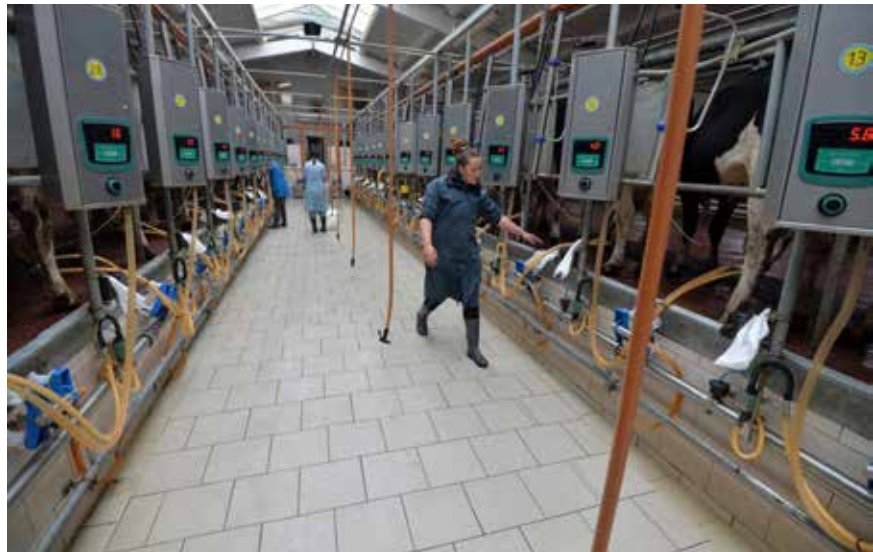
In almost every case, backyard farms in Russia are family-run businesses and this is where the main challenge comes from. People of the younger generation are less inclined to work in farms, hence they move to big cities in search of educational opportunities. The older generation gradually retires so that the average age of dairy farmers in Russia exceeded 50 years in 2016.

Andrey Danilenko, chairman of Soyuzmoloko, expected the combined output of backyard farms will keep falling by at least 5% per year in the coming years - and there is apparently nothing federal or regional authorities can do about the decline. The best thing, given the

current circumstances, is to encourage industrial farms to gain production performance so that it would be able to offset capacities losses suffered by backyard farms, Danilenko said.

The Russian government had more than doubled state aid allocated for milk farmers since the introduction of a food embargo, bringing it to RUB26.7 billion (US\$500 million) in 2016, according to an official statistical information. State support is provided in two main ways: through a soft-window facility and direct subsidies per liter of produced milk.

However, unlike most segments of the agricultural industry in Russia, the milk industry has virtually not benefited from the food embargo. This is partially due to a price competition with Belarus, which occurred within the common customs space of the Eurasia Economy Union. In the



Last year, Russia produced 30.7 million tonnes of milk - 0.2% lesser as compared to 2015 - despite a comprehensive support by the country's federal budget.

first year after the food embargo was introduced, Belarus had increased export of milk to Russia by one million tonnes, Soyuzmoloko estimated.

Russian officials went on to accuse Belarus of re-exporting banned dairy products from the EU. Officials of Russian veterinary watchdog Rosselkhoznadzor also suggested some companies in Belarus were importing cheese, butter and some other products from Europe, changing packaging and selling these to Russia under the guise of products of Belarus-origin.

As a result, the introduction of food embargo sent the prices for poultry, pork and beef soaring, but the price of raw milk, adjusted for inflation, remained just at the levels of 2012-2013, according to the Russian State Statistical Service.

The pro-investment environment in the meat industry turned out to be another disadvantage for the milk industry, Danilenko said. Concerning current prices, the payback period for milk farms ranges from 12 to 18 years - a very long time in the Russian economy, which is currently undergoing a long period of uncertainty. As for the meat industry - vis-à-vis the dairy sector - the payback period of an investment project, on average, is two times shorter. Therefore, since 2014, capital resources have been bypassing the milk industry and invested into more attractive niches.

With the milk industry failing to take advantage of the potential benefits of the Russia-US sanctions war, the sector fully suffered from all challenges associated with this development. From 2014 to 2016, the Russian milk industry had been rocked by product quality scandals after it was discovered that major dairy plants in the country were replacing milk fat in dairy products with palm oil.

Such an unsavory action had enabled dairy plants to keep the price of dairy products low; yet, it was ostensibly a critical move for the affected plants as incomes had slumped nearly two times due to sanctions against Russia. The

consequence was a nationwide dismay over the questionable quality of dairy products at grocery stores as Russians began to cut milk consumption.

Eventually, the size of the Russian dairy market shrank by 1% in the first half of 2017. It is not quite clear for now, how long sales are going to continue declining.

In May 2017, Russia's Agricultural Minister Alexander Tkachev said that the federal government had already crafted plans to mitigate the drastic situation in the domestic milk industry. The most effective solution, in his opinion, would be to build several dozens, or even hundreds, of huge facilities, which he described as "mega-farms". The hallmark of the plan is that the Ministry wants to redirect state aid towards strategic investors, who would be able to build large complexes.

However, in regards to that initiative, Russian experts pointed out that it would be extremely hard to find enough strategic investors, who would be willing to pump billions into milk farms.

As a potential alternative to Tkachev's plan, Soyuzmoloko had proposed a different scheme and offered to design an industry-development programme for a period of at least 15 years. In Danilenko's opinion, this initiative will improve the predictability of the milk farming business in Russia. Also, due to a more transparent state policy, it would be much easier for investors to evaluate possible risks, potential payback period and expected profitability, Danilenko claimed.

Finally, for the sake of better predictability in the industry, livestock producers want the federal government to disclose how long the food embargo is purposed to last for. It is obvious that sanctions will not remain in place forever, but it is also clear that it will not be abrogated soon.

As Russian officials once said, those things remain to be seen. 🌱

- VLADISLAV VOROTNIKOV,



**As milk production keeps growing at industrial facilities and middle-scale farms, backyard farms are constantly reducing output.**

**Russia had more than doubled state aid to milk farmers since the introduction of a food embargo; but partially due to a price competition with Belarus, the milk industry has virtually not benefited.**

**Also, since 2014, capital resources have been bypassing the milk industry and invested into more attractive niches.**



From 2014 to 2016, the Russian milk industry had been rocked by product quality scandals. Hence, Russians began to cut milk consumptions as a dismay over questionable dairy products ensued.

## ADVANTAGES AND LIMITATIONS OF DAIRY EFFICIENCY MEASURES AND THE EFFECTS OF NUTRITION AND FEEDING MANAGEMENT INTERVENTIONS (PART 1)

### Review and discussion: Dairy efficiency measures—Description, advantages, and limitations

**Physical Feed Efficiency.** The most well-known and used measure of dairy efficiency is the amount of milk produced, expressed as 3.5% FCM, 4% FCM, or energy-corrected milk, per unit of DMI or “physical feed efficiency” (physical FE). This is a measure of gross feeding efficiency calculated as the ratio of total outputs divided by total inputs (Table 1). Physical FE indicates whether cows are digesting their ration according to expectations (St-Pierre, 2008) and influences both environmental and economic outcomes.

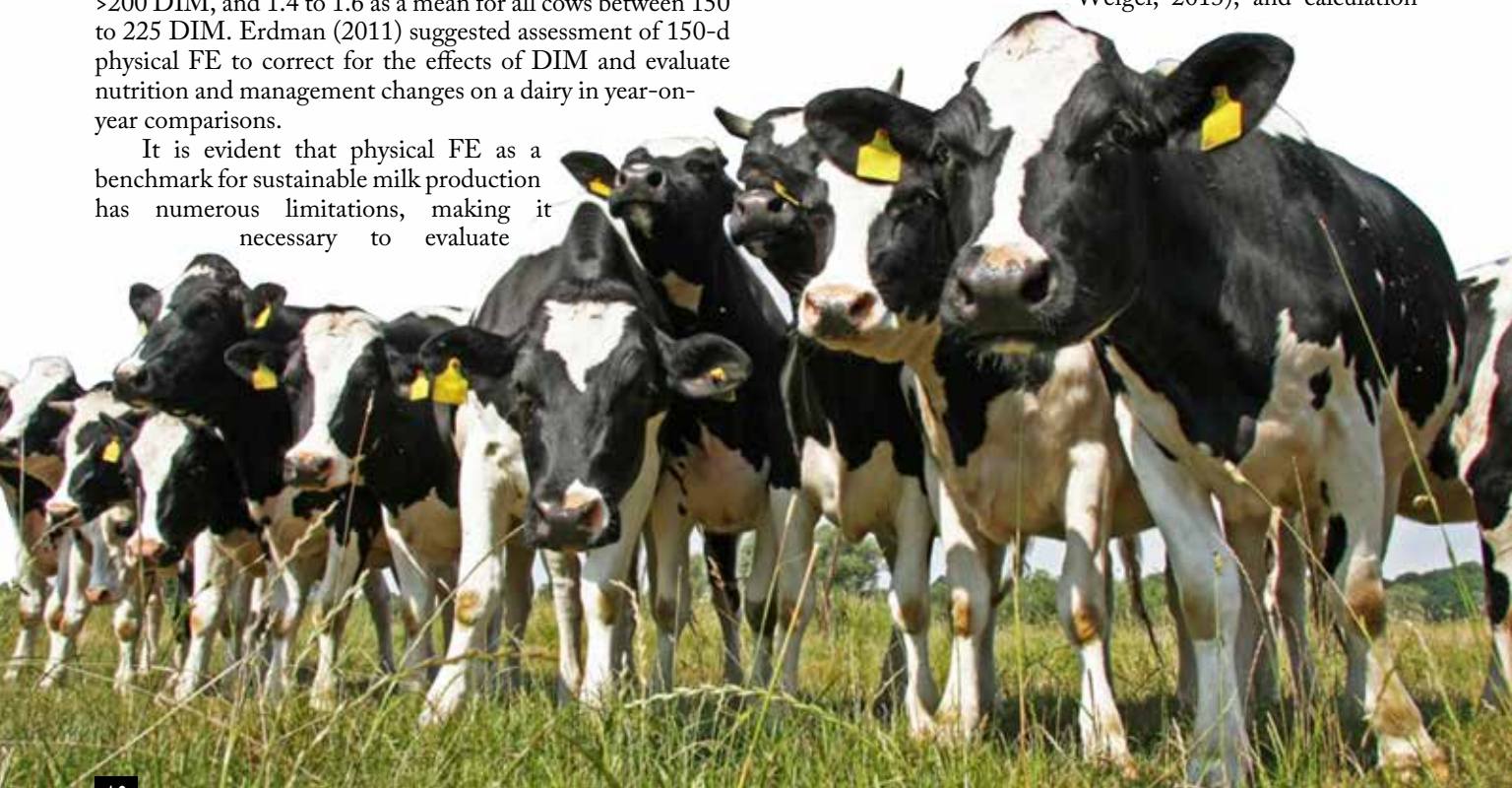
The simplicity of calculating physical FE as FCM/DMI incurs numerous limitations (Table 1). First, physical FE does not consider body tissue accretion and mobilisation, the implication being that physical FE changes with DIM.

Maximum physical FE occurs in early lactation when cows are in negative energy balance and mobilising body tissue to support milk production. As lactation progresses, physical FE declines exponentially over the first 3 mo and eventually linearly until lactation finishes (St-Pierre, 2008). Based on field experience, Hutjens (2005) suggested goals for physical FE (3.5% FCM/DMI) as 1.6 to 1.8 for multiparous cows <90 DIM, 1.3 to 1.4 for multiparous cows >200 DIM, and 1.4 to 1.6 as a mean for all cows between 150 to 225 DIM. Erdman (2011) suggested assessment of 150-d physical FE to correct for the effects of DIM and evaluate nutrition and management changes on a dairy in year-on-year comparisons.

It is evident that physical FE as a benchmark for sustainable milk production has numerous limitations, making it necessary to evaluate

other economic and efficiency measures concurrently. Primiparous heifers still using nutrients for growth will present lower physical FE values than mature cows (Hutjens, 2005). Physical FE also ignores environmental stressors such as heat or cold that depress efficiency (Britt et al., 2003; Hutjens, 2005). Physical FE gives no consideration to nutrient density and nutrient profile. For example, increasing dietary fat increases dietary energy density, also increasing physical FE by 0.03 to 0.10 units per percentage unit of fat addition (Erdman, 2011). Typically, supplemental dietary fat is more costly than other energy sources. Protein quality and cost play a role in dairy efficiency but are not considered with FCM/DMI. With ideal rumen function, digestion, and microbial protein synthesis, RDP can make up a greater proportion of dietary protein, reducing the need for RUP, which is typically more expensive. Grain and forage lost from shrink and feeding refusals are not considered in physical FE either but greatly influence environmental and economic outcomes.

**Efficiency of Nutrient Usage.** Efficiency of use of individual dietary nutrients may not be similar (Armentano and Weigel, 2013), and calculation



of separate nutrient efficiencies such as energetic efficiency and N efficiency can be valuable. Gross nutrient efficiencies, based on the amount of nutrient consumed, are typically calculated. Digestive efficiencies can be informative for comparing genotypes but can also be useful for nutritionists and environmentalists if fecal nutrient losses are separately accounted (Owens et al., 2016). Differences in metabolic efficiency suggest divergence in nutrient partitioning between milk production and other nutrient uses such as body tissue accretion. Thus, metabolic efficiency is used more by geneticists rather than by nutritionists or environmentalists (Phuong et al., 2013).

Energy conversion efficiency is calculated as milk energy output divided by ME intake (Table 1). Unfortunately, as with physical FE, energy conversion efficiency will be improved with greater mobilisation of body reserves (early lactation) and reduced during body tissue accretion (late lactation). Because of the negative effects of body reserve loss on reproduction and health, greater energy conversion efficiency is not always desirable. Residual energy intake (REI) is actual ME intake minus the predicted energy requirement of the cow based on production, BW, BW change, and gestational energy needs (Mantysaari et al., 2012; Table 1). Because BW changes are predicted and accounted for, REI is influenced less by body reserve loss and gain. A reduced REI indicates that less energy is wasted after accounting for the energy in milk, maintenance, and growth and that efficiency of energy use is improved. Mantysaari et al. (2012) concluded that stage of lactation affected REI among Nordic Red cows. This relationship could be due to true energetic efficiency differences during the lactation or to inadequate assessment of changes in body reserves affecting calculated REI.

**Economic Feed Efficiency.** As measures of physical FE increase, economic profitability typically increases, but this positive association is not always true (St-Pierre, 1998). Robinson and Erasmus (2010) demonstrated that greater DMI and milk yield are typically more profitable than a similar physical FE ratio with reduced DMI and milk yield. Because dairy sustainability also requires dairy profitability, calculation and evaluation of economic efficiency is prudent. Ration cost efficiency is the fiscal value of milk divided by the fiscal cost of consumed DM (Robinson and Erasmus, 2010; Table 1). Unfortunately, ration cost efficiency does not account for BW changes, heifer growth, health, longevity, forage DM losses, feed refusals, and feed shrink.

Feed cost per hundredweight (45.4 kg) is calculated as the accumulated feed cost for lactating and dry cows divided by the amount of milk (hundredweight) shipped (Table 1). Feed price, feed refusals, feed shrink, dry period length, reproduction, and herd health all affect feed cost per hundredweight; however, the heifer enterprise and milk composition are not considered (Bethard, 2013). St-Pierre (1998) argued against the objective of minimising feed cost

per hundredweight of milk but rather supported a system of accurate nutrient value estimation based on market prices of many feed ingredients and optimisation of feed resources and production.

Milk income over feed cost (IOFC) is a calculated margin that has been used for decades (Table 1). Use of IOFC is helpful for short-term feeding and management decisions, but it is not recommended for long-term herd performance assessment because it is dependent on fluctuating milk and feed prices (Bethard, 2013). Calculated IOFC may or may not include costs of feed shrink, feed refusals, cow health, dry cow management, or heifers. A survey of 95 Pennsylvania dairy herds from 2009 to 2012 determined a mean IOFC of \$7.71, ranging from -\$0.33 to \$16.60 (Buza et al., 2014). Improved nutrition and milk yield positively affected IOFC more than reduced feed cost. Money Corrected Milk (Bethard, 2013) calculates milk prices in the same way as milk processors, with fixed feed and milk component prices over time, to more accurately reflect herd performance over time. This measure is an improvement over IOFC yet still does not include costs of feed shrink, feed refusals, cow health, dry cow management, or heifers.



As dairy sustainability requires dairy profitability, calculation and evaluation of economic efficiency is prudent.

**Lifetime Efficiency.** Lifetime efficiency is the percentage of lifetime feed energy (GE) intake converted into milk, conceptus, and body tissues (VandeHaar and St-Pierre, 2006; Table 1). Obviously, earlier and more efficient calf and heifer growth and greater longevity generally equate to improved lifetime efficiency. It was calculated that a cow producing 9,000 kg of milk/yr at maturity would have a lifetime efficiency of 17% after the first lactation and 20.5% after the third lactation, only increasing to 21.4% after the fifth lactation (VandeHaar and St-Pierre, 2006).



**Total Dairy Enterprise Efficiency.** To accurately describe the efficiency of a dairy enterprise, all nutrient losses and gains need to be accounted for.

This includes nutrient losses associated with crops, manure, feeding management and reproductive inefficiency, feed nutrients required for replacement heifers and dry cows, and the value of animals sold for beef or other purposes. Integration of accurate farm data including actual DM and nutrient intakes with advanced nutrition models such as the NRC (2001), Molly model (Baldwin et al., 1987), or Cornell Net Carbohydrate and Protein System (Sniffen et al., 1992; Higgs et al., 2015; Van Amburgh et al., 2015) and whole-farm dairy models such as DairyWise (Schils et al., 2007) and the Integrated Farm Systems Model (Rotz et al., 2013) could help to more accurately calculate actual total dairy enterprise efficiencies. 🌱

- M. B. DE ONDARZA\* AND J. M. TRICARICO

The full article can be accessed at:

<http://linkinghub.elsevier.com/retrieve/pii/S1080744617300864>

# MEETING PREPARTUM DAIRY COW'S DCAD NEEDS



**T**here are excellent reasons for feeding a ration formulated for a negative Dietary Cation-Anion Difference (DCAD) to dairy cows prior to calving. For instance, this action reduces the incidence of hypocalcemia and other health disorders while improving animal performance.

However, some dairies are experimenting with the concept that, if modifying pre-fresh ration DCAD a little is good, then modifying it significantly is better. Using this theory, they assume cows will be healthier and get off to a better start during lactation if they lower DCAD beyond -12 meq/100g ration dry matter prior to calving.

A recent University of Florida research found that it is not necessary to reduce ration DCAD levels in prepartum diets below -12. You simply need to acidify the rumen during the prepartum period to achieve the desired health benefit. This goal can be achieved by feeding a ration formulated to -8 to -12 meq/100g ration dry matter.

Formulating rations with increasingly negative DCAD values only increases feed cost.

This means dairies do not attain the performance or economic payback they desire from this strategy. There are no compounding efficiencies or increases in health or milk production to be gained from further acidifying the blood.

## The need for negative DCAD

Think about why dairies formulate rations for negative DCAD in the first place. It becomes a valuable nutrition strategy to mitigate metabolic challenges like hypocalcemia, metritis and ketosis during the transition period.

Concerning hypocalcemia, the onset of lactation causes a severe, rapid drain on blood calcium required to produce milk. If this blood calcium is not replaced as rapidly as it is reduced via bone calcium release (resorption) or intestinal absorption of calcium, cows will become hypocalcemic, with

some developing clinical milk fever. Reducing DCAD to negative values has been repeatedly shown to prevent this decline in blood calcium at calving.

Cows with hypocalcemia often experience depressed immune response, leading to additional health issues. These animals are also susceptible to reduced skeletal and smooth muscle function, predisposing cows to displaced abomasum, metritis, mastitis and other health and productivity challenges in the ensuing lactation.

The positive effects of negative DCAD mean dairy producers can make these challenges a rarity versus the common occurrence that ensues without this feeding programme.

Research published in the November 2010 issue of *Journal of Dairy Science* indicates that cow fed a ration formulated for negative DCAD prior to calving produced substantially more milk daily than cows that did not receive this diet.

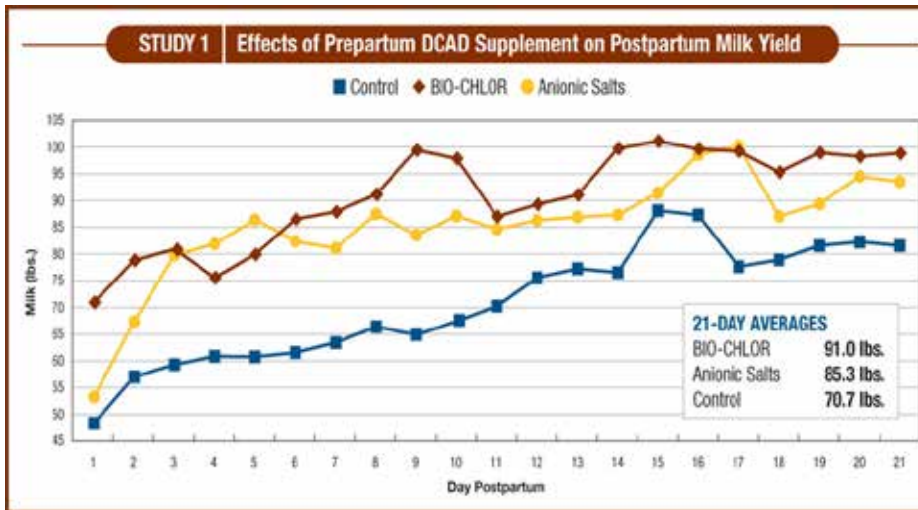
## Research results

Still, the question remained in the minds of researchers, nutritionists and producers: should negative DCAD be reduced beyond -12 to obtain better results?

During the University of Florida study, researchers fed pre-fresh Holstein dairy cows a ration with a negative DCAD of either -7 meq/100g ration DM or -18 meq/100g ration DM for either the last 21 days or 42 days of gestation.

They assessed daily dry matter intake, urine pH status and analysed blood samples for several parameters, including blood concentration of calcium.

They found that feeding a more negative DCAD diet — regardless of duration — adversely affected key metabolic and performance parameters of blood base excess and dry matter intake. Specifically, data showed that reducing negative DCAD from -7 to -18 meq/100g ration DM:



Source: J Dairy Sci 2010;93:5268-5279.

- Reduced prepartum dry matter intake by 1.4 to 2.2 kilograms per day
- Further exacerbated metabolic acidosis prepartum

“The negative DCAD diet reduced dry matter intake prepartum as expected,” explained Dr. José Santos, research foundation professor of the University of Florida’s Department of Animal Sciences. “That is an anticipated response based on all the literature available.”

“We attribute the reduction in intake prepartum with the negative DCAD due to the metabolic acidosis induced by the diet, but that remains to be confirmed experimentally,” he added. “We are working on an experiment to answer that question.”

#### Ultimately, the results show two things:

- There is no reason to feed a negative DCAD diet more than -12 meq/100g ration DM.
- It reinforces past research indicating that you can feed a negative-DCAD diet for the entire dry period. This is good news for dairies unable to separate pre-fresh cows into different groups.

Finally, decreasing ration DCAD to attain urine pH values below the suggested threshold of -12 meq/100g ration dry matter adds unnecessary feed cost. You will spend more than necessary to achieve a more negative DCAD, which does not translate into a better outcome.

Calculations show that for every two points of DCAD you decrease the diet of, you add approximately US\$0.05 cents to ration cost (four to seven cents depending on product price).

For example, if you only need -10 but are over-formulating for -14, then you are wasting US\$0.10 per cow daily with no added benefit.

#### Target ration DCAD levels, not urine pH results

There has been much attention on monitoring

urine pH levels as a measure of transition cow health, which is a good way to monitor whether a ration has been adequately formulated for DCAD.

In some instances, however, urine pH monitoring has become the focus of the nutrition management programme, rather than the desired outcomes related to health.

Instead of debating how high or low urine pH levels should be, or what fluctuating urine pH levels mean, your strategy must go beyond that. The bigger concern is what you are trying to accomplish when formulating rations for DCAD.

The purpose of feeding a negative DCAD diet prior to calving is to have healthier cows with less time in the sick pen. Reducing transition health challenges by lowering prepartum ration DCAD accomplishes this aim. Additionally, it helps elevate reproductive performance and cow productivity in the following lactation — a win for cows, farmers and your dairy’s bottom line.

As for dealing with the minutiae of urine pH monitoring, it should be of lesser concern than the overarching objectives of improved animal health and performance. Still, it makes sense to develop and follow a specific protocol to obtain the most useful results.

“**The purpose of feeding a negative DCAD diet prior to calving is to have healthier cows. Reducing transition health challenges by lowering prepartum ration DCAD accomplishes this aim.**”

1. Understand that there will be some fluctuations in urine pH due to the cow’s biology. These variations are normal and no cause for alarm. Changes in urine pH can also be related to feeding times or other management actions.

2. Take samples at the same time to remove inconsistencies out of your sampling programme.

3. Don’t focus on getting and keeping urine pH levels to extremely low levels.

If urine pH is below 6.8 for Holsteins or 6.5 for Jerseys, you will reap health and productivity benefits of a prepartum negative DCAD diet.

Moreover, there appears to be no justification for trying to achieve lower urine pH values based on postpartum health and production responses.

Recording lower urine pH values below the target values during monitoring is not necessarily an issue since some variation is normal, but there is no reason to strive for extremely low urine pH values. ☹️

For more information, visit: [AHAnimalNutrition.com](http://AHAnimalNutrition.com).

Citations available upon request.

- DR. ELLIOT BLOCK, senior research fellow & director of technology, Arm & Hammer Animal Nutrition

# AMINO ACID BALANCING TO MAXIMISE PROFITABILITY

Reducing feed costs and removing feed additives are the first things milk producers consider when milk protein price is low. However, methionine is not like other feed additives; it is crucial to optimal production of important proteins and enzymes, which are needed for maintenance, health and reproduction.

Methionine is the most limited amino acid in lactating cows. However, feeding cows with crystalline methionine is not beneficial as free methionine is quickly and virtually degraded by microorganisms in the rumen. In contrast, rumen-protected methionine has a positive influence on milk protein synthesis in cows (Osorio et al., 2013)

Smartamine<sup>®</sup>M and MetaSmart<sup>®</sup> are two forms of rumen-protected methionine developed by Adisseo and are proven by research to support production of more milk and milk components in both fresh and lactating cows, via an improved amino acid balance. They can also improve immune responses, liver function, reproduction, and other indirect benefits, which are difficult to quantify.

Here are five steps to reduce feed costs, maintain performance, and increase profitability while keeping methionine supplementation's benefits:

1. Choose the right protected amino acid: In cows, *cost per unit* of metabolisable amino acid is a better parameter than cost per tonne, to evaluate bioavailability (BV), which must be supported by

reputable suppliers with peer-reviewed research.

2. Balance the ideal lysine-methionine ratio:
  - a. For lactating cows' diets evaluated with CNCPS, the optimum lysine-methionine ratio for *milk protein yield* is approximately 2.68:1. When the ratio is above the ideal level, there is an opportunity to reduce costs by removing "extra" lysine. When the ratio is below ideal, there is an opportunity to increase performance by supplying lysine up to an ideal amount or to lower costs by reducing the amount of surplus methionine. Unless the ratio is at an ideal level, there is inefficiency and less-than-ideal utilisation of protected amino acids being fed.
  - b. During the periparturient period, the ideal lysine-methionine ratio is 2.50:1, due to increased demand for methionine for liver function and immune response.

3. Provide the optimal amount of methionine: metabolisable methionine at a ratio of 1.13 grams per Mcal of metabolisable energy - the amount needed for optimal milk protein yield. Cows fed less than this ratio will be compromised with less efficient production of milk protein, resulting in weaker performance and reduced profitability.

4. Improve efficiency and lower costs with reformulation: As methionine and lysine are limited amino acids in most dairy rations, metabolisable protein (MP) will be in surplus until the concentrations of methionine and lysine in the MP are raised above the optimal level. Therefore, reducing MP while maintaining the amino acids balance will simultaneously help produce the desired performance and lower cost. For example, the table below shows a typical amino acid balance of a high-producing group with a typical MP supply of 3,000 grams. After reformulation, the same amino acid balance and supply are achieved in a diet containing 300 grams less MP. Because the amino acid concentrations are still below the optimal concentrations in MP, the reformulated diet will provide the same performance at a lower cost.

In summary, by choosing the right protected amino acids, applying balanced lysine-methionine ratio, providing adequate methionine to metabolisable energy, and reducing surplus metabolisable protein (combined with modern, non-linear low-cost balancing programmes), it is possible to trim feed cost by US\$0.10-0.30 per cow daily, which will help farmers to maintain competitiveness and profitability.

- DR. KEVIN LIU and DR. CLAIRE XU, Adisseo Asia Pacific P/L

“  
**Choosing the right protected amino acids and applying balanced lysine-methionine ratio can help trim feed costs and enable dairy farmers to maintain profitability.**

Nutrient	Before reformulation	After reformulation
ME Mcal	64	64
MP (grams)	3,000	2,700
<b>Methionine</b>		
grams	72	72
grams/Mcal ME	1.13	1.13
% MP	2.40	2.67
<b>Lysine</b>		
grams	193	193
grams/Mcal ME	3.02	3.02
%MP	6.43	7.15
<b>Lysine:Methionine</b>	<b>2.68:1</b>	<b>2.68:1</b>

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# THE EFFECT OF HEAT STRESS ON DAIRY COW PERFORMANCE: BEAT THE HEAT WITH CHROMIUM

## Introduction

The effects of extreme weather conditions, especially hot conditions, on the health and performance of livestock have been well documented (Aleena *et al.*, 2016; Rhoads *et al.*, 2013; Dunshea *et al.*, Baumgard and Rhoads, 2013). With climate change and erratic weathers escalating, heat stress and its impact on livestock are now critical management considerations in global dairy production.

Additionally, with genetic improvement to increase the average liveweight and production potential of modern dairy cows, metabolic heat production has also risen and added to heat load and the risk of heat stress. Heat stress in dairy cattle is shown to reduce feed intake and milk yield, alter milk composition, lower reproductive performance and immune response whilst concomitantly increasing the incidence of diseases, such as mastitis and mortality. Heat stress is a global phenomenon; in the US alone, the economic impact on the dairy industry - through underperformance - is estimated to be about \$1 billion per annum (St-Pierre, 2003). Therefore, dairy producers and nutritionists will need to develop strategies to manage heat stress and ameliorate its effect on livestock health and performance.

There are different management practices to mitigate the direct and indirect effects of heat stress. However, this article will focus on how chromium can help to diminish the negative effects of heat stress on production parameters. Also, heat stress' impact on production parameters in dairy cows will be highlighted.

## Measurement of heat load (Temperature-Humidity Index)

Heat stress can be assessed using the temperature-humidity index (THI). The index accounts for the combined impact of air temperature and relative humidity (RH) by calculating a single value, which is used to assess risk and determine appropriate heat-reducing strategies. Although THI does not account for air movement, solar radiation or length of exposure to heat, it is still considered a useful, simple tool



Dr. Razaq Balogun, technical service manager (ruminant), Kemin Animal Nutrition & Health division, Asia

for assessing heat stress (Ravagnolo, 2000). Previously, it was thought that lactating cows become heat stressed only when the THI exceeds 72. But recent studies have shown that production parameters, such as milk yield, starts to decrease at a THI below 72 (Zimbelman *et al.*, 2009; Ravagnolo, 2000), indicating that heat stress may start before clinical signs become obvious. Dairy cows in tropical regions are particularly subjected to heat stress over an extended period but cows in temperate climatic zones, like Australia and New Zealand, can also experience heat stress.

The chart below (Figure 1) provides a guide for THI over a range of temperatures and relative humidity (Collier *et al.*, 2013).

Temperature		Relative humidity (%)																					
°F	°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
75	24							68	68	68	69	69	70	70	71	71	72	72	73	74	74	75	75
80	27	69	69	69	70	70	71	72	72	73	73	74	74	75	75	76	76	77	78	78	79	79	80
85	29	70	71	72	72	73	74	75	75	76	77	78	78	79	80	81	81	82	83	84	84	85	85
90	32	72	73	74	75	76	77	78	79	79	80	81	82	83	84	85	86	86	87	88	89	89	90
95	35	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	94	95
100	38	77	78	79	81	82	83	84	85	86	87	88	90	91	92	93	94	95	96	96	97	97	98
105	41	79	80	82	83	84	86	87	88	89	91	92	93	95	96	97							
110	43	81	83	84	86	87	89	90	91	93	94	96	97										
115	46	84	85	87	88	90	92	93	95	96	98												
120	49	86	88	89	91	93	95	96	98														

Figure 1. Temperature Humidity Index for lactating cows (adapted from Collier *et al.*, 2013).

It is clear from this chart that even at mild temperature, heat stress is possible with high humidity.

## Impact of heat stress on feed intake, milk production and reproduction

The most obvious effect of heat stress on dairy cows is the drastic reduction in feed intake. Cows will reduce feed intake to help minimise internal heat load. It was reported that heat-stressed animals undergo metabolic changes involving the upregulation of hormones leptin and adiponectin, both of which adversely affect feed intake (Baumgard and Rhoads, 2013). The effect of heat stress on feed intake varies and will depend on species and other environmental conditions. Aleena *et al.* (2016) reviewed several studies on heat stress and estimated the reduction in feed intake to range from two to 61.9% when farm animals are exposed to heat stress conditions (Table 1). Different animal breeds have different tolerance to heat stress but it is recognised that tropical animals, such as *Bos indicus* cattle, can cope with heat stress more than *B. taurus*, a temperate cattle (Hansen, 2000). Similarly, high producing dairy cows are likely to be more affected by heat stress than low producing cows (Yasothei, 2014; Dunshea *et al.*, 2013).

Species	Reduction in feed intake (%)	References
Holstein cows	61.9	Lamp <i>et al.</i> , 2015
Alentejana cows	10	Pereira <i>et al.</i> , 2008
Limousine cows	9.6	Pereira <i>et al.</i> , 2008
Mertolenga cows	2	Pereira <i>et al.</i> , 2008
Buffalo heifer	8-10	Hooda and Singh, 2010
Indian goats	13	Kaliber <i>et al.</i> , 2016
Murciano-Granadina dairy goats	27	Hamzaoui <i>et al.</i> , 2013
Afshari lambs	17.5	Mahjoubi <i>et al.</i> , 2015
Gilt pigs	47.1	Pearce <i>et al.</i> , 2013
Laying hens	47.9	Mashlay <i>et al.</i> , 2004
New Zealand white rabbit	42.4	Ondruska <i>et al.</i> , 2011

Table 1. Effect of heat stress on feed intake of lactating cows and other farm animals (As reported by Aleena *et al.*, 2016)

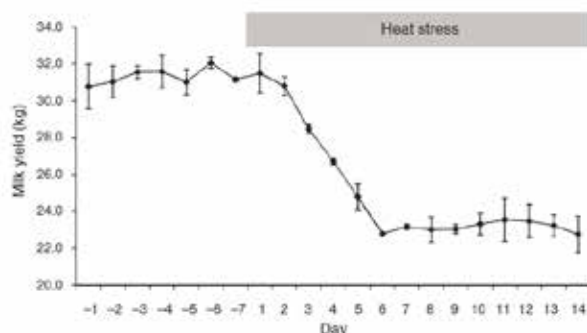


Figure 2. Milk yield of lactating dairy cows exposed to thermoneutral conditions (-7 to -1 days) followed by exposure to 14 days of heat stress (1-14 days post exposure; Dunshea *et al.*, 2013, adapted from DiGiacomo, 2011).

Animal type	Effect of heat stress	References
Guernsey heifers	Reduced conception rate	Madan and Johnson 1973
Beef cattle	Increased anaestrous	McDowell 1972
Lactating cow	Reduced conception rate	Nabenishi <i>et al.</i> 2011
Guernsey heifers	Increased plasma concentration of progesterone (negative impact on embryo development and survival)	Abilay <i>et al.</i> , 1975
	Increased length of oestrous cycle	Abilay <i>et al.</i> , 1975
Holstein cows	Linear negative relationships between THI and conception rate	Ingraham <i>et al.</i> , 1974
Holstein cows	Reduced pulsation of LH secretion that can affect the maintenance of embryonic development by corpus luteum	Wise <i>et al.</i> , 1988

Table 2. Description of reported effects of heat stress on reproduction parameters

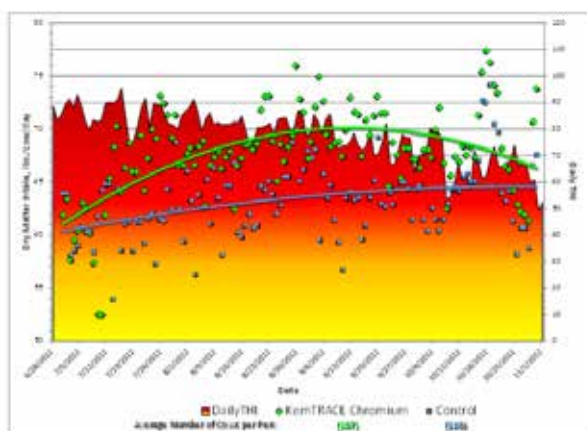


Figure 2. Effect of KemTRACE™ Chromium on pen average dry matter intake in a high producing Holstein commercial dairy herd under heat stress conditions (Kemin Internal Document: TD-13-00018)

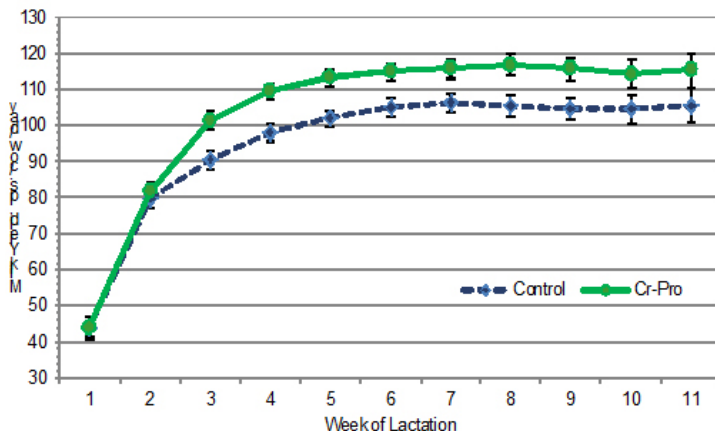


Figure 3. Effect of KemTRACE™ Chromium on milk yield in a high producing Holstein commercial dairy herd under heat stress conditions (Kemin Internal Document: TD-13-00018)

Sharp reduction in milk yield has been reported when cows are exposed to extreme heat (Dunshea *et al.*, 2013, adapted from DiGiacomo, 2011; Figure 2). Lower milk production during hot conditions was thought to be virtually attributed to reduced feed intake. However, a recent study showed that a reduction in feed intake only explained 35-50% of the reduction in milk production (Rhoads *et al.*, 2013; Wheelock *et al.*, 2010). It was suggested that other metabolic adjustments necessary for an animal to adapt to heat stress may explain the rest of the 50-65% reduction in milk production (Baumgard and Rhoads, 2013). An increase in maintenance costs associated with panting, sweating and other metabolic processes that help to maintain the body will draw glucose from the mammary gland and reduce milk yield

(Baumgard and Rhoads, 2013; O'Brien *et al.*, 2008).

Heat stress has been shown to affect reproductive capacity of lactating cows (Table 2). Heat stress affects a cow's fertility and reproductive performance as it causes hormonal changes, resulting in decreased oocyte and semen quality. It also hinders embryo development and embryo survival (Rhoads and Baumgard, 2013). The secretions of luteinizing hormone (LH) and estradiol are also reduced, leading to a reduction in the length and intensity of estrus, therefore causing 'silent' heat. Exposure to heat conditions can also induce poor development of oocytes into blastocyst stage, resulting in decreased fertility. The low secretion of progesterone and low prostaglandin under heat stress reduce embryo survivability and therefore curtails the >>>

maintenance of pregnancy.

Nabenishi *et al.* (2011) studied the effect of THI on body temperature (measured as vaginal temperature) and found that an increase in body temperature by 0.6°C resulted in an 11.6% reduction in the conception rate of Holstein-Friesian lactating dairy cows. It was reported that in general, there is a 4.6% reduction in conception rate for every unit increase in THI above 70 (Krishnan *et al.*, 2017).

### Mitigating heat stress with chromium

Chromium supplementation is identified as a nutritional solution to help reduce production losses associated with heat stress (Dunshea *et al.*, 2013; Baumgard and Rhoads, 2013). Heat stress causes various biochemical changes in cows and these changes are meant to allow adaptation and survival of heat load (Aleen *et al.*, 2016; Baumgard and Rhoads, 2013; Dunshea *et al.*, 2013). One of these changes is the regulation of glucose utilisation by the mammary gland. It was hypothesised that glucose is partitioned away from the mammary gland and preferentially utilised for other processes when cows are exposed to heat stress conditions, resulting in a lower milk production. In effect, heat stressed cows will relegate production processes, such as milk synthesis and fertility, in favour of survival processes, like maintaining normal body temperature (homeostatic thermoregulation). Therefore, it is suggested that any nutritional intervention, which will help dairy cows to manage insulin sensitivity and glucose utilisation, may ameliorate the impact of heat stress on feed intake, milk yield and reproduction (Dunshea *et al.*, 2013).

The role of chromium in carbohydrate metabolism has been elaborated in many publications (Vincent, 2000; Metz, 1993). Chromium potentiates the action of insulin and improves the utilisation of glucose by the peripheral tissues. Studies, which are designed to test chromium's effect on milk yield and feed intake under heat stress, have shown that chromium supplementation could reduce the effect of heat stress on milk yield and feed intake in lactating cows (Dahl, 2016; Ferguson, 2013; Mirzaei *et al.*, 2011; An-Quing, *et al.*, 2009; Soltan, 2009). Studies using other livestock species have also shown the positive effect of chromium in mitigating heat stress' impact on production performance (Samanta *et al.* 2008; Sahin *et al.*, 2005).

Kemin Industries, in collaboration with the University of Pennsylvania, conducted a field trial on a commercial dairy farm to determine the effect of chromium propionate (Cr-Prop, as KemTRACE™ chromium 0.4%, Kemin Industries, Des Moines, Iowa, US) supplementation (to provide 8mg Cr/head/day) on dry matter intake and milk production of lactating Friesian cattle. Results from this trial were presented at the 2013 ADSA-ASAS annual joint meeting (Ferguson, 2013). Throughout the

Parameter	Effect of Chromium propionate (unit change)
Pregnancy rate, %	+ 10
1st Service conception rate, %	+ 15
2nd Service conception rate, %	+ 7
3rd Service conception rate, %	+ 9
4th Service conception rate, %	+ 12
Body condition score	+ 0.3

**Table 3. Effect of KemTRACE™ chromium on reproduction in a high producing Holstein commercial dairy herd under heat stress conditions (adapted from Ferguson *et al.*, 2013).**

“ Dairy cows in both tropical and temperate regions can suffer heat stress, which causes lower oocyte and semen quality, and hormonal changes as well as adversely impacting fertility, reproduction, and embryo development and survival. ”

feeding period, most cows that received Cr-Prop maintained significantly higher feed intake compared to cows that did not receive Cr-Prop (Figure 2). When Cr-Prop was withdrawn at the end of the study, intake continued to decline to a similar level as the control cows. Similarly, milk production from the Cr-Prop cows was consistently higher throughout the study period vis-à-vis cows which did not receive Cr-Prop (Figure 3).

The effect of Cr-Prop on reproduction in lactating dairy cows under heat stress was reported by Ferguson (2013) (Table 3). There were significantly higher conception rates for first, second, third and fourth services. These increases are consistent with the overall increase in pregnancy rate and may be associated with the ability of cows to maintain body condition (Ferguson, 2013).

### Conclusion

Heat stress is becoming more frequent as it causes welfare concerns and economic losses for dairy producers. Therefore, nutritionists and dairy farmers need to develop nutritional and non-nutritional management strategies to minimise this risk.

Chromium supplementation is a cost-effective, nutritional way of mitigating heat stress. Studies on lactating dairy cows under heat stress have demonstrated the ability of the cows to continue maintaining feed intake and milk production as well as reproducing better when supplemented with chromium. A heat stress management programme incorporating KemTRACE™ chromium may help dairy cows to maintain feed intake, thus improving production, reproduction and profitability. 🌱

*References are available upon request.*

- DR. RAZAQBALOGUN, technical service manager (ruminant), Kemin Animal Nutrition & Health division, Asia



# CHINA dairy

## PURCHASE LIMITATION PRACTICES HURT CHINA'S DAIRY FARMING



Dairy farm in Yinchuan, Ningxia Hui autonomous region, China.

China's dairy farming is not showing strong signs of recovery even as the industry improves in production standards. This is notable in Tongliao, Inner Mongolia, the country's major dairy cattle breeding ground. One of the factors hampering the sector's growth is the practice of limiting milk collection at every farm.

Currently, large dairy producers are collecting raw milk at a price of RMB3.5-3.8/kg (US\$0.53-0.58), about 7% lower than last year's RMB4/kg (US\$0.61). However, they have an unwritten rule to take only 80-90% of each farm's milk supply. This means dairy cattle farmers have to dispose the remaining 10-20% of raw milk themselves, either by feeding to calves or selling at a much lower price of RMB1.80-2/kg (US\$0.27-0.30) to smaller dairy producers. Inevitably, the actual revenue from milk sales is slashed by RMB0.20-0.30/kg (US\$0.03-0.04), hence hurting the profit margins of dairy farms.

Generally, profit is a mere RMB0.50/kg (US\$0.08) of raw milk. For a farm with 450 head of dairy cows, which is capable of producing five tonnes of raw milk daily, gross annual profit adds up to around RMB900,000 (US\$137,000). After deducting expenses to keep non-lactating cows and calves, the net gain is almost halved at RMB500,000 (US\$76,000). Such rate of return is unimpressive considering that the investment in a farm of this size is close to RMB10 million (US\$1.5 million).

The sector is therefore unattractive to investors, particularly as it struggles to recover from the melamine scandal in 2008.

Since 2011, over 90% of backyard dairy cattle farms in Tongliao have closed, with the number of farms falling from 4,654 to less than 400 by last year. 🌱

- DAVID LIN



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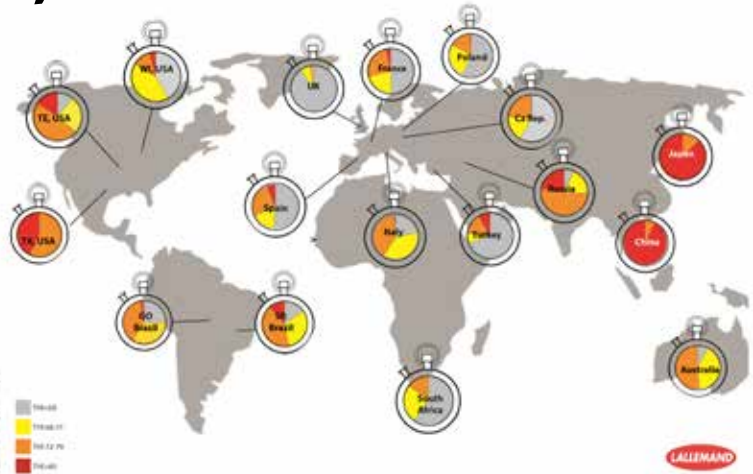
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# HEAT STRESS SIGNIFICANTLY AFFECTS MILK COMPONENTS, SOMATIC CELLS

**H**eat stress is a growing concern in dairy cows and beef cattle. We are fully aware that, even at low level, it can significantly impact herds' production and welfare. For several years, Lallemand Animal Nutrition has been focusing on identifying and monitoring indicators to assess rumen efficiency on-farm and help producers manage their herd for optimal production and welfare (the REI programme, see diagram). This approach helps gather thousands of data from different regions and production systems, which reveals heat stress's impact beyond experimental trials, in real-life conditions. Data obtained from dairy farms, under moderate to severe stress, were compiled, indicating that during heat stress, various indicators were affected:

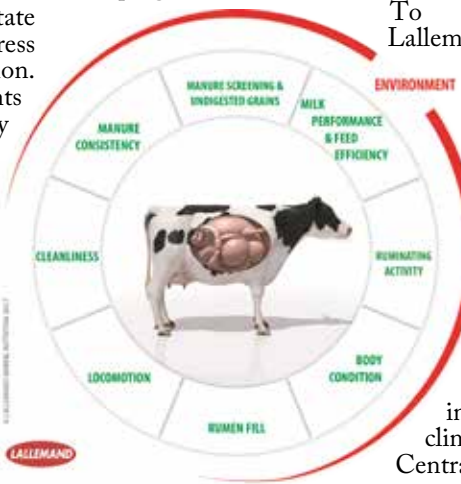
- Milk fat and fat/protein ratio appears significantly lower compared to other seasons, highlighting reduced rumen efficiency (see graphs).
- The percentage of cows in good body condition is lower.
- The percentage of clean cows is reduced.
- Manure screening shows reduced digestion efficiency: the occurrence of manure with more than one undigested (but processed) grain is increased.
- Somatic cell count in milk significantly increased (an indicator which is affected by poor rumen conditions and impaired antioxidant status).

Aurélien Piron says: "Our rumen audit approach, based on objective and measurable indicators of rumen efficiency on farms, is very much in line with current trends across the industry. For example, a recent study from Penn State Extension reveals a clear correlation between heat stress level (THI), daily rumination time, and milk production. According to this study, it is estimated that for 10 points increase in THI, daily rumination could be reduced by one hour and dairy production by 2.7 kg/day. **Rumen**



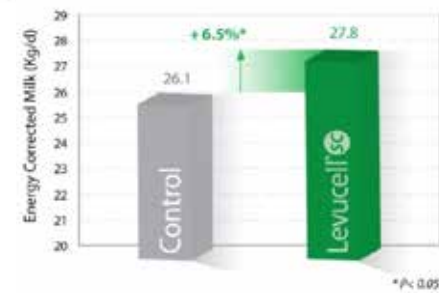
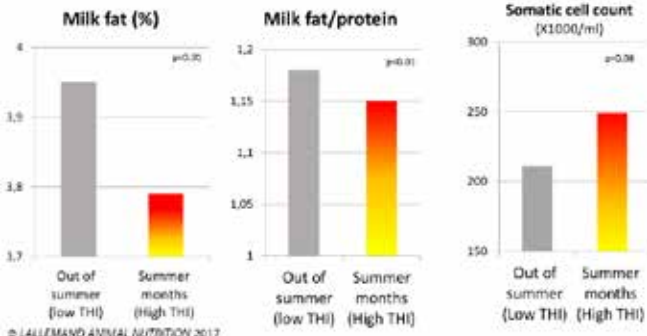
World map of heat stress risk representing amount of time spent under each stress level per 24 hours (Lallemand internal data)

efficiency is clearly affected by heat stress and, besides using heat abatement methods, we recommend focusing on ensuring optimal rumen function by adapting the ration (high-quality fiber, higher energy diet, increased starch and fat, good quality forage) and feeding strategy. Additionally, we have shown in many conditions that rumen specific live yeast, *Saccharomyces cerevisiae* CNCM I-1077, has a positive impact on dairy and meat production performance, helping to alleviate heat stress for the rumen."



To evaluate heat stress, Lallemand conducted a global survey - at farm level under various climate conditions - by recording real-time THI variations in animals' environments. Along with external climate recordings, this helped build a world map of heat stress risks, which aims to prepare producers to deal with summer problems, even in areas not known for hot climates, like Northern and Central Europe. 🌿

- LALLEMAND ANIMAL NUTRITION



Effect of rumen specific yeast LEVUCCELL® SC on dairy and meat production under heat stress conditions: Left: Energy corrected milk yield in dairy cows under moderate heat stress: THI: 63-73 (Fustini et al., 2013); Right: Bull's average daily weight gain under heat stress; THI 70-80 (Commercial trial, Italy, 2015).

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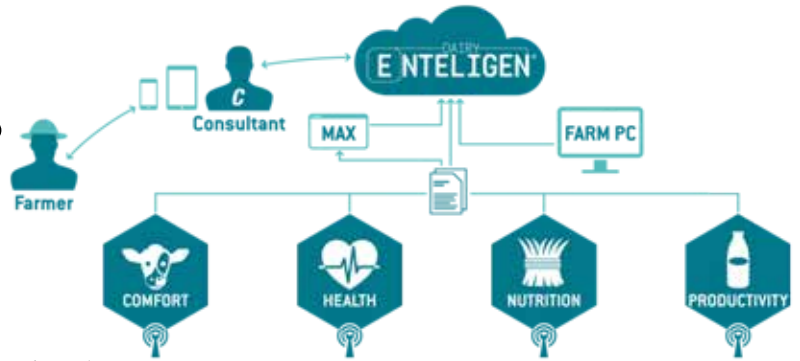
Rumen protected palm fat for dairy cow nutrition

## CARGILL INTRODUCES NEW DIGITAL PLATFORM FOR DAIRY FARMING

CARGILL has introduced Dairy Enteligen™, a new digital platform that provides data to help dairy farmers improve their operations.

“In today’s agricultural economy, farmers are looking for real-time information and insights to help them make the best decisions to run a profitable and efficient farm, while also ensuring their animals are properly nourished,” said Ricardo Daura, global product line director at Cargill Animal Nutrition’s digital insights business. “We believe Dairy Enteligen has the power to fundamentally transform the dairy industry by unlocking the power of data to guide farmers’ decision-making right from their fingertips.”

Using smart tablets or computers, dairy consultants work with farmers to track key information, including milk productivity, animal health and comfort and feed formulation. The Dairy Enteligen data collection, management and analysis platform combines various information from multiple programmes into one comprehensive system, allowing Cargill



advisors and customers to make precise decisions on feed and farm management.

“Dairy Enteligen helps Cargill consultants provide a better service to our farm customers,” said Chantal van der Meijde, Cargill’s global category manager for dairy technology. “Armed with insights from Dairy Enteligen, consultants can help farmers streamline operations, make critical decisions and manage the short-term while planning for the long-term sustainability of dairy operations. Before even setting foot on the farm, a dairy consultant will know how much milk a customer’s cows are producing and why, and have identified opportunities for improvement.”

The platform is available in Spain and Italy and will be launched in the US and other markets over the next several months. The platform is built with a secure technology to ensure farm records are protected, yet accessible by both the farmer and Cargill consultants 24 hours a day. 🌱

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ZIN121

## DSM'S RONOZYME® RUMISTAR™ WINS ONE-STAR CATEGORY AT SPACE 2017

DSM has claimed two new achievements for its bovine and poultry portfolios during the SPACE 2017 show in Rennes, France.

At this year's Innov'Space Awards, an evening programme of SPACE, the company's RONOZYME® RumiStar™ won the one-star category for animal feed bovine while its Digital YolkFan™ was awarded the two-star category for poultry.

RONOZYME® RumiStar™ is developed in collaboration with Novozymes and is the only EFSA-registered feed enzyme for dairy cows in the market. The product offers enhanced fiber and starch digestibility and improved feed efficiency.



The Digital YolkFan™ is a user-friendly device which has been lauded for its outstanding accuracy in objective yolk color measurement and easy data management.

DSM has a history of success at Innov'Space, having won awards for a number of innovative solutions including RONOZYME® HiPhos, RONOZYME® ProAct and MaxiChick™.

RONOZYME® RumiStar™ and Digital YolkFan™ prove DSM's dedication to improving feed utilisation, animal health and performance as well as sustainable animal production, the company said.

The products, along with the company's strong heritage and 50 years' experience in the animal nutrition and health industry, enables DSM to be a leading global partner for the feed industry. 🌱

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## TROUW NUTRITION'S LIFESTART SYMPOSIUM TO TALK ABOUT DAIRY HEIFER DEVELOPMENT BEYOND WEANING GROWTH



Trouw Nutrition's Calf & Beef Research Facility

TROUW Nutrition will be holding its LifeStart Press Briefing on October 17 (10am - 1pm), at its Calf & Beef Research Facility in St Anthonis, the Netherlands.

According to the Nutreco company, its brand LifeStart expands understanding of the effects of early nutrition and management on the development of a dairy cow.

“These effects create clear differences throughout the productive lifetime of the cow. Increased understanding of how nutrient regulation is affected by early life nutrient supply leads the way to improve their robustness and productivity, thus unlocking their full genetic potential,” Trouw Nutrition says.

The 2017 LifeStart Symposium brings together leading scientists and industry partners from around the world to focus on barriers the industry faces in relation to dairy farming and calf rearing.

It will be opened by Knut Nesse, CEO of Nutreco, followed by presentations from Trouw Nutrition experts who will share their insights relating to this important field.

The speakers include Prof Dr. Leo den Hartog (“Context of the dairy farming industry”), director of R&D, and researchers Leonel Leal (“LifeStart beyond weaning growth”) and Dr. Harma Berends (“LifeStart science: Breaking barriers”). 🌱



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# SPACE 2017 MARKS SUCCESSFUL EDITION WITH INNOVATION AND ADDRESSING FARMERS' CONCERNS

**S**PACE 2017 served as a meeting point for farmers looking for concrete, practical solutions to their projects as well as seeking innovative ideas by industry developers.

This agricultural trade show also functioned as an echo-chamber of concerns expressed by both farmers, the market-orientated agri-industry and the community as a whole. This is the least prominent aspect of SPACE but nevertheless, an essential part. For four days, SPACE focuses on tackling the crucial issues pertaining to the environment, fair prices for farmers, animal welfare, the challenges of food for all and food safety issues.

“The good visitor numbers, the atmosphere in the halls, the delegates from all over the world... all these translate to these past four days the drive and capacity of the agricultural sector to face the future,” said Anne-Marie Quéméner, chief commissioner of SPACE.

“This terrific, collective success demonstrates that SPACE has its rightful place and has found a new impetus setting the tone for the new season.”

Quéméner also highlighted the show’s Innov’space awards night which “has entirely fulfilled its mission of promoting innovation.” One notable recipient at the evening programme is global science-based company DSM, which was awarded for its bovine and poultry solutions (see pg 27).

“I would like to thank the exhibitors for the excellent quality of their stands. *Espace for the Future* has also shown us new opportunities for robots in agriculture. SPACE subscribes to this approach and desires to be the flag-bearer for many years to come,” Quéméner concluded. 🌱



SPACE 2017’s popular cow/cattle breed competition.



An exhibitor demonstration at SPACE 2017.



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NOVEMBER 2017

**10–12 November**

**Agrilivestock Cambodia**

Phnom Penh, Cambodia

E-mail: [yeo@ambtarsus.com](mailto:yeo@ambtarsus.com)

Website: <http://agrilivestock.net/AGRI%20CAMBODIA/>

**15–17 November**

**4<sup>th</sup> Dairy Asia Pacific Summit 2017**

Singapore

E-mail: [katie.wang@duxes.cn](mailto:katie.wang@duxes.cn)

Website: [www.duxes-events.com/dairyap/](http://www.duxes-events.com/dairyap/)

DECEMBER 2017

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**Agrilivestock Myanmar**

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MARCH 2018

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E-mail: [events@arena-international.com](mailto:events@arena-international.com)

Website: [www.arena-international.com/dairy](http://www.arena-international.com/dairy)

**20–22 April**

**International Dairy Expo China**

Harbin, China

E-mail: [yangtw@chgje.com](mailto:yangtw@chgje.com)

Website: <http://en.dairyexpo.com/>

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MAY 2018

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**DairyNZ Farmers' Forum**

Hamilton, New Zealand

E-mail: [andrea.clayton@dairynz.co.nz](mailto:andrea.clayton@dairynz.co.nz)

Website: [www.dairynz.co.nz/](http://www.dairynz.co.nz/)

NOVEMBER 2018

**13–16 November**

**EuroTier 2018**

Hannover, Germany

E-mail: [c.lser@dlg.org](mailto:c.lser@dlg.org)

Website: [www.eurotier.com/en/](http://www.eurotier.com/en/)

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