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IDF DAIRY SUSTAINABILITY OUTLOOK

SPECIAL EDITION

FAO Global Conference on

Sustainable Livestock Transformation

PREFACE

MESSAGE FROM THE IDF DIRECTOR GENERAL

Our series, IDF Dairy Sustainability Outlook, spotlights initiatives implemented by the global dairy sector to contribute to the UN Sustainable Development Goals (SDGs). This seventh issue is dedicated to the first FAO Global Conference on Sustainable Livestock Transformation, that will take place in Rome from 25 to 27 September 2023. We have collected a range of case studies that showcase how the dairy sector around the world work for better production, better environment, better life, and above all, better nutrition.

Nutrition security stands as a foundational element for human health and underpins the achievement of SDGs 2 and 3, highlighting the interconnectedness of nutrition and well-being within sustainability efforts. The nutritional value inherent in milk and dairy products plays a pivotal role in fostering both individual and societal health, while also offering a pathway to environmentally conscious and sustainable development through responsible production practices and resource management

The dairy sector provides nutrient-rich foods that are part of healthy diets and are therefore contributing to human health and nutrition. As major providers of a wide range of nutrients such as high-quality protein and essential micronutrients like calcium, phosphorus, potassium, iodine, and vitamins A, B2, B12, dairy products are fundamental in the push to achieve SDGs 2 and 3. The nutrients with which dairy contributes to healthy diets are key for all, but especially for children, pregnant women and the elderly, who have increased nutrient requirements. In addition, the nutrients in dairy work together complementing one another as part of the dairy matrix. Therefore, the unique combination and interaction between dairy components creates positive health effects that aren't achieved when these same nutrients are ingested in other forms.

The sustainability of food systems is not solely based on environmental considerations, but also on the nutritional value of the foods delivered and their combinations. Per FAO's definition, "a sustainable food system is one that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised". As stated by FAO, health is a basic requirement to accomplish sustainable food systems. Good health is a fundamental human right and a prerequisite for individuals to fully participate in society and contribute to sustainable development. Without health and well-being, you can't achieve a strong economy, maintain a flourishing environment, or build a strong society. Therefore, it is crucial to ensure the nutritional quality of food products when conceiving a more sustainable industry.

With the prevalence of the double burden of malnutrition worldwide, we must recognize the importance of nutrient-dense foods and make the distinction between feeding and nourishing. While feeding may satisfy hunger, nourishing goes beyond that by providing the body with the necessary building blocks for optimal growth, development, and repair. Simply providing calories is not enough to end hunger - food products need to be safe and nutrient-rich.

With the aim of showcasing the dairy sector's integral role of nutrition and health in sustainable development, this issue also includes initiatives in all four domains of the FAO Global Conference on Sustainable Livestock Transformation. Through these case studies will demonstrate how the global dairy sector is providing better nutrition and nourishing people while achieving better production, better environment, and better life.

Altogether, milk and dairy foods prove essential when securing healthy and sustainable diets for everyone: they are affordable and have a low environmental impact for their nutritional density. The intensification of the major drivers of food insecurity and malnutrition – conflict, climate change, economic crises – often occurring in combination, continues to challenge the quantity and quality of foods people can access. Therefore, furthering sustainable development in the dairy sector is major in ensuring a healthy future for the world population.

Have a great reading.

Caroline Emond
IDF Director General

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BETTER NUTRITION

CANADA

Dairy an important part of human nutrition says the FAO's latest report on the contribution of terrestrial animal source foods to health

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ALIGNMENT WITH SDGS

The role of milk products in health and nutrition has been studied extensively for many years. The Food and Agriculture Organization of the United Nations (FAO) summarized this vast amount of evidence in a recent report, Contribution of terrestrial animal source food to healthy diets for improved nutrition and health outcomes (2023), that places dairy as an important part of human nutrition. This robust, evidence-based global assessment of the role of animal source foods within the context of a healthy diet highlights the critical nutrient contribution of terrestrial animal source food, such as dairy products, and their role in supporting health throughout the lifecycle. Dairy Farmers of Canada (DFC) has analyzed the FAO report and prepared the following highlights.

HOW WAS THIS REPORT PRODUCED?

This report, produced in April 2023 with the assistance of a multidisciplinary committee and external reviewers, synthesizes the evidence on the effects of terrestrial animal source foods (TASF) on human nutrition and health. The FAO defines TASF as all food products obtained from terrestrial animals, including animal production and farming, as well as hunting. Categories of TASF include eggs and egg products, milk and dairy products, meat and meat products, food from hunting and wildlife farming, and insect and insect products.
In addition to providing a robust systematic review of over 500 studies on the impacts of TASF on health, the FAO report includes an analysis of some 250 current policy documents and dietary guidelines.

TERRESTRIAL ANIMAL SOURCE FOODS ARE NUTRIENT-RICH AND PLAY AN IMPORTANT ROLE IN OPTIMAL NUTRITION

Findings from the FAO report confirm that TASF are nutrient-rich and play an important role in optimal nutrition across the lifecycle, especially in pregnant women, school-age children and adolescents, adults, and older adults.
This report underscores that TASF contain several macronutrients, micronutrients, and bioactive compounds that have unique and important contributions to human health. In fact, they can provide a large proportion of the recommended nutrient intake across the life span. The intake of TASF has also been shown to counteract the effects of the anti-nutrients contained in plant-based foods.
The vital contributions of TASF, as a part of a healthy diet, towards nutrition and health are highlighted, as TASF contribute critical nutrients that play a key role in ensuring food health:

- High-quality, digestible proteins, that contain important amino acids, such as indispensable (essential) amino acids and some with roles in human health (such as carnitines, creatine, taurine, etc.);
- Long-chain fatty acids and ratios of fatty acids that are important for human health;
- Various critical micronutrients in bioavailable forms, including vitamins, such as B12, and minerals, such as the iron in meat or the calcium in milk.

The report encourages governments to update national food-based dietary guidelines so that they adequately consider terrestrial animal source foods and the specific nutrient requirements they contribute across the lifecycle.

> "A robust evidence base shows that milk and dairy consumption during pregnancy increases infant weight at birth and may also increase birth length and foetal head circumference. [...] Evidence shows that consumption of milk and dairy products by school-age children and adolescents increases height and reduces overweight and obesity. […] In adults, findings largely indicate that consumption of milk and dairy products (such as yoghurt) has positive effects in terms of reducing risk of all-cause mortality, hypertension, stroke, type 2 diabetes, colorectal cancer, breast cancer, obesity, osteoporosis and fractures."
>
> **Food and Agriculture Organization of the United Nations**

DAIRY'S UNIQUE MATRIX AND NUTRIENT DENSITY ARE RECOGNIZED

In particular, milk and dairy products are described in the FAO report as nutrient-dense foods that not only contain high-quality protein (primarily casein and whey), but a wide range of micronutrients such as highly bioavailable calcium, phosphorous, potassium, magnesium, vitamin B complex, as well as zinc and selenium. Additionally,

dairy's unique natural food matrix includes compounds that enhance its digestion and absorption, such as β-lactoglobulin which may enhance vitamin A absorption, casein which acts as a carrier for calcium and phosphorus, as well as lactoferrin which binds iron and play a key role in immunity.

FAO REPORT ALIGNS WITH RECOMMENDATIONS OF HEALTH CANADA AND THE INTERNATIONAL OSTEOPOROSIS FOUNDATION

According to Health Canada, many Canadian adults have inadequate dietary intakes of magnesium, calcium, vitamin A and vitamin D.2 The FAO report recognizes milk and dairy products for their importance as sources of nutrients, including complete proteins, and high quantities of "bioavailable" calcium, which refers to their ability to be well-absorbed by the body. The International Osteoporosis Foundation recommends foods as the preferred source of calcium; it highlights that "Milk and dairy products are the most readily available dietary sources of calcium. Dairy foods have the additional advantage of being good sources of protein and other micronutrients important for bone health."

TERRESTRIAL ANIMAL SOURCE FOODS CONTRIBUTE TO IMPROVED NUTRITION, HEALTH AND COGNITION

Milk products are recognized by the FAO for their protein content as well. The protein in milk is a complete protein, meaning that it provides all essential amino acids in adequate proportions and thus supports the optimal development and maintenance of muscles and other body tissues. It makes dairy particularly efficient at supporting the development and growth of body tissues like muscles.

Overall, the evidence suggests that TASF in the context of a healthy and balanced diet, can contribute to improved nutrition, health, and cognition. In fact, data supports that TASF intakes at appropriate levels benefit several health outcomes, including reducing the levels of both infectious and noncommunicable diseases, across the lifespan.

Much of the evidence on the role of TASF across the lifespan pertains to milk and dairy products, which have been more thoroughly researched:

- Milk and dairy consumption during pregnancy promotes healthy weight of infants at birth and may also benefit birth length and foetal head circumference, with some evidence suggesting greater effects if the intervention starts in the first trimester.
- Infants and young children have limited gastric capacity and consequently, may need nutrient-dense, easily absorbable foods (such as TASF) as a part of complementary feeding to support growth and development.
- In school-age children and adolescents, dairy intake was linked to increased height and lower risks of obesity/overweight.
- In adults, findings largely indicate that consumption of milk and yogurt reduces the risk of all-cause mortality, hypertension, stroke, type 2 diabetes, colorectal cancer, breast cancer, obesity, osteoporosis, and fractures.
- Preliminary evidence suggest that milk and dairy products may play a role in mitigating sarcopenia, fractures, frailty, dementia, and Alzheimer's disease.

On the topic of sustainability, the FAO notes that assessments of TASF in healthy diets need to consider factors such as regional variations in natural resources, background health and nutrition as well as people's nutritional needs over the lifespan, the availability and accessibility of foods, and the ecosystem roles of the livestock. Moreover, emerging evidence on sustainability of diets shows that greater diversity of species in the diet (plant-based foods, TASF, and aquatic food) contributes to higher nutrient adequacy.

IN PRACTICE

- TASF are nutrient-dense foods that contain high-quality proteins, important fatty acids and various vitamins and minerals including iron, zinc, selenium, vitamin B12, choline and calcium, among several others.
- The evidence suggests that TASF, in appropriate amounts, can be supportive of health throughout the life course and reduce the risk of many noncommunicable diseases.
- Milk and dairy products have been associated with several positive health outcomes at many life stages, such as healthy birth weights, improved body composition in childhood, a reduced risk of several chronic diseases in adulthood, and potentially frailty and dementia in older adults.
- Emerging evidence on sustainability of diets shows that greater diversity of species in the diet (plant-based foods, TASF, and aquatic food) contributes to higher nutrient adequacy.
- Dietary guidelines should consider the contribution of TASF, including milk and dairy, to healthy diets across the life course to mitigate both micronutrient deficiencies and decrease the risk of noncommunicable diseases.

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CHILE

Dairy: a key food in the new Dietary Guidelines of Chile

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ALIGNMENT WITH SDGS

THE BIG PICTURE

In 2020 the national health authority initiated the work to update the Chilean Food Guide aiming to improve the nutrition and health of the Chilean population. In the last 20 years, the rates of child and adult obesity have increased, resulting in increasing rates of chronic diseases in the population. In this context, amidst a still growing dairy consumption in Chile, to counterbalance with scientific evidence anti-dairy messages spread by media influencers and sometime also by health professionals, our organization started a program called "Gracias a la Leche" in partnership with academia and research institutes, with the goal to communicate to nutritionist and doctors, the scientific evidence available worldwide about the nutritional and health benefits of dairy consumption and their role in sustainable diets.

THE PREMISE

To give a comprehensive scientific context to nutritionist, the medical community, and the health authority about the key role of dairy in sustainable diets.

"Dairy is one of the key foods included in the new Chilean Food Guides which were developed based on scientific evidence and the cultural-environmental respect."

Octavio Oltra and Roberto Koch

MOVING THE WHEEL

The program Gracias a la Leche included several actions:

- launched a communication plan which included the creation of a multi stake-holders committee to guide the actions;
- the development of knowledge diffusion material as a book called Dairy: Nutrition and Health than include the review of 1,500 paper done by 54 authors;
- a health community engagement plan than includes activities such as conferences, symposia, talks in universities and health centres;
- communication though traditional media and social media engagement, and the creation of a Scientific Committee to encourage the development of scientific projects.

THE HISTORY OF SUCCESS

There are three positive results of the program, one is the increase of requests received to give talks in universities, hospitals, and health centres. The second one is that we received 10 grant proposals projects for our research fund created with the Chilean Nutrition Society. The third result is the inclusion of our book "Lácteos: Nutrición y Salud" as bibliographic reference in the new dietary guidelines, as well as the use of several key messages of our program, such as: "Dairy should be consumed at all stages of life", "the role of dairy in body weight control", "recommendation of the consumption of three serving of dairy a day", "nutritional differences between milk and vegetable beverages" and "dairy as part of a sustainable diet".

THE VALUE OF THE INITIATIVE

We generated a network of research, health professionals and nutritionists that are actively communicating the benefits of dairy consumption. Also, currently there are new research projects focused on the impact of dairy in nutrition and human health that bring new knowledge that supports the information communicated by the program. Finally, the main beneficiary is the Chilean population because there is still a gap between the average consumption and the recommendations, therefore some major health concern as obesity, bone health and the nutrition of the elderly people could be addressed with a better diet that includes more dairy.

IX

Mensajes de las Guías Alimentarias para Chile

5. Consume lácteos en todas las etapas de la vida

La leche y sus derivados, tales como yogur o queso,

se han transformado en alimentos importantes para la nutrición, salud y bienestar del ser humano, considerando los diferentes nutrientes que aportan y los efectos de su consumo diario durante las diferentes etapas de la vida.

Los lácteos, aportan energía y diversos nutrientes entre los que destacan proteínas de alto valor biológico; minerales como calcio, fósforo, magnesio, potasio, zinc, selenio; vitaminas como la A, D, B1, B2, B3, B6 y B12. También es un alimento en el cual se puede agregar nutrientes o compuestos bioactivos beneficiosos para la salud, entre los que destacan los ácidos grasos Omega-3, hierro, fitoesteroles, etc.

Además, su consumo, previene el desarrollo de diversas enfermedades no transmisibles, especialmente obesidad, enfermedades cardiovasculares y diabetes tipo 2, y/o la conservación de la funcionalidad de la masa ósea y muscular en la vida adulta. También su consumo ha demostrado tener un rol importante en salud pública, especialmente en programas de alimentación complementaria o programas de alimentación escolar, donde los beneficios incluyen reducción de la desnutrición infantil, enfermedades infecciosas, anemia ferropriva, y también mejores indicadores respecto a aprendizaje y habilidades cognitivas.

NEW OPPORTUNITIES

During this year, we will continue communicating the benefits of dairy to health professionals and nutritionist highlighting the results from the research supported by the program. Also, we are using the recommendation given for the Dietary Guideline, to reach consumers with messages though social media and the press.

In addition, this year we are developing a new plan to add widder sustainability issues to the messages of the program, which will be mainly focused on the concerns that health professionals and nutritionist have told us their patients tell them.

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CHINA

Promotion of anti-food-waste practices in dairy factories — A Case of Mengniu

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ALIGNMENT WITH SDGS

THE BIG PICTURE

There is a community with a Shared Future for Mankind. The United Nations adopted 17 sustainable development goals in 2015 to guide global development efforts from 2015 to 2030. The sustainable development goals include "zero hunger", "good health and well-being" and "responsible consumption and production", combating food waste can help achieve these goals. According to statistics, China wastes approximately 35 million tons of food annually, making it urgent to reduce food waste. In 2021, China issued the "Anti-food-waste Law", advocating for resource conservation, environmental protection, and promoting sustainable economic and social development. In order to help achieve the sustainable development goals of the United Nations and comply with relevant national laws, Mengniu promotes the fight against food waste.

Through self-inspection, we identified some food waste risks in the value chain. In response, we issued a group level "Anti-food-waste Guidelines", and took a series of measures. The implementation of these measures reflects the company's proactive commitment to social and environmental responsibility, and its sense of mission to contribute to the sustainable development of all humanity.

"Mengniu is committed to reduce food waste and strengthen communication and advocacy with the public"

Dongping Yu

THE PREMISE

We hope to practice and promote anti-food-waste through the following angles: the standardization of daily production in the factory and the promotion of employee behaviour and awareness in factory operations.

- **Daily production standardization:** Reduce milk waste in the production process, with a goal of reducing the waste rate to 2.0% by 2022.
- **Advocacy of behavioural awareness:** Spread and convey the concept of combating food waste, and guide employees to practice frugality in their daily lives

MOVING THE WHEEL

We focus on exploring ways to reduce waste in our daily work and taking three major measures to reduce waste from the source:

- In terms of production and operation, we launched an internal project, "Preventive Milk Loss Map, Saving Every gram of Milk", reducing waste in the production process by improving technology and management;
- In terms of surplus product processing, we avoid food waste by sorting out surplus yogurt products and collaborating with external organizations to donate these;
- In terms of awareness and behaviour advocacy, we promote the weighing of each meal and adhere to the implementation of "clean your plate" checking campaign to reduce personal food waste.

THE HISTORY OF SUCCESS

The three major measures we have taken to combat food waste have all achieved significant results:

Measure 1: Before the implementation of the project, 2.99% (in 2019) of the milk in the low-temperature fermented milk production process was wasted and treated as sewage; After the project was launched in 2020, the company has saved 18,576 tons of milk by the end of 2022.

Measure 2: 200,000 cups of surplus yogurt were donated in 2022 (calculated as 100g/cup product);

Measure 3: By advocating the concept of prudence, and weighing each meal in the employee cafeteria, over 40,000 employees of the company have participated in the internal "clean your plate" checking campaign.

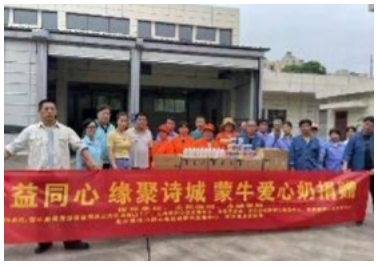
THE VALUE OF THE INITIATIVE

- Mengniu's various anti food waste measures are proved to be effective providing valuable experience for enterprises and even the dairy industry in their efforts to combat food waste.
- Mengniu actively assumes social and environmental responsibilities, practices ESG concepts at all levels of the value chain and supports the achievement of United Nations sustainable development goals.
- By advocating for employees to avoid food waste in daily production and life, Mengniu is committed to forming a sustainable corporate culture, increasing the public's attention to solve food waste, environmental and climate issues.

Main beneficiaries:

- Recipients who receive surplus product donations
- Enterprise
- The natural environment

NEW OPPORTUNITIES



Photos of surplus product donations

Prizes won by Mengniu's activity of reducing food waste

Photos of "Preventive Milk Loss Map, Saving Every gram of Milk" project in Mengniu factory

In the future, based on the current surplus of product donations, we plan to carry out donations of near-expired food to further reduce food waste on the consumer end. We will attach greater importance to cooperation with e-commerce platforms and supermarkets, and leverage the platform's advantages to better promote project implementation. In addition, we will collaborate with the enterprise foundation of Mengniu, to carry out more influential projects in the field of public welfare to reduce food waste and strengthen communication and advocacy with the public.

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In 2021, Mengniu's activity of reducing food waste was selected into the 2021 "carbon neutrality typical cases" of the second Green Economic Development Forum held by People's Daily Online, the All-China Environment Federation and the Chinese Ministry of Ecology and Environment. https://baijiahao.baidu.com/s?id=1717491809731951317&wfr=spider&for=pc

In 2021, Mengniu's activity of reducing food waste won the second prize of "Golden Key · China Action for SDG".

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CHINA

Improve nutritional value of dairy foods and promote precise nutrition-commitments in action

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ALIGNMENT WITH SDGS

THE BIG PICTURE

The nutritional quality evaluation standards for dairy products remain inconsistent in China, which poses a challenge to consumers in identifying products with high nutritional value. There is a lack of regulatory standards of dairy products specific to different population groups, making it difficult to meet the precise nutrition demands of various groups. Furthermore, research on nutrition status and requirements through the whole lifespan is insufficient, which hinders the recognition of the precise nutritional demands of a specific population group and makes it challenging to develop customized products to address nutritional deficiencies. Dairy products are good sources of various nutrients, but the number of dairy products that can precisely meet the nutrition requirements of diverse populations is limited. Moreover, dairy products play a pivotal role in satisfying the increased nutrition demands after the COVID pandemic and are crucial to the realization of China's 2030 National Nutrition Plan.

THE PREMISE

We are committed to support the development of relevant regulations, advancing nutrition surveys and research, and providing consumers with more diverse, nutritious, and customized dairy products. Our goal is to promote the well-being of people at all ages and make dairy products accessible to all in China.

> "Providing healthier and customized dairy products for all at all ages"
>
> **Zhanyou Yun**

MOVING THE WHEEL

Yili collaborates with universities and research institutes to identify nutrition gaps in different ages through dietary and nutrition surveys. This allows us to understand the nutritional status of the Chinese population and recognize opportunities for innovation and improvement of the nutrition design of our dairy products in order to better meet the nutritional needs of targeted populations. Moreover, Yili established China's first industrial-led Nutrition Profiling (NP) system covering all populations, which guides the improvement of the nutritional value of products. With the help of the research and the NP system, we launched various products tailored to the needs of diverse populations, including children, women, and the elderly.

THE HISTORY OF SUCCESS

Based on dietary surveys and research at different life stages, Yili has tailored and launched various products to meet the specific nutritional needs of different age groups, such as Cute-star kids-formula, Xinhuo Bones energy formula milk powder for adults, and Yili nutritional milk powder for women. With the development of sugar reduction technology, the NP system has helped more than 90% of products to complete sugar reduction formula adjustments. Furthermore, Yili launched the "Yili Nutrition 2020" initiative, which was upgraded to "Yili Nutrition 2030" in 2021. This program covers 25 provinces and has benefited nearly 700,000 children.

THE VALUE OF THE INITIATIVE

By establishing the NP system, Yili offers a successful and replicable scheme for developing highly nutritious dairy products for the dairy industry. We obtained detailed information on nutrition and health parameters and provided a comprehensive database for the development of dairy products in China. For children, we have also issued an expert consensus on dairy products and children's nutrition to guide the development of children's dairy products in the industry.. Moreover, we provided nutritious and affordable dairy products for all ages, especially for children in the rural

area. For example, Cute-star ZhenGao was fortified with vitamin D3, vitamin K2, and α-lactalbumin, while the price is only 1/6 of imported products.

NEW OPPORTUNITIES

We will advance the establishment of standards for the nutritional evaluation of dairy products. With the in-depth research on different groups, we aim to uncover further nutritional needs and design dairy products accordingly. With the development of packaging technology, we will develop small-portion products to minimize waste. Moreover, we will conduct research on dairy farming to enhance the nutritional quality of raw milk and promote "Net zero-carbon". We aim to address the imbalances and inadequacies in China's dairy industry, facilitate the implementation of national nutrition and health initiatives, and contribute to a better life for all members of society.

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ITALY

Cow's milk: is there a place in sustainable healthy diets?

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ALIGNMENT WITH SDGS

THE BIG PICTURE

A daily consumption of milk/yogurt is recommended by nutritional guidelines for healthy diets since they are an excellent source of important nutrients like calcium, vitamin D and proteins. However, in Italy and many other countries the intake of cow's milk (CM) is progressively reducing. There are several reasons behind this reduction, including allergies, lactose intolerance and concern about animal welfare as well as planet health. In addition, the dairy sector is targeted by the widespread of fake news, these elements make an evidence-based communication on the role of dairy products in sustainable healthy diets needed. Of course, this must be done taking into account the portions and frequencies of consumption, the different needs of the different targets of the population and enhancing the need to implement green approaches in terms of sustainability.

THE PREMISE

The initiative aims at increasing knowledge about the role of milk and dairy products in optimized healthy and sustainable diets through the implementation of the scientific literature on this topic, using it for an effective and evidence-based communication directed to the general population and to specific target groups.

MOVING THE WHEEL

To demonstrate the role of dairy in sustainable healthy diets, the main actions put into place so far are: i) the systematic review of the impact of substituting cow's milk with plant-based alternatives on markers of human health; ii) the assessment of the impact on nutrient intake following the substitution of CM with plant-based drinks (PBD), both in dietary patterns based on the Italian Dietary Guidelines (IDG) and in an Italian-Mediterranean dietary pattern adapted from the "Planetary diet" (EAT-IT).

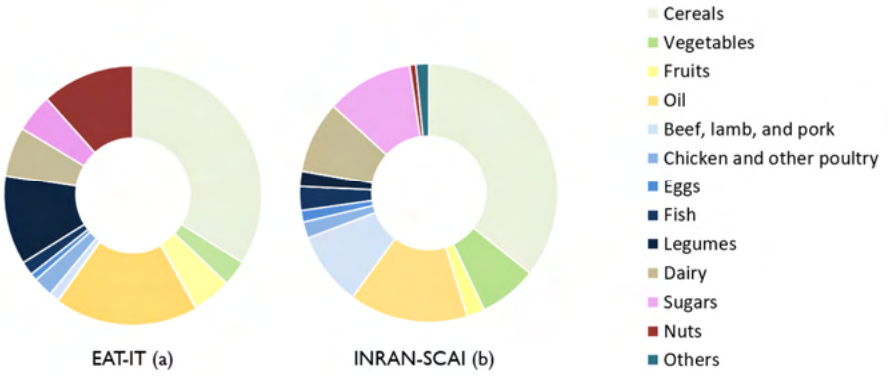

Figure 1. Contribution of different food categories within the EAT-IT dietary pattern (a) and habitual Italian diet, based on INRAN-SCAI 2005-2006 data (b). Data are reported as mean daily intake percentage of total energy. Legend: EAT-IT: Italian-Mediterranean Dietary Pattern Developed Based on the EAT-Lancet Reference Diet; INRAN-SCAI: Italian National Food Consumption Survey [19].

"Cow's milk has a key role to play in healthy and sustainable dietary patterns."

Ivana Gandolfi

THE HISTORY OF SUCCESS

The results of the review indicate that, due to the scarce number of intervention studies and the heterogeneity in terms of characteristics of subjects, duration and markers, the evidence on the effects of the substitution of CM with PBD on markers of human health is still limited. However, the assessment of the impact on nutrient intake following the substitution of CM with PBD revealed that an undifferentiating substitution could lead to unintended nutritional consequences due to a reduced intake of important nutrients (e.g., Ca, Vit. B1, B2 and B12), and this risk is not always adequately perceived by the population..

THE VALUE OF THE INITIATIVE

The current work responds to the urgent need to understand the role of cow's milk in sustainable healthy diets and its impact on diet quality and human health. It highlights the lack of data in literature about the impact on human health of elimination of CM from the diet or from its not conscious substitution with PBD. The data obtained can help to fight the spread of fake news related to cow's milk. The collected evidence can be included in educational materials to be disseminated in food education projects aimed at highlighting the role of dairy products in sustainable healthy diets.

Table 3. Comparison between the suggested portions in the Italian dietary guidelines for healthy eating (for a 2500 kcal diet) and the EAT-IT dietary plan (i.e., the ELCRD tailored to consider Italian food habits), which was developed based on the planetary healthy diet.

Italian Guidelines			EAT-IT Dietary Pattern
Food Group	**Food Subcategory**	**Daily or Weekly Portion**	
Cereals and derivatives	Bread	4.5 portions/day of 50 g (225 g/day)	≠ Max daily amount of whole grain bread of about 375 g
	Pasta, rice, corn, spelt, and barley	1.5 portions/day of 80 g (120 g/day)	≠ Max daily amount of about 200 g
	* Bread substitutes (rusks, crackers, and breadsticks)	1 portion/week of 30 g (30 g/week)	≠ About 45 g of rusks (five slices) can be eaten at breakfast
	* Sweet bakery products (brioche, croissants, and biscuits)	2 portions/week of 50 g for croissants or cake or 30 g/week for biscuits (100 or 60 g/week)	≠ Sweet products can be eaten at breakfast and are indicated as "sugars and other sweeteners"
	* Breakfast cereals	2 portions/week of 30 g (60 g/week)	≠ About 45 g of breakfast cereals can be eaten at breakfast
Tubers	Potatoes	2 portions/week of 200 g (400 g/week)	↓ 1 portion/week of 325 g (325 g/week)
× Fruits	Fresh fruits Dried fruits	3 portions/day of 150 g (450 g/day) 3 portions/day of 30 g (90 g/day)	↓ 200 g/day n.s.
× Vegetables	Fresh vegetables Leaf salad	3 portions/day of 200 g (600 g/day) 3 portions/day of 80 g (240 g/day)	↓ 300 g/day n.s.
Meat	* Red meat (beef, pork, and sheep meat)	1 portion/week of 100 g (100 g/week)	Beef, lamb, or pork—100 g/week (100 g/week)
	White meat (chicken, turkey, or rabbit)	3 portions/week of 100 g (300 g/week)	↓ Chicken and other poultry—2 portions of 100 g/week (200 g/week)
Fishery	Fish (including mollusks and crustaceans)	3 portions/week of 150 g (450 g/week)	↓ Fish—2 portions/week of 105 g (210 g/week)
	* Preserved fish (e.g., canned tuna)	1 portion/week of 50 g (50 g/week)	n.s.
Egg	Egg	4 medium eggs/week (200 g/week)	↓ 1 portion/week of 2 medium eggs (125 g/week)
× Legumes	Fresh legumes or canned Dried legumes	3 portions/week of 150 g (450 g/week) 3 portions/week of 50 g (150 g/week)	↑ 8 portions/week of 65 g of dried legumes—about 200 g of fresh legumes (520 g or 1560 g/week)
× Milk and derivatives	Milk Yogurt and other fermented milk	3 portions/day of 125 mL (375 mL/day) 3 portions/day of 125 g (375 mL/day)	↓ 1 portion/day of 250 mL of milk or other isocaloric equivalences of milk derivatives (e.g., yogurt, butter, etc.) (250 mL/day)
	Cheese (fat <25% and less than 300 kcal/100 g) Cheese (fat >25% and more than 300 kcal/100 g)	3 portions/week of 100 g (300 g/week) 3 portions/week of 50 g (150 g/week)	
× Fats and seasoning	Vegetable oil (e.g., extra virgin olive oil and seed oil)	4 portions/day of 10 mL (40 mL/day)	↑ 50 g/day of added fats, preferably from dietary plant sources. Butter is excluded because it is already included in the milk and derivatives food category
	Butter and other animal fats	4 portions/day of 10 g (40 g/day)	
Nuts and seed	Walnuts, peanuts, almonds, seeds, etc.	2.5 portions/week of 30 g (75 g/week)	↑ 40–50 g/day
Water	Water	At least 10 glasses of 200 mL/day (2 L/day)	n.s.

n.s.: not specified. ×: the portions reported for the food included in that category are alternatives and not additive (e.g., for "fruits," 150 g of fresh fruit OR 30 g of dried fruit); *: subcategory for which it is possible to have a lower frequency of consumption and increasing the consumption of other foods from the same category, according to the Italian dietary guidelines (IDG). ≠: food category with different recommendations between the IDG and EAT-IT but not clearly definable in terms of whether the amount is higher, equal, or lower. ↑↓ higher or lower recommendations, respectively, in the EAT-IT dietary pattern compared to the IDG.

Table 6. Comparison between minerals provided by the IDG and EAT-IT dietary plans for a 2500 kcal diet.

Mineral Intake						
Nutrient	**IDG**	**EAT-IT**		**LARN (Adults 18–59 Years)**		
				AR	**PRI or AI §**	**SDT**
Calcium	1079.1	675.6 *	mg	800 mg	PRI 1000 mg	
Sodium	2070.3 *	826.9	mg		AI 1500 mg	<2000 mg
Chlorine	1217.0	531.0	mg		AI 2300 mg	<3000 mg
Iron	17.9	22.1	mg	Male 7 mg (female 10 mg)	PRI male 10 mg (female 18 mg)	
Magnesium	356.2	491.4	mg	170 mg	PRI 240 mg	
Phosphorus	1851.4	1867.0	mg	580 mg	PRI 700 mg	
Potassium	4939.2	4609.5	mg		AI 3900 mg	
Zinc	14.8	15.9	mg	Male 10 mg (female 8 mg)	PRI male 12 mg (female 9 mg)	

AI: adequate intake; AR: average requirement; EAT-IT: dietary pattern based on the EAT-Lancet Commission Reference Diet with adaptations for the Italian population; IDG: Italian Dietary Guidelines; LARN: Reference Intake Levels of Nutrients and Energy for the Italian Population; PRI: population reference intake. §: AI was obtained from the average intakes observed in an apparently healthy population free from manifest deficiencies. It was used as a substitute for AR and PRI when these indicators could not be calculated based on available scientific evidence. *: The level of intake for the respective nutrient was inadequate to satisfy the nutritional requirements.

NEW OPPORTUNITIES

The next step of this initiative will be the optimization of dietary plans including cow's milk in order to maximize diet quality while minimizing the environmental impact of these patterns. The results collected from this initiative will provide further evidence-based information that should be used for effective communication on the role of cow's milk in sustainable healthy diets. This will be crucial for counteracting the widespread of fake news related to the dairy sector and for informing people about the nutritional risks deriving from the total substitution of cow's milk, especially in the long-term.

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JAPAN

Improve health by adding protein to breakfast!

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ALIGNMENT WITH SDGS

THE BIG PICTURE

Skeletal muscle is an important organ for maintenance of physical function. Carbohydrate, fat, as well as protein intake at all three meals is essential for muscle protein synthesis and maintenance of muscle mass both in young and older population. Protein deficiency at breakfast has been reported not only in Japan but also in other countries. An interventional study was preformed with 2 groups, one group of young subjects which added whey protein to an average protein-deficient breakfast and another group that added the same protein to dinner. Both groups were subjected to resistance training 3 times/week for 3 months after which their anthropometric measurements were taken. The group that added protein at breakfast showed more significant muscle hypertrophy, indicating that protein intake, especially at breakfast, is important for muscle growth. Therefore, we are working to inform the public not only about the importance of recommended daily allowance of protein, but also about the importance of ample amount of protein intake, especially at breakfast.

THE PREMISE

It is important for the general population not only to meet their daily protein intake, but also to consume enough protein at each meal to maintain and increase muscle mass regardless of age. Furthermore, the use of dairy products, which are a high-quality source of protein, is an effective way to combat protein deficiency.

"Consume a protein-rich breakfast to maintain and improve your health."

Satoshi Fujita

MOVING THE WHEEL

Evidence from scientific papers is disseminated at national and international conferences and symposia of dairy-related organisations on the importance of high-quality protein intake at each of the three meals, particularly breakfast. In Japan, the importance of eating protein at each meal is also communicated to the general public through television, magazines, newspapers and other media. Through the media, the benefits of dairy products, not only in terms of protein quantity, but also in terms of protein quality, are emphasized to highlight the importance of the essential amino acid leucine in stimulating protein synthesis.

THE HISTORY OF SUCCESS

During the pandemic, domestic demand for healthy food has increased and the importance of protein intake has attracted more attention. In contrast to fats and carbohydrates, protein has been the focus of attention as a nutrient that should be actively consumed. The increase in the importance of protein-enriched foods and protein can be seen in the rise of special features on protein intake in magazines and TV programs, as well as a change in general consumer behavior. .

THE VALUE OF THE INITIATIVE

Dietary change is not easy. It requires long-term nutrition education tailored to the individual's age group and lifestyle. Increasing protein intake at breakfast is a relatively easy dietary modification to incorporate and can be used by a wide range of age groups with a wide range of lifestyles.

NEW OPPORTUNITIES

Protein is essential not only for maintaining skeletal muscle mass, but also for the protein turnover of other organs, hormones and immune cells in the body. While we continue to educate society about the importance of protein as a nutrient, we will also continue to build the scientific evidence for high-quality protein intake, including dairy products, to maintain and improve health.

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The following paper presents the relationship between protein intake at breakfast, with or without exercise, and muscle mass in young and elderly Japanese subjects.

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NEW ZEALAND

The Sustainable Nutrition Initiative®: providing the nutrition evidence for the sustainable food debate

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ALIGNMENT WITH SDGS

THE BIG PICTURE

The sustainable food debate has been dominated by environmental and economic perspectives: how can we minimise the impact of food production and consumption on the environment, while remaining economically viable for producers and consumers. Nutrition has taken a back seat, often lumped into burden of disease outcomes, or addressed on an energy or protein basis. But energy, protein, and the limited inference to be made around the health outcomes of different foods and diets, are not nutrition.

The Sustainable Nutrition Initiative® was formed to address this deficit. Without understanding the full nutritional profile of food, down to the bioavailability of nutrients within it and its role in a healthy diet, the true value of food was not being captured. This is particularly important for dairy in New Zealand, under scrutiny for its environmental impacts, but with a significant nutrition story (going far beyond protein) that should not be ignored.

THE PREMISE

To develop tools, data, and communications that clarify the nutrition aspects of sustainable food, and ensure that these aspects are not ignored by academia, industry, or policy.

MOVING THE WHEEL

The Sustainable Nutrition Initiative® built the DELTA Model®: a freely accessible, online tool for examining how current and future food system scenarios deliver nutrition to the global population. This tool identifies the importance of many food groups (such as dairy) today, and demonstrates how they may fit into future production.

THE HISTORY OF SUCCESS

The New Zealand government proposed the DELTA Model® as a "game-changing solution" to the UN Food Systems Summit in 2021, sparking follow-up research on the important role of food and nutrition trade in feeding populations.

National and international food sector industry have picked up the model for their own use, including several national dairy bodies, who are now engaged with the program's development of new modelling tools for sustainable diets.

Application of the DELTA Model® to understanding the current importance of dairy in feeding the global population led to an IDF award for Dr Nick Smith, one of the developers, and provided highly valuable data for dairy advocates.

> "If the food system doesn't feed people – full nutrition, not just protein and energy – it is not sustainable."
>
> **Nick Smith**

Registered model users now number in the hundreds, from 26 countries, and the model is used in teaching at multiple NZ and overseas universities.

NEW OPPORTUNITIES

The team are already working on national-level food system models for NZ and other economies around the world, bringing relevant nutrition evidence into national as well as global conversation.

Separately, the team are developing a model for sustainable diets for the individual, which will clarify how different food groups can fit into environmentally sustainable, affordable, nutritious diets based on the values of the consumer.

Further development of the DELTA Model®, including building in further environmental impact data, is ongoing, as are communications on the topic of sustainable nutrition, together continuing to inform the debate.

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www.sustainablenutritioninitiative.com

NORWAY, SWEDEN, DENMARK

Work to nuance and highlight the importance of dairy when incorporating (environmental) sustainability into nutrition recommendations and food-based dietary guidelines

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ALIGNMENT WITH SDGS

THE BIG PICTURE

The revised Nordic Nutrition Recommendations (NNR) has, for the first time, incorporated sustainability but limited to mainly the environmental dimension with an emphasis on GHG emissions. The background articles on sustainability have targeted dairy among the food groups to limit to reduce environmental footprint of food consumption. This view has also been extracted from the summary draft, published for open consultation March 31st.

The outcome of the Nordic recommendations is important as the following revision of national dietary guidelines will be to a large extent based on these recommendations.

THE PREMISE

The aim was to emphasise the positive role of dairy in sustainable nutrition recommendations.

MOVING THE WHEEL

During the revision process we have initiated meetings with relevant stakeholders, published articles on dairy and sustainability, have had great use of international networks (IDF, EMF, Scandinavian collaboration, national networking, external experts/key persons) in the process of answering the public consultations and engaging politicians, decision makers, authorities and NGOs.

INCREASED NETWORKING AND AWARENESS OF DAIRY'S ROLE IN DIETS

Politicians and decision makers, as well as the public have become more aware of the role NNR has in forming national food-based dietary guidelines and understand the implications of dietary policies on a broader level such as self-sufficiency associated with food security.

> "The NNR 2023 process highlights the difficulties in incorporating sustainability in nutrition recommendations. It is of utmost importance not to forget nutrition and health aspects, when climate and environmental issues are considered."
>
> **Merete Myrup**

THE VALUE OF THE INITIATIVE

The report was be launched in June. We see an increasing awareness of NNR among professionals and other key stakeholders.

We applaud the clear recommendation to keep dairy in the diet within the range of 350-500 ml per day. Although the intake of dairy is seen as a substantial contribution to GHG emissions by the authors of the report, the recommended intake is not reduced.

The meat recommendations are lowered from 500 to 350 grams/week and the report recommends that the reduction should be compensated for by legumes, and not by an increased consumption of white meat.

The report states that "Dominantly or fully plant-based diets, as vegan diet, require solutions beyond dietary guidelines in terms of food fortification and dietary supplementation to ensure nutritional adequacy".

NEW OPPORTUNITIES

The revision of national dietary guidelines will commence shortly after the launch of the NNR-report. It is therefore important to highlight the importance of dairy products in Nordic diets both nutritionally and to secure national food production.

- It is important for consumers and our members to have an ongoing trust in the importance of dairy.
- The revision of dietary guidelines makes is possible to highlight sustainability initiatives in the dairy sector – past, present, future.
- Continued networking in and outside of the sector.

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Several debate articles in national media especially in Norway and Sweden have been initiated by the animal food sector.

Nordic Nutrition Recommendations 2023

NNR2022 chapters: Public consultation

SOUTH AFRICA

Communicating the nutrition and health benefits of dairy to the health professional

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ALIGNMENT WITH SDGS

THE BIG PICTURE

Dietitians are specialists in the field of nutrition and diet therapy, but not everyone has in-depth knowledge of dairy nutrition. When the Milk SA's Consumer Education Project (CEP) started in 2008, there were several misconceptions about milk and dairy among South African consumers, and our work has focused on debunking these through evidence-based communication. It was essential to include HPs as a target audience, as it strengthened our messages and provided credibility to our work.

The Project uses various communication channels to communicate with Health Professionals (HPs) (specifically dietitians and nutritionists) in South Africa. For example, dairy-based nutrition reviews are available on the Project's website and are occasionally also published in prominent local nutrition and medical journals. These reviews are written by an independent technical advisory committee, which includes well-regarded academics from the various universities in SA. This not only ensures high-quality reporting of the latest research but also unbiased insight into important developments in dairy nutrition. The CEP also presents presentations at congresses or symposiums and uses such platforms to communicate its work with the target market. A good relationship has been built with the local national associations of dietetics and nutrition associations.

THE PREMISE

To communicate and educate HPs in South Africa on the latest scientific evidence on dairy nutrition and its health benefits to ensure they stay up to date with new research and developments in the dairy industry.

> "Communicating the nutrition and health benefits of dairy to the health professional (HP) in South Africa enhances the credibility of project and strengthens the voice of dairy nutrition."
>
> **Maretha Vermaak**

MOVING THE WHEEL

One of the most important communication channels is the annual continuing professional development (CPD) activity for HPs. In South Africa, it is mandatory for dietitians and nutritionists to earn CPD points to remain registered with the Health Professional Council.

By hosting scientific articles and associated sets of questions and answers on an online portal, the Project offers HPs an opportunity to earn CPD points. The activity launched with only a few articles in 2014, but since 2017 dietitians and nutritionists can earn all their required CPD points (30 within a years' cycle), at no cost, by completing these article questions.

The selected articles focus on dairy nutrition and health as well as new research related to general nutrition. Two articles are specifically selected to provide the delegates with ethics points (5), as required by the Health Professionals Council. The articles and questionnaires are approved and accredited by the SA Dietetic CPD office. The activity is open from 1 April to 31 December each year. The platform is a one-stop service, handling registration, submission of articles and generation of the certificates.

The database generated from this activity also provides the Project with contact details of the HPs, which serves as another avenue to inviting HPs to continuing development events and webinars. The events are usually themed around topical nutrition issues and experts in the fields of dairy nutrition (local and international) are invited as speakers.

South African dietitians have also been able to join the IDF Nutrition and Health symposium online for the past three years. As these sessions were also CPD accredited, HPs could earn additional points.

THE HISTORY OF SUCCESS

Registration grew from 88 participants in 2014 to 2197 at present. Over the past three years, well over 9000 answer sheets have been completed. With only about 3000 registered dietitians in the country, the project has the support of more than 70% of the profession.

Years of hard work to deliver high-quality, trusted science-based information, has made the CEP the go-to source of nutrition information, as illustrated by events organised by the Project usually being fully booked. Over the past three years, South African dietitians made up 25–40% of the participants at the IDF's annual Nutrition and Health symposium, which is testament to the support of the nutrition community in South Africa. They trust the CEP and what they present and see these webinars as being valuable professional development opportunities.

THE VALUE OF THE INITIATIVE

The main beneficiaries of the initiative were HPs in SA, working specifically in the field of dietetics and nutrition. Ultimately this is passed on to the SA consumer. Over the years, the CEP has established itself as a trusted source of science-based information on all things dairy, which, in turn, opened opportunities to communicate with diverse disciplines within the nutrition community.

NEW OPPORTUNITIES

The Project plans to extend on its current continued professional education events and webinars. The aim is also to create opportunities to help establish a strong more integrated relationship between HPs, the dairy producers and the dairy processors and so foster opportunities to improve more sustainable dairy nutrition for all in South Africa.

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UNITED KINGDOM

Public Health England sugar reduction programme

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ALIGNMENT WITH SDGS

THE BIG PICTURE

All groups of the UK population, particularly children, are consuming far too much sugar.

This increases the risk of excess calorie consumption and weight gain, which, over time, can lead to obesity. The high prevalence of obesity in England, both in children and adults, leads to a range of social and health problems and consequent economic impacts, including major costs to the NHS.

High levels of sugar intake also increase the risk of tooth decay, which is common in English children and is another significant cost to the NHS and families.

THE PREMISE

In 2016, the food industry was challenged by Public Health England to reduce sugar in 10 categories of food by 20% between 2015 and 2020. The categories included ice cream, dairy desserts, yogurts and fromage frais.

In 2018, juices and milk-based drinks were added to the programme and industry was challenged to reduce sugar by 5% and 20%, respectively, by mid-2021.

MOVING THE WHEEL

In some products, it may be perfectly acceptable to just remove the sugar. In others, it may not be as simple as that. It may be that companies need to add sweeteners or flavourings to rebalance the taste. Or in some cases, it may be appropriate to review the whole recipe to determine how the mix of different ingredients can ensure that the flavour profile remains acceptable to the consumer.

"Dairy delivers in UK sugar reduction programme"

Erika Hocking

The amount needed depends on the product - some products are more reliant on sugar than others. Ultimately, it is all about reducing the sugar whilst maintaining consumer acceptability.

THE HISTORY OF SUCCESS

Key findings for retailer and manufacturer-branded products were:

- For the first 10 categories, there was an overall 3.5% reduction in sugar between baseline (2015) and year 4 (2020) across all categories. Larger reductions were observed for yogurts and fromage frais (-13.5%), breakfast cereals (-14.9%) and 7.2% (-ice cream).
- There have been reductions in sugar between 2017 and 2020 for milk-based drinks, including -29.7% for pre-packed milk-based drinks, -6.9% for pre-packed flavoured milk substitute drinks and -7.1% for pre-packed fermented (yogurt) drinks.

THE VALUE OF THE INITIATIVE

The dairy sector proudly played a leading role in reducing sugar intakes from dairy products to help improve public health, creating a win-win for the sector and consumers.

NEW OPPORTUNITIES

A lot of work has been carried out to achieve the reductions we have seen but the sector is reaching the limit of what is possible with the technology available right now.

The main challenge is consumer taste acceptability: beyond a certain level of sugar reduction consumers don't accept the product, as shown by consumer testing panels.

The second challenge is the move on the part of the consumer towards products they consider "natural" and free of additives. This puts companies in a difficult position and limits their options in terms of sugar reduction.

In addition, should the taste of dairy be compromised too much, children may be put off consuming them and may start moving towards other nutrient-poor snacks.

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UNITED STATES

Advancing Milk and Dairy Foods' Important Role in Improving Nutrition Security During Pregnancy and Early Childhood

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ALIGNMENT WITH SDGS

THE BIG PICTURE

Poor nutrition during pregnancy and early childhood has far-reaching impacts on a child's ability to succeed in school and life, and greatly influences health outcomes as they grow older, including likelihood of developing chronic diseases. Prioritizing and investing in women and children's well-being during the first 1000 days of life can prevent countries from losing billions of dollars related to lower economic productivity and higher health care costs. During pregnancy and lactation, milk, yogurt, and cheese provide iodine and choline, important nutrients that support neurocognitive growth and development, yet they are under consumed in these critical life stages. Numerous structural, social, and individual and family factors, known as determinants of health, also influence nutrition during the first 1,000 days. Ensuring equitable access to nutritious milk and dairy foods and evidence-based nutrition education is critical for achieving nutrition security throughout life.

THE PREMISE

Dairy Council of California is a nutrition organization working to elevate the health of children and communities through lifelong healthy eating patterns. Its Let's Eat Healthy initiative invites multidisciplinary collaboration to champion community health and advance the health benefits of milk and dairy foods as part of the solution to achieving nutrition security and sustainable food systems.

MOVING THE WHEEL

The Let's Eat Healthy initiative, launched in February 2020 by Dairy Council of California, held a convening that brought together experts in health to identify priorities to improve California children's nutritional needs titled, *Well-Nourished, Brighter Futures*. Strategic objectives from the convening identified the need for nutritional support in the first 1000 days in vulnerable communities. As a result, Dairy Council of CA partnered with researchers at University of California, Irvine to conduct a cross-sectional, mixed methods project assessing the status and gaps within nutrition education resources and services offered in California during the first 1,000 days. The community needs assessment revealed a need for culturally responsive nutrition education resources and professional development.

> Milk and dairy foods are critical to health during pregnancy and early childhood, supporting growth and development, bone health, cognition, immunity and beyond. Efforts to ensure milk and dairy foods are part of nutrition security solutions requires collaborative action at all levels, from supporting knowledge and skills to creating environments that make nutritious dairy foods accessible. "
>
> **Ashley Rosales**

THE HISTORY OF SUCCESS

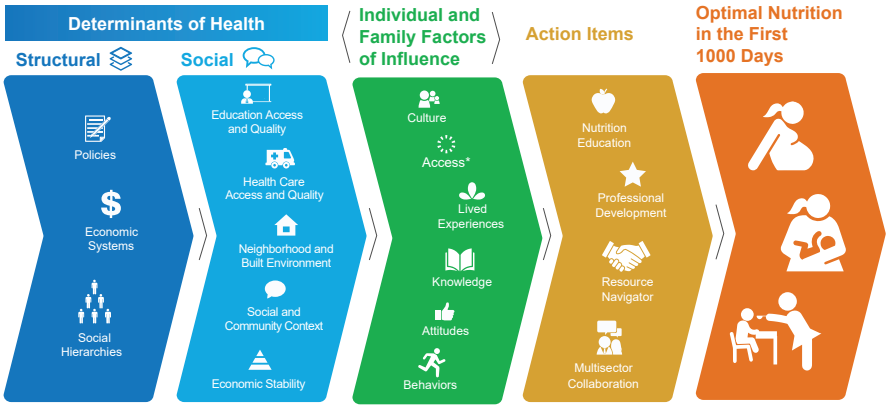
To support the findings of the needs assessment, Dairy Council of CA received funding from the National Association of County and City Health Officials (NACCHO) for development of culturally responsive resources to support infant and toddler nutrition for Latino and African American families. This cross-sector collaboration supported developing critical resources while responding to community needs. Ensuring dairy remains a valued part of recommended eating patterns is a critical component of improving population health.

THE VALUE OF THE INITIATIVE

Collaborative activations to support nutrition during early life helped to identify tangible ways to highlight dairy's contributions to nutrition security and sustainable food systems. Advocating for nutrition education and access to nutritious foods like dairy as part of nutrition and health policy and programs supports progress toward global sustainable development goals to achieve nutrition security and promote good health and well-being. A focus on maternal health and early childhood supports the empowerment of women and future generations.

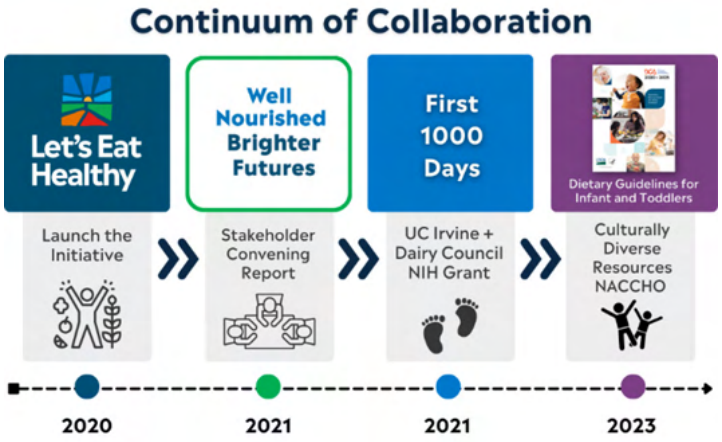
NEW OPPORTUNITIES

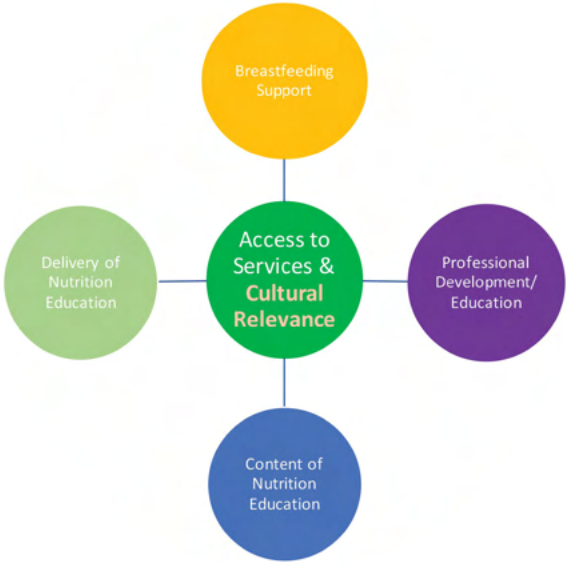
Dairy Council of CA continues to maximize resources through collaboration and collective impact using environmental and science-based strategies. Through a grant from Legacy Health Endowment, Dairy Council of CA is partnering with Community Health Centers of America and other local organizations to provide



Overarching framework for achieving nutrition equity in the First 1000 Days

*LIFTT Access: Language, Income, Food Resources, Transportation, Time





evidence-based, culturally relevant nutrition education training and resources to health care providers and residents in central California, as well as supplemental food vouchers to families with toddlers to purchase nutrient-dense milk and dairy foods. Results of the pilot will be shared to explore ways dairy foods increase nutrition security among low resource families with young children.

MORE INFORMATION

https://www.healthyeating.org/nutrition-topics/nutrition-science/scientific-research/nutrition-in-the-first-1000-days

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UNITED STATES

The importance of trade-offs: Looking at milk as a vital component in the global food system

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ALIGNMENT WITH SDGS

EXPLORING THESE DAIRY PRODUCTION TRADE-OFFS AT A GLOBAL SCALE IS NEEDED

Ruminant production systems across the globe vary in terms of their efficiency, productivity, and environmental impacts. Regardless of this variability, milk has been consistently identified as an essential and important source of nutrients for humans. This becomes a critical point during discussions of restructuring foods systems, as it is necessary to balance the environmental impacts of livestock production with their important contributions to human nutrient supplies and sustainable farming. Previous work in 2017 by White and Hall (https://doi.org/10.1073/pnas.1707322114) demonstrated that removal of livestock from US agriculture would result in notable decreased essential micronutrient supplies not made up for by plant crops, along with a minimal change in agricultural GHG emissions. Exploring these dairy production trade-offs at a global scale is needed to better illustrate the role of dairy in nourishing a growing global population.

> Milk is an important food within the global agroecosystem."
>
> **Kelly Sheridan**

THE PREMISE

Dairy Management Inc. supported recent research by Dr. Robin White of Virginia Polytechnic University to characterize the global contributions of fluid milk to human food and nutrient supplies, greenhouse gas emissions, and water withdrawal. "Global contributions of milk to nutrient supplies and greenhouse gas emissions" https://doi.org/10.3168/jds.2022-22508. The evaluation was done as follows:

Nutrition
The individual data sets used in the analysis have been preserved in the open-access Virginia Tech Data Repository (http://doi.org/10.7294/6y9v-gg39). Supply of a food product was defined as a simplified form of the food supply definition used by the FAO. Contributions of dairy to human-edible nutrient supplies were evaluated on both the continental and global scales. The analysis focuses exclusively on nutrient supplies (what has been produced), which should not be confused with nutrient consumption (what is being consumed).

Environment
The environmental impact analysis has been sourced from the companion paper, White and Gleason, 2022 (https://doi.org/10.1038/s41598-022-21135-1), which used identical data sets. Briefly, the analysis employed a Bayesian learning network approach to examine the relationships between individual country yearly average production of different food categories (based on total mass of production), production of nutrients (based on the total amount produced), agricultural production of GHG, and agricultural water use.

THE HISTORY OF SUCCESS

This study resulted in three main points:

1. Fluid milk provides over 10% of the vitamin B12, vitamin A, riboflavin, and calcium available for human consumption globally. In terms of human nutrient requirements, milk provides enough vitamin B12 to meet the needs of over 60% of the global population, riboflavin for 50% of the population, and calcium and phosphorus for over 35% of the population.

2. Compared with other foods available to provide nutrients globally, milk ranked among the highest in terms of nutrient-to-calorie ratio for numerous amino acids, phosphorus, calcium, and riboflavin.

3. Milk is unique among foods because of its contributions to critical mineral and vitamins needed for human health. Conditional dependencies were identified between greenhouse gas emissions and ruminant milk and meat, but not between water withdrawal and milk production. As such, the environmental impact of dairy foods should be considered in the context of their nutrient provision.

THE VALUE OF THE INITIATIVE

The value of advancing dairy science at the intersection of nutrition and environment is that it helps to characterize global contributions of dairy foods to the food and nutrient supplies available for human consumption, while considering trade-offs in environmental impacts. Additionally,

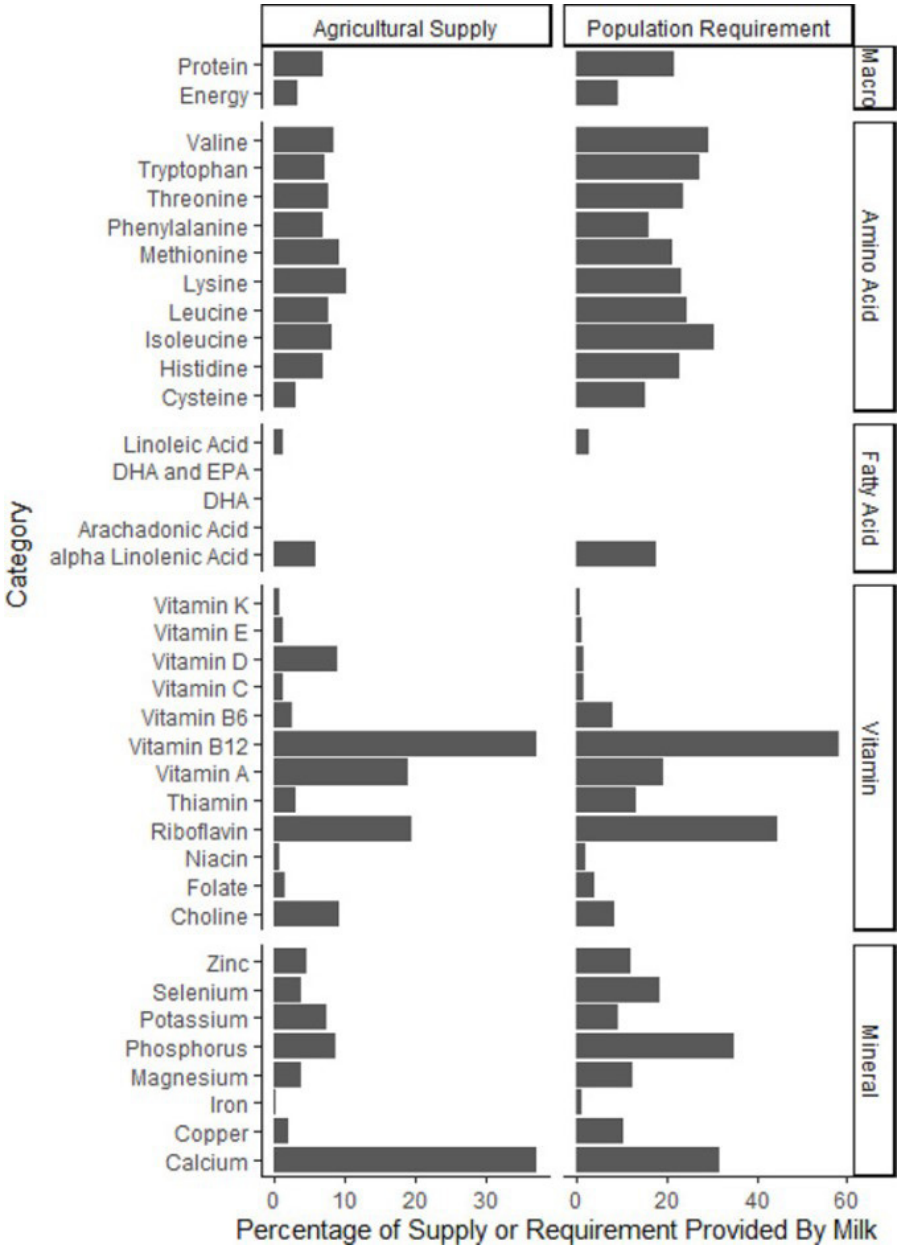

Figure description from White and Gleason, 2023: Percentage of nutrient supply coming from milk (left) or percentage of global population nutrient requirement satisfied from supplied milk (right). DHA = docosahexaenoic acid; EPA = eicosapentaenoic acid.

this work adds to a recent FAO report "Contribution of terrestrial animal source food to healthy diets for improved nutrition and health outcomes", where those authors conclude that governments should promote the benefits of sourcing food from land-based animals while taking into account challenges (including environmental impact) of livestock production.

This study acknowledged that only food-based supplies of nutrients were considered and did not consider fortification or supplementation as strategies to obtain nutrients. Future work could more holistically explore the impact of supplementing critical nutrients. Additionally, region- or country-specific plans for agricultural adaptation, inclusive of land use, are key, but future work to design such plans should also consider the global opportunities for cooperation and coordination among agriculture sectors.

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IDF SCHOOL MILK KNOWLEDGE HUB

Bringing together knowledge on school milk programmes from around the world

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ALIGNMENT WITH SDGS

For over 30 years IDF has been engaging on the topic of school milk, collecting and sharing information, as we understand the role milk and dairy foods play in supporting the health of children worldwide. We have therefore created the IDF School Milk Knowledge Hub to bring all the information together in one place; accessible to all.

WHAT IS THE SCHOOL MILK KNOWLEDGE HUB?

There is a long history of organising school milk programmes in every corner of the world, either as part of school meals programmes or as stand-alone school milk programmes. School feeding programmes have been identified as important social protection mechanisms providing good nutrition and education for children, as well as supporting local economies.

Organising these programmes sustainably needs careful preparation, monitoring and evaluation. Led by experts from IDF's global network, the School Milk Knowledge Hub has been designed to bring together knowledge and expertise on the implementation and organisation of these programmes.

SCHOOL MILK PROGRAMMES TO BUILD HUMAN CAPITAL

School milk programmes are common in many countries around the world, for good reason. The benefits of providing school children with milk are plentiful. Dairy's well-known natural nutrient-richness provides an abundant supply of high-quality protein, calcium, phosphorus, potassium, iodine, and vitamins B2 and B12. Analysis also shows that a quality education, combined with a guaranteed package of health and nutrition interventions at school, such as school feeding, can contribute to child and adolescent development and build human capital.

> "For over 30 years IDF has been engaging on the topic of school milk, collecting and sharing information, as we understand the role milk and dairy foods play in nourishing children worldwide supporting them in their development."
>
> **Laurence Rycken**

By partnering with organisations across all levels – from local and regional to national and global – the dairy sector can empower stakeholders to understand the evidence-based need for incorporating policies and programmes, such as school milk programmes and milk and dairy foods in school meal programmes, to support children's access to nutritious foods.

SCHOOL MILK PROGRAMMES SINCE 30 YEARS

Since 1993, IDF has provided an overview of the development, implementation and improvement of school milk programmes.

The work undertaken by IDF provided the foundation for the FAO survey conducted in 1998, published in IDF bulletin 341/1999. In 2013, the FAO and IDF again worked collaboratively to gain insights into milk programmes in operation, in the largest global review ever conducted. The new data was compared to the 1998 results, enabling a unique insight invaluable to those involved in running programmes and those within the dairy sector supplying the milk, and the results were published in the IDF bulletin 480/2015.

IDF continued the efforts by publishing in 2020 the Bulletin of the IDF N° 505/2020: The contribution of school milk programmes to the nutrition of children worldwide. The knowledge hub was also launched to share the Bulletins as well as to showcase case studies.

160 MILLION CHILDREN AROUND THE WORLD CURRENTLY BENEFIT FROM SCHOOL MILK PROGRAMMES

School Milk programmes have been recognised for over a century for their contribution to nutritional adequacy, health, and learning. Milk and dairy products are nutrient-rich, easy to consume, highly palatable, affordable, and often locally produced.

In addition to providing milk and/or dairy products, these programmes help to foster a better understanding of dairy products, including where they come from, how dairy products are made, their nutritional composition, and how they fit into overall diets.

SHARE THIS PAGE PRINT

Providing vital nutrition

There is long history of organizing school milk programs in every corner of the world, either as part of school meals programs or as stand-alone school milk programs. School feeding programs have been identified as important social protection mechanism as they provide good nutrition and education to children, as well as are able to support local economies.

Organizing these programs sustainably needs careful preparation, monitoring and evaluation. Led by experts from within the global IDF network, The School Milk Knowledge Hub has been designed to bring together the knowledge and expertise on the implementation and organization of these programs.

Explore the Hub for information on existing programs, case studies, resources and campaigns and other important links.

Global importance

School milk programs are common in many countries around the world, for good reason. The benefits of providing school children with milk are plentiful. Dairy's well-known natural nutrient-richness provides an abundant supply of high-quality protein, calcium, phosphorus, potassium, iodine, and vitamins B2 and B12. Analysis also shows that a quality education, combined with a guaranteed package of health and nutrition interventions at school, such as school feeding, can contribute to child and adolescent development and build human capital.

A NEW IDF BULLETIN WILL BE READY NEXT YEAR

In 2023 IDF is re-colleting information on the implementation of school milk, with the aim to publish the IDF Bulletin on the topic on World School Milk Day in 2024.

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BETTER
PRODUCTION

AUSTRALIA

Research aims to halve nitrogen use in pasture-based dairy regions.

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ALIGNMENT WITH SDGS

A partnership between the Tasmanian Institute of Agriculture and Dairy Australia, the national services body for the Australian dairy industry, is addressing the growing interest in reducing reliance on nitrogen fertilisers used in pasture production in Australia.

DELIVERING NATIONAL FEEDBASE INSIGHTS

The five-year research project commenced in 2022 and aims to deliver national feedbase insights which could lead to significant cost savings for farmers, home-grown feedbase optimisation, and important environmental outcomes.

Named Dairy HIGH (short for High Integrity Grass-fed Herds), the research project identifies positive outcomes for pasture-based dairy farms by reducing synthetic nitrogen fertiliser use and improving milk production efficiency from low-cost grazed pasture systems. Other elements of the project are focussed on adding economic value for non-replacement dairy cows, as well as the enhancement and development of people and skills.

MULTISPECIES PASTURE COULD ENHANCE CARBON SEQUESTRATION AND SUPPORT REDUCED FERTILISER USE

The project has seen the construction of a purpose-built dairy at the Tasmanian Institute of Agriculture's Dairy Research Facility and the establishment of four new farmlets, or mini farms, to research strategies for reducing reliance on synthetic fertiliser and its impacts under real farm conditions. One of the farmlets consists of a multispecies pasture treatment, investigating how mixing pasture species that have complementary growth characteristics can help reduce fertiliser use. The species being tested have been shown to help reduce nitrous oxide emissions and nitrate leaching supporting reduced fertiliser use. This research will also look at how multispecies pastures could potentially increase the rates of carbon sequestration and provide enhanced soil function.

> "If similar utilised pasture production and milk solids can be achieved with half the amount of synthetic nitrogen fertiliser commonly applied per hectare or minimal nitrogen inputs– without increasing concentrate per cow feeding levels – we can implement significant cost savings."
>
> **Dr Albornoz**

HALF THE AMOUNT OF SYNTHETIC NITROGEN FERTILISER

Dairy Australia's Technical Lead in Feedbase and Nutrition, Rodrigo Albornoz, is overseeing the research. Dr Albornoz explains how cost savings and environmental benefits can be achieved while reducing the environmental impacts of nitrogen losses to the environment.

Pasture is the most important homegrown feed for most Australian dairy farmers. Successfully growing and utilising pasture is a key determinant of profitability.

The project team aims to achieve 17 tonnes of dry matter utilisation from irrigated pasture and 1,800 kg milk solids per hectare per year using only 150 units of synthetic nitrogen fertiliser. If successful, this will represent a reduction of close to half of the amount of synthetic nitrogen fertiliser that is commonly used. The research team also expects to reduce reliance on synthetic nitrogen fertilizer even further while achieving optimal productivity with the use of multispecies pastures.

TASMANIA FIRST, AUSTRALIAN PASTURE-BASED SYSTEM NEXT

While the research is being conducted in Tasmania, the findings of this project will hopefully support sustainable and long-term growth across other, similar pasture-based farming systems in Australia. Their aim is to deliver beneficial insights that can be practically implemented, helping dairy farmers thrive in the current changing environment.

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© Rodrigo Albornoz, Dairy Australia

CANADA

Breeding for dairy cows that produce less methane

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ALIGNMENT WITH SDGS

Dairy farmers now have a genetic tool to reduce their herd's methane emissions by 20 to 30% by 2050.

GENETIC SELECTION OF DAIRY CATTLE WITH REDUCED METHANE EMISSIONS CAN LEAD TO SUSTAINABLE EFFORTS TOWARDS REACHING NET-ZERO GHG EMISSIONS

The Canadian dairy sector has committed to reaching net-zero greenhouse gas emissions by the year 2050 and genetic selection of dairy cattle with reduced methane emissions can lead to sustainable efforts towards this initiative. Pivotal research led by University of Guelph researchers and funded through the collaboration of numerous partners, including dairy farmers through the National Canadian Dairy Research Strategy, demonstrated the accuracy of predicting individual animal methane emissions. As a key provider of services, knowledge and progressive herd management solutions for Canadian dairy farmers and sector partners, Lactanet Canada created a genetic evaluation for methane efficiency that gives farmers a tool to breed for cows that produce less methane without impacting milk production. Contrary to other approaches to reduce methane emissions, genetic improvement using methane efficiency will lead to improvements that are permanent and cumulative from generation to generation.

THE COMMITMENT OF THE CANADIAN DAIRY SECTOR

The Canadian dairy sector is committed to reaching net zero by 2050 and methane efficiency is a powerful tool to achieve that robust objective. By selecting for animals that produce methane more efficiently, the dairy sector will see permanent and cumulative reductions in greenhouse gas emissions and improved long-term sustainability.

EVALUATING GENETICS OF METHANE EFFICIENCY

Methane efficiency genetic evaluations were realized after an investment of more than 10 years of research and development, during which time methane emissions and routine milk samples were recorded on dairy cows in Canadian research herds. Using novel machine learning approaches, Lactanet developed the first system in the world to predict methane production from milk spectral records collected on over half a million cows across Canada. This led to the launch of Lactanet's genetic evaluation system in April 2023, which allows dairy farmers to now identify animals that have the genetic predisposition to produce less methane without impacting milk production.

PREDICTION BETWEEN METHANE EMISSIONS AND MILK COMPOSITION

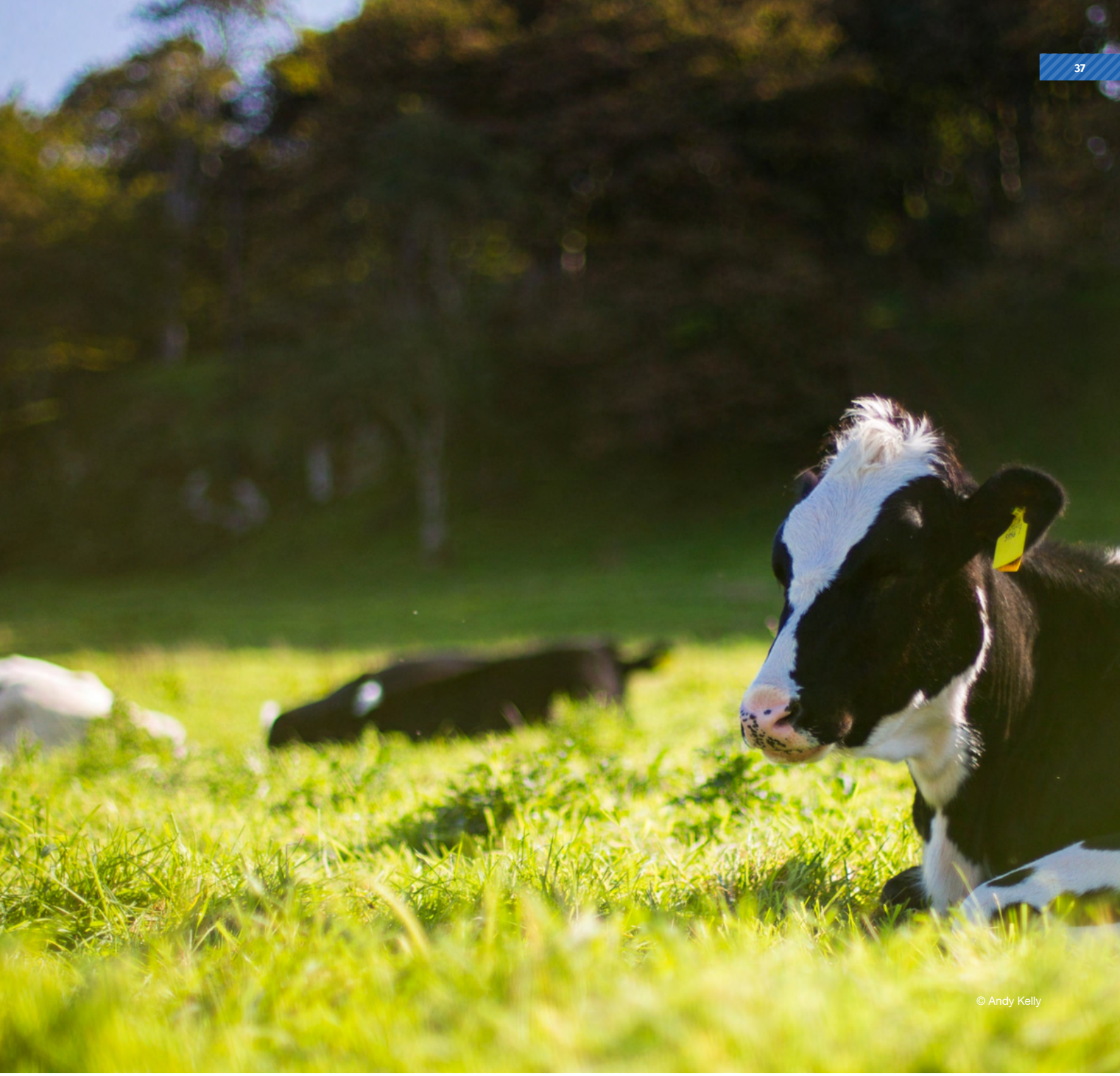
The collection of methane emission data on individual cows is expensive and difficult to measure. There is, however, a biological link between a cow's methane emissions and the composition of its milk, which is routinely analyzed via Lactanet's milk recording services. The development of a machine learning approach to predict methane from milk spectral data was pivotal for the implementation of methane efficiency genetic evaluations. In April 2023, Lactanet delivered this new tool to the Canadian dairy sector for over one million cows and thousands of bulls, making it widely accessible for breeding decisions to improve dairy sector sustainability.

THE CANADIAN NATIONAL HEARD CONTRIBUTES LESS METHANE TO THE GLOBAL CARBON FOOTPRINT

The main beneficiaries are Canadian dairy farmers that opt to use this novel genetic tool and the overall dairy sector, which will contribute less methane to the global carbon footprint. Overall, the national herd can decrease their enteric methane emissions by 1.5% per year, and a 20-30% reduction by 2050 is achievable depending on the intensity of selection. This initiative can be applied on a large scale and at low cost without impacting production levels. Such genetic improvements are permanent and cumulative over successive generations of selection. Other countries using Canadian dairy genetics also have the possibility of benefitting.

RESEARCH INTO METHANE DATA CONTINUES

Now that methane efficiency evaluations are broadly available, a pipeline for the continuous collection of additional methane data and research is required. Lactanet has invested in several long-term strategies to collect methane emission data from commercial dairy farms in Canada. As more data is acquired, the existing evaluation system will improve



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"Pivotal research led by University of Guelph researchers and funded through the collaboration of numerous partners, including dairy farmers through the National Canadian Dairy Research Strategy, demonstrated the accuracy of predicting individual animal methane emissions."

Lactanet Canada

and the adoption rate by Canadian dairy farmers will escalate to help achieve the longer-term Canadian dairy sector goals. Expanding the reach of Canada's methane efficiency genetic evaluations to dairy farmers in other countries will further contribute to the global effort toward the reduction of greenhouse gas emissions.

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ICAR – IDF

Using sensor data to improve animal welfare by management and breeding – a joint initiative of ICAR and IDF

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ALIGNMENT WITH SDGS

THE BIG PICTURE

Digitalisation is coming along with rapid developments in farm technologies, which can revolutionize cattle farming through new tools for improving production, animal health and welfare and also sustainability. Farmers increasingly implement on-farm sensor systems that monitor, for example, animal behaviour to receive support of timing of insemination and health-related targeted animal controls. Large amounts of data are collected, while only a smaller fraction is currently used on farms and along the dairy value chain. This has motivated ICAR (International Committee of Animal Recording) and IDF (International Dairy Federation) to start a joint initiative aiming at improved usability of data across sensor systems and applications. Partners are the ICAR Functional Traits Working Group (ICAR FTWG) and the IDF Standing Committee of Animal Health and Welfare (IDF SCAHW) who collaborate with international experts from science and industry.

THE PREMISE

The aim is to promote the integrated use of sensor data and other novel traits along the dairy value chain. Standardisation and harmonisation will be supported through guidelines that include basic definitions and recommendations regarding data processing and use (reference method, data cleaning / validation, trait definitions for herd management, genetic improvement, and quality assurance).

"The joint ICAR-IDF initiative will develop guidelines to support adoption of novel technologies and use of sensor data for improving animal health and welfare, contributing towards higher sustainability in the dairy value chain."

Christa Egger-Danner

MOVING THE WHEEL

Part of the participatory approach of the ICAR / IDF collaboration is to learn from industry leaders how novel data and indicators can be used for herd management, breeding and quality assurance schemes. Close collaboration with international experts from science and industry allows to comprehensively address the stakeholders' needs and to benefit from synergies. Activities in recent years include a baseline survey (status quo, expectations) followed by several webinars and workshops on specific topics (animal-based welfare indicators and welfare frameworks in general, recording and evaluation of lameness and Body Conditions Scores, using sensor technology for improvement of health and welfare).

THE HISTORY OF SUCCESS

This joint initiative is the result of ongoing successful initiatives within IDF SCAHW and ICAR FTWG on data based animal welfare monitoring and management, e.g. the Guideline for Lameness in Bovines and the Novel ways to use sensor data to improve mastitis management - Journal of Dairy Science. The joint initiative has a strong record of well attended seminars, workshops and webinars. Lively discussions showed the strong interest and contributed to expand our network and deliver valuable insights for drafting the guidelines.

THE VALUE OF THE INITIATIVE

Both organizations ICAR and IDF see a great benefit providing standards and recommendations for use of data relating to health and welfare. Accordingly, beneficiaries include farmers, manufacturers, DHIs, breeding organisations, advisors, researchers, dairy processors, and consumer. Using the synergies of both organizations will facilitate communication, collaboration between stakeholders and implementation along the dairy chain, e.g. herd management, breeding, quality assurance.

Improving the quality and comparability of data will allow development of more precise tools and thereby contribute to increased sustainability (productivity and economic performance, improved animal health and welfare, better usage of resources and reduction of the environmental footprint).

NEW OPPORTUNITIES

This international initiative between ICAR and IDF has formed a network of representatives from various stakeholders and excellent scientists. Cutting-edge research and approaches developed will be further discussed with regard to practice transfer. Related to sensor data work is in progress on reference standards, harmonised definitions and terminology, data cleaning as well as trait definitions for use in genetics. Best practices are exchanged and recommendations for use of these data are being elaborated. Accompanying results and outcome will be disseminated.

Furthermore the collaboration between the experts from a wide range of scientific fields enables a holistic approach to the challenges of the dairy industry and facilitates research and innovation.

REFERENCES

A baseline survey as well as various webinars and workshops have been organised in the recent years. The topics related to animal-based welfare indicators covered welfare frameworks in general, recording of lameness, recording and evaluation of Body Conditions Score till the use of sensor technology for improvement of health and welfare so far. Various guidelines have been elaborated and published.

Further information under

https://www.icar.org/index.php/technical-bodies/working-groups/functional-traits-working-group/

INDIA

Use of ethnoveterinary medicine as a cost-effective, efficacious alternative to conventional therapy in dairy animals

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ALIGNMENT WITH SDGS

SCALING UP ETHNOVETERINARY MEDICINE

The small and marginal farmers are the quintessential milk producers of our country and own around 80% of the bovines. With limited resources and liquidity at their disposal, the conventional treatment options available are usually beyond their means. Moreover, indiscriminate and irrational use of drugs, especially antibiotics is leading to the emergence of antimicrobial resistance (AMR), both in animals and humans. By using ethnoveterinary medicine (EVM) the farmer is equipped with a basket of formulations for managing many common ailments in bovines. Since EVM is very cost-effective and can be formulated with ingredients usually available at the farmers' homesteads, the likelihood of adoption are far more than if left with only the option of costly conventional treatment. EVM is easily scalable since it mainly involves only transfer of knowledge to the farmer. This approach thereby helps reduce the use of drugs and antibiotics, thereby contributing towards stalling the emergence of antimicrobial resistance (AMR).

EVM IS AN ALTERNATE OPTION TO MANAGE COMMON AILMENTS IN BOVINES IN INDIA

The propagation of EVM aims at providing the dairy farmer a cost-effective and efficacious alternate option to manage common ailments in bovines that result in productivity losses. EVM also provides an immediate option to the farmer to limit their losses. It is also easy to prepare, non-invasive and has no milk withdrawal periods.

REACHING ALL STAKEHOLDERS IN THE INDIAN DAIRY SECTOR

A total of over 1000 villages under 16 milk unions (MU) and milk producer companies (MPC) from 7 Indian states have been involved in propagation of EVM since 2017-18. More than 1000 veterinarians and about 10,000 dairy society personnel have been trained on the EVM concept. Brochures, posters, pamphlets, videos and, an android mobile application (eGOPALA) on preparation and application of various EVM formulations has been prepared in 12 major vernacular languages including English so as to reach the last mile farmer. More than 600 medicinal plant demo plots have been set up at milk union or dairy society level. Training on EVM is routinely being provided by NDDB to all stakeholders.

"The purchase of antibiotics by a Milk Union extensively propagating EVM has reduced by around 63% from Rs.18.86 million in 2017-18 to 7.03 million in 2022-23."

Dr A V Harikumar

OVERALL AVERAGE CURE RATE OF ABOVE 81%

An on-line reporting system was put in place for recording both empirical and individual animal data on number of cases apparently cured against those treated for a particular ailment. Veterinarians from each MU and MPC were trained to upload data of the cases treated by EVM along with various other parameters being recorded to monitor the impact of EVM implementation. Empirical data of more than 865,000 cases which included above 31,750 individual case records of various ailments managed by EVM from various locations in the country showed an overall average cure rate of above 81%.

REDUCING ANTIMICROBIAL USE IN DAIRY CATTLE

The purchase of antibiotics in most of the milk unions reduced significantly, the case in point being one milk union where it reduced by around 63% from Rs.18.86 million in 2017-18 to 7.03 million in 2022-23 following extensive propagation of EVM. The cost of antibiotic used per visit by the union veterinarian also reduced by around 59% from Rs.31.81 to Rs.12.95 during the same period. There was a 26% increase in awareness on EVM among the farmers within one year of propagation. The preference for use of antibiotics for treating mastitis had also drastically reduced from 47% to 8% during this period. The cost savings of EVM treatment vis à vis conventional treatment extrapolated from the available literature was ranging between 67% to 96%. The main beneficiaries were the dairy farmers.


© Dr A V Harikumar, National Dairy Development Board

VALIDATING EVM FORMULATIONS

Scientific studies of the EVM formulations are being taken up with institutes of repute like Indian Institute of Science (IISC), Bangalore alongside field validations. Extension material as mentioned above on preparation and application of EVM for various ailments is available in 12 major Indian vernacular languages including English. Efforts are also on to include the basics of the EVM in the veterinary curriculum so that graduates are exposed to the Indian systems of medicine. The creation of a robust and reliable database through the online reporting system juxtaposed with scientific validations will provide a plausible reason for the sceptics to start considering this as an alternate option to conventional therapy.

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Sample video for mastitis EVM in English, also available in 11 other major vernacular languages. Videos on EVM for ~30 other ailments also available in all these languages.

https://play.google.com/store/apps/details?id=coop.nddb.pashuposhan&hl=en_IN&gl=US&pli=1: Free Android App, "eGOPALA"containing all the links to the videos and reading materials on EVM for various ailments.

Easy to Switch, Down to Earth 1-15 December 2022: downtoearth.org.in

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INDIA

Implementing genomic selection of dairy cattle & buffaloes in small holder conditions for sustainable dairying

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ALIGNMENT WITH SDGS

DOUBLING THE GENETIC POTENTIAL THROUGH GENOMIC SELECTION

Genomic selection (GS), a new selection tool, has the capacity to double the rate of genetic gain (increase genetic potential) through selection and breeding of bulls at a younger age rather than an older age. With the help of GS, it is now possible to save up to 92% of their costs of breeding design by investing more funds in genotyping to increase selection intensities and thereby increase the rates of genetic gain for sustainable dairying.

Problems to be addressed:

- Traditionally, farmers in the country selected cattle and buffalo for better performance (draft power), not for better production.
- Performance recording was also not being carried out to validate the actual potential of the animals.
- As the population of cattle and buffalo is increasing with the increase in demand for milk, productivity is the main hurdle that needs to be addressed for sustainable dairying in India. Generation interval, along with the accuracy of adopted selection methods, is also a prime area to be improved.
- Improvement in economic traits like Age at first calving, Days open, milk yield

"Genomic Selection: The Game Changer."

Dr. Nilesh Nayee

WHAT IMPACT WILL THIS HAVE?

- Performance recording of cattle and buffalo breeds in India
- Accelerate the genetic potential of the cattle and buffalo by increasing productivity of the animal.
- Creation of reference population of cattle and buffalo
- Selection of breeding bulls by using Genomic Breeding Value

THE SECTOR IS MOVING THE WHEEL

- Initiation of field-based progeny testing (PT) programs in buffalo breeds and crossbred cattle along with Pedigree Selection programme in Six pure indigenous cattle breeds and three buffalo breeds.
- Systematic performance recording to identify elite animals
- Genomic Selection methodologies adopted by increasing performance recording
- SNP genotyping chips developed for cattle and buffalo: INDUSCHIP and BUFFCHIP
- Prediction equations developed based on phenotypic records within the country: genomic breeding values (GBV) using either the single-step GBLUP (Murrah, Mehsana buffaloes, HFCB, JCB cattle) or GBLUP (Gir) method were estimated
- With the performance records available, the correlation of the dam's lactation yield, estimated breeding value, and GBV with the corrected average daughters' yield for bulls were compared with the validation study.

OUR HISTORY OF SUCCESS

Genomic breeding values estimated, without the use of milk production records of validation animals, were 45% correlated to animals' performance in Gir cattle. Thus, GBVs are around three times more accurate than mothers yield-based selection in Gir cattle.

Similarly, there was an increase in the accuracy of GBVs by 143% in Murrah buffaloes compared to the mother's yield-based selection. GBVs were 76% and 91% more accurate compared to pedigree-based estimated breeding values (EBVs) in Murrah buffaloes and Holstein Friesian cattle.

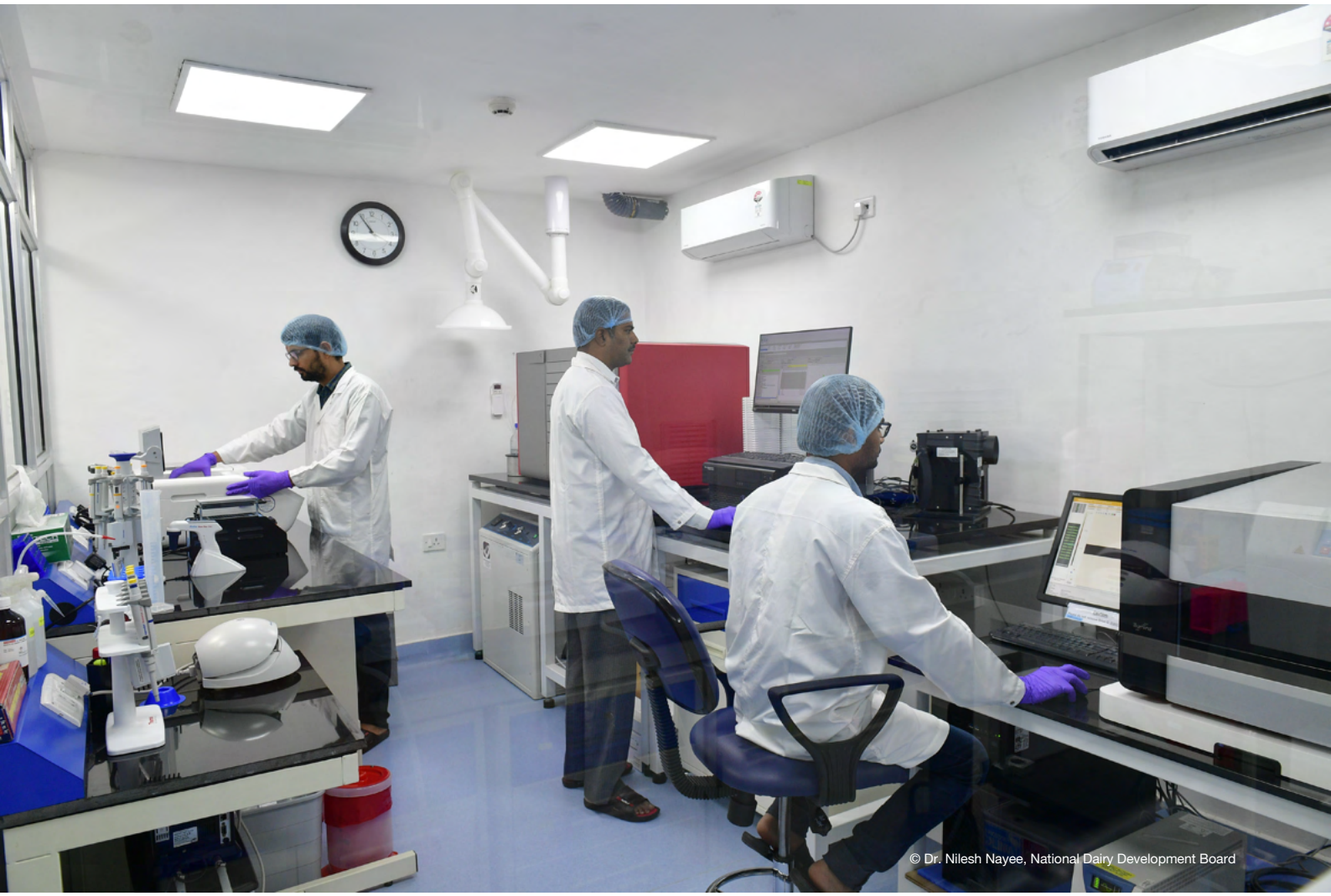
Till date, genotyped sample in Buffalo is 28495, and Cattle is 39310.

GENETIC SELECTION OF ALL YOUNG BULLS IN INDIA

Based on the efforts made by NDDB, genomic selection is now practically being used for the selection of young bulls in India.

Genomic breeding value-based selection is going to be included in all possible breeds of cattle and buffalo, which have the maximum share of milk production in India.

Genomic Selection approach is going to benefit all the semen stations in the country, along with dairy cooperatives and ultimately farmers, by increasing profit and the economy.



NEW OPPORTUNITIES

- Various agencies have signed an agreement with NDDB for the implementation of GS to increase the reference population and for breeding value estimation procedures to be standardized to suit smallholder farming conditions in the country.
- There is need to initiate performance recording in other breeds of cattle and buffalo, which have a share in milk production.
- Focus would be given to the Bayesian approach in genomic selection in the country for further improvisation.
- Development of expertise by collaborating with experienced research institutes across the world which may be helpful to develop appropriate methodologies for developing the right prediction equations for estimating the genomic breeding values of different breeds.

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BETTER
ENVIRONMENT

CANADA

Best Management Practices: helping Canada's farmers reach dairy net-zero by 2050

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ALIGNMENT WITH SDGS

Dairy Farmers of Canada's Best Management Practices Guide supports farmers in their work towards our ambitious Net Zero by 2050 commitment by highlighting a wide range of practices that reduce greenhouse gas emissions.

THE COMMITMENT OF DAIRY FARMERS OF CANADA

In February 2022, Dairy Farmers of Canada (DFC) announced a commitment to achieving net-zero greenhouse gas (GHG) emissions by 2050. Canadian dairy farmers had already worked hard to make their carbon footprint one of the lowest in the world. To build on this momentum, DFC released the Net Zero by 2050 Best Management Practices Guide to Mitigate Emissions on Dairy Farms ("BMP guide") earlier this year.

This guide is a key part of DFC's Net Zero by 2050 objective. The 44-page booklet provides an overview of 30 on-farm best management practices (BMPs) identified in current research that outline opportunities for reducing greenhouse gas emissions, increasing carbon sequestration, and improving overall environmental sustainability.

Working towards net zero demonstrates that our sector will continue to be part of the solutions to tackle climate change and ensure Canadians can continue enjoying dairy products made with 100% Canadian milk for generations to come.

THE BEST MANAGEMENT PRACTICES GUIDE TO MITIGATE EMISSIONS ON DAIRY FARMS

The BMP guide is designed to help farmers identify on-farm practices that will reduce their GHG emissions to mitigate climate change and lessen the impacts of extreme weather events that are affecting dairy farms across Canada.

> "DFC understands the importance of maintaining the longstanding sustainability efforts of Canadian dairy farmers. Our sustainability strategy and BMP Guide leverages progress and streamlines current and future efforts into a comprehensive plan to help our sector reach its net-zero objective."
>
> **Dairy Farmers of Canada**

ASSESSING OPTIONS TO REDUCE GHG EMISSIONS ON DAIRY FARMS

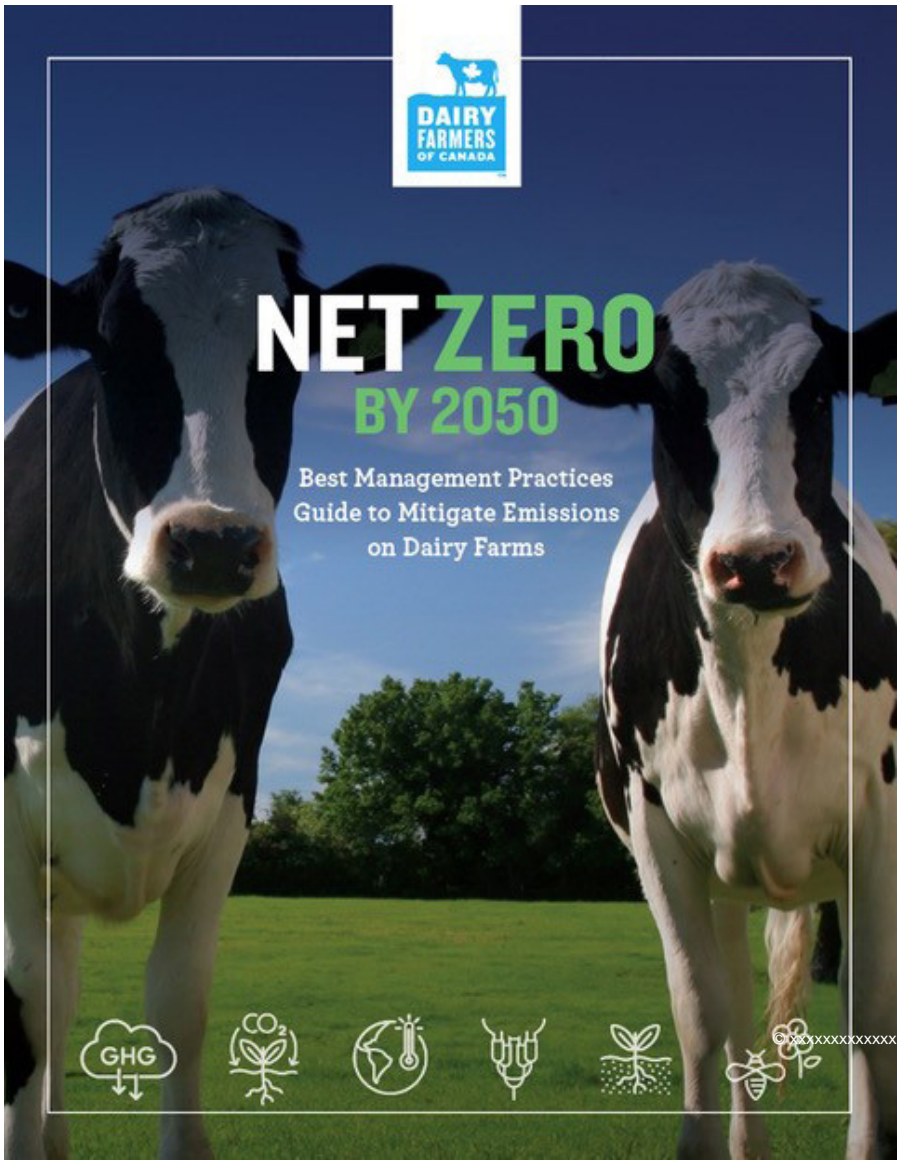
DFC worked with Viresco Solutions, experts in low carbon and sustainable agriculture, to assess options to reduce GHG emissions on dairy farms. They evaluated available research to determine impact on GHG emissions, return on investment, and co-benefits. Dairy farmers across Canada participated in focus groups to provide input on BMPs and the feasibility of implementation. Viresco Solutions then consulted with experts and modelled the potential impact of the most feasible BMPs. Viresco's research informed the BMP guide which focuses on four main categories including: livestock management, feed production, manure management, energy infrastructure and transportation and land management.

MONITORING PROGRESS OF THE ADOPTION OF THE BMP

DFC uses a variety of mechanisms to measure the progress of BMP adoption. The carbon footprint, water consumption and land use are measured at the national level through our Life Cycle Assessment. The uptake of many BMPs is measured through the Environmental Questionnaire that is part of the Environment module of DFC's existing proAction® program, which is widely recognized for its high standards and is mandatory on all Canadian dairy farms. DFC is currently exploring the development of an on-farm carbon footprint measurement tool. Farmers also have the option to monitor individual progress using Lactanet's Herd Sustainability Index.

SUPPORTING THE LONGSTANDING SUSTAINABILITY EFFORTS OF CANADIAN DAIRY FARMERS

DFC understands the importance of maintaining the longstanding sustainability efforts of Canadian dairy farmers. Our sustainability strategy and BMP Guide leverages progress and streamlines current and future efforts into a comprehensive plan to help our sector reach its net-zero objective. It's important



to acknowledge that dairy farms are as unique as the people operating them. Our strategic approaches are designed to support and guide farmers to the best recommendations for their farms, implement them, and measure their effectiveness. Pursuing the net-zero objective is also essential to remaining relevant to millennial and generation-Z consumers amid growing competition from dairy imitators.

CARBON SEQUESTRATION STUDY AND BIODIVERSITY ASSESSMENT INCLUDED

As part of our overall strategy, DFC is committed to supporting farmers to advance sustainability and efficiency of their operations by developing strategic partnerships with leading environmental organizations; increasing research, innovation, and knowledge and technology transfer; ensuring farmers are support by beneficial regulatory environments and markets; leveraging economic opportunities; and communicating on farmers' sustainability journey.

DFC will soon be completing our 2021 life cycle assessment, which includes a new biodiversity assessment and is supplemented by a coordinating carbon sequestration study. These initiatives will inform our strategy and collaboration with diverse stakeholders to support dairy farmers' continuous sustainability efforts.

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FRANCE

The low carbon dairy farm, a solution to reduce carbon emissions

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ALIGNMENT WITH SDGS

French dairy farmers are participating in the fight against climate change

IN FRANCE, DAIRY FARMING REPRESENTS 6.4% OF GREENHOUSE GAS GLOBAL EMISSIONS

Even though the milk carbon footprint decreased by 24% between 1990 and 2010 (GESEBOV, 2013), the French Dairy sector, represented by the CNIEL, has pursued its efforts by launching in 2013 the multi-partnership LIFE Carbon Dairy project. This pilot project aimed to reduce the greenhouse gas emissions of 3900 French dairy farms. Supported by the European Union and the French Ministry of Agriculture, the programme facilitated the development of the CAP'2ER® environmental diagnostic tool and the training of advisors.

This tool helps to evaluate farms' environmental performances and sustainability, to analyse the results, and to identify actions to reduce the carbon footprint and improve economic performance.

Following the success of this pilot project, the CNIEL and its partners have decided to extend the initiative to all French dairy farms, then becoming the Low Carbon Dairy Farm programme.

THE LOW CARBON DAIRY FARM PROGRAMME AIMS TO REDUCE FARMS' CARBON FOOTPRINT BY 20% BY 2025.

The Low Carbon Dairy Farm programme is a sector-wide initiative that guides dairy farmers in reducing their greenhouse gas emissions based on an individual diagnosis. Each farmer can choose, with an advisor's support, appropriate actions to implement on their farm according to their goals.

"Responsibility and solidarity are values that we want to carry within the French dairy sector. Building the future together is the ambition of our sector, so that each of the economic actors will be a winner, together, and an ally of consumers."

Caroline Helleisen Errant, General Director of CNIEL

THE FRENCH DAIRY SECTOR SUPPORTS THE LOW CARBON DAIRY FARM'S DEPLOYMENT

Since 2013 the CNIEL has been financially involved in technical programmes (e.g., Life Carbon Dairy, STRACE², Life Carbon farming…) to develop references and identify technical levers to reduce dairy farms' carbon emissions. CNIEL supports communication towards farmers and farm advisors on the available technical resources, through the specialised press and technical meetings, to enhance the deployment of sustainable practices.

CNIEL facilitates the Low Carbon Dairy Farm programme by co-financing the individual environmental diagnosis and farm advice. CNIEL also helps to identify, through its regional sections known as CRIELs, other public fundings so that diagnosis costs do not became an obstacle for dairy farmers.

Implementation of the CAP'2ER® tool is also supported by the French dairy sector and regularly updated as it evolves to become more and efficient and performant.

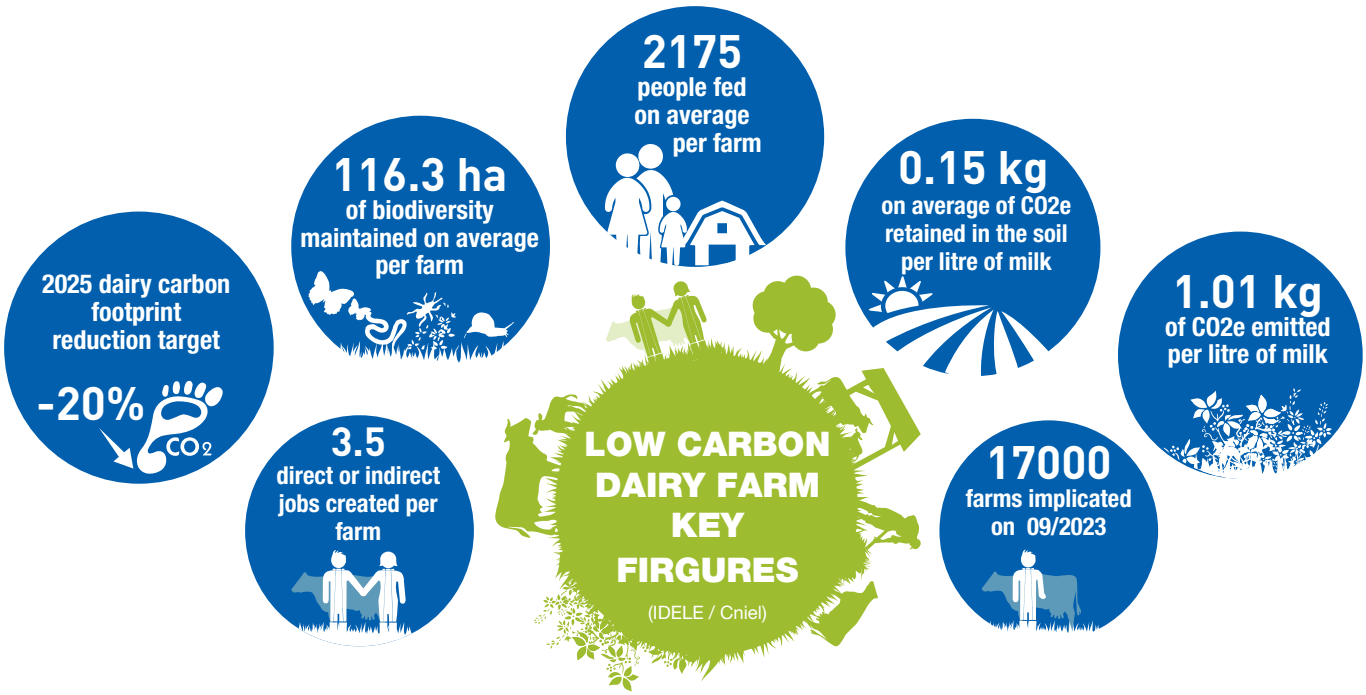
SO FAR, 34% OF FRENCH DAIRY FARMS ARE INVOLVED TO MITIGATE THEIR ENVIRONMENTAL IMPACTS.

To date, more than 17 000 French Dairy farms are involved in the programme and collectively work to reduce their greenhouse gas emissions while preserving or implementing their positive contributions, such as carbon sequestration or biodiversity. Thanks to their efforts, the French milk carbon footprint decreased by 6% between 2016 and 2021.

An example of feedback from one farmer highlights the efficiency of the programme. The diagnosis allowed him to position himself in relation to the national averages defined for farms with characteristics similar to his. This enabled him to identify his strong points but also what he could improve. He worked on several levers, such as reducing the age of first calving, making the most of grazing, and reducing fuel consumption. He related that these are both ecological measures and potential economic gains, a real «win-win» strategy.

TO PRODUCE SUSTAINABLE FOOD WE HAVE A REAL CHALLENGE: TO BUILD THE FUTURE TOGETHER

Thanks to the Low Carbon Dairy Farm programme and the efforts of farmers, the French Dairy sector can proudly highlight the ways in which it responds to the requests of consumers and citizens, while demonstrating the progress of initiatives from all actors in the sector as well as the commitments they are taking for tomorrow.



WORK IN PROGRESS

For the 2023-2025 period, the French Dairy sector has identified two major priorities: attractiveness of the dairy sector and decarbonisation. The aim of the dairy sector is to increase its actions to mitigate its environmental impacts and to adapt to climate change. This will lead to expanding the Low Carbon Dairy Farm programme by engaging every French dairy farmer by 2030. Actions will be gathered into a decarbonisation roadmap which will draw the path of the dairy sector decarbonisation to 2030 and 2050.

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FINLAND

Manure biogas is part of agriculture's green transition and improves finland's energy self-sufficiency

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ALIGNMENT WITH SDGS

Food company Valio and energy company St1 have established a joint venture 'Suomen Lantakaasu' to produce renewable biogas as transport fuel using dairy farm manure and agricultural by-products

BIOGAS FOR FINLAND'S ENERGY AND FUEL SELF-SUFFICIENCY

Biogas produced from manure creates significant climate benefits and strengthens Finland's energy and fuel self-sufficiency. Biogas has all the potential to quickly grow its market share as a fuel for transport.

Alongside positive climate actions, we must secure the continuity of Finnish food production: expenses for dairy farms are at a high level. Finland's geopolitical situation is putting the spotlight on energy self-sufficiency. Increasing the production and use of domestic biogas addresses all these challenges. Utilising manure in biogas production reduces the carbon footprint of milk production by as much as one quarter, when the emissions reduction of both agriculture and transport are taken into account.

THE PREMISE

Suomen Lantakaasu is part of the Valio's climate programme that aims to cut milk's carbon footprint to zero by 2035. The first plant in Upper Savo will be Finland's biggest biogas plant and it is a so-called hybrid plant, meaning there is one industrial-scale, centralised liquefied biogas production plant in Kiuruvesi and smaller satellite biogas plants in clusters of several farms elsewhere in Upper Savo region.

MOVING THE WHEEL

Farms are geographically dispersed, so efficiently collecting and utilising manure and surplus grass is a challenge at the moment. Suomen Lantakaasu's innovative hybrid production model will bring this energy production potential into use: the agricultural feedstocks are recirculated at the biogas plant and returned to fields, enabling renewable energy to be recovered and nutrients to be returned to plants. This recycled fertiliser can significantly reduce the use of fossil fuel-based fertilisers, which have become very expensive.

> "Utilising manure in biogas production reduces the carbon footprint of milk production by as much as one quarter, when the emissions reduction of both agriculture and transport are taken into account."
>
> **Hanna Hiekkamies**

THE HISTORY OF SUCCESS

There is a growing interest in biogas production among Valio dairy farms because it has a positive impact on farm profitability and improves nutrient cycling on the farm. The use of manure for biogas production reduces the carbon footprint of milk production by up to 25% when taking into account emission reductions from both agriculture and transport.

Energy company St1 has solid expertise in both biogas production and distribution. St1 is already Sweden's leading biogas player in the road transport segment. The company produces, imports and exports biogas and supplies it to customers through several sales channels. St1 also has six biogas production and upgrading units in Sweden and is currently building a biogas upgrading and liquefaction facility in Borås, Sweden.

THE VALUE OF THE INITIATIVE

Suomen Lantakaasu aims to produce a total of 1 TWh of renewable transport fuel, which corresponds to a quarter of Finland's biogas target by 2030. The production capacity of 1TWh would correspond to 100 million litres of traditional diesel and the production plant in Upper Savo would correspond to 12 million litres of diesel fuel. Thus, the biogas production will reduce food production and transport emissions. The biogas value chain also efficiently recycles nutrients and decreases nutrient run-off into water systems.

The biogas plant will bring significant investments, tax revenue and new economic activity to Upper Savo. The plant complex will provide employment, both directly and indirectly, e.g. to logistics operators in the region.

NEW OPPORTUNITIES

The biogas plant will produce renewable liquefied biogas from the manure and other agricultural by-products of cattle farms. At the same time, hygienised biofertiliser will be produced for use by local farmers. It is more efficient and environmentally friendly than untreated manure and less odorous than untreated liquid manure.

The St1 and Valio joint venture aims to build 8–10 production plants for biogas production and liquefaction by 2030. The company aims to produce a total of 1 TWh of renewable transport fuel. St1 will distribute the biogas through its own nationwide network of fuelling stations for heavy-duty vehicles.

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CHINA

Low Water Footprint Initiative at Yili

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ALIGNMENT WITH SDGS

THE FIRST COMPANY IN THE CHINESE DAIRY SECTOR TO PROPOSE THE "LOW WATER FOOTPRINT INITIATIVE".

Water footprint, a new measure of environmental, social and governance (ESG) following carbon footprint, is closely connected with carbon emissions. The use and discharge of one ton of water produce at least 5kg of carbon. In addition to milk, other dairy products that use milk as the main raw material, such as yogurt, milk powder, ice cream, cheese, etc., will consume more water per unit of product due to the water footprint of the production process and other ingredients added. Yili Group has breakdown water use in all sectors of its value chain with full life cycle assessment and is the first company in the Chinese dairy sector to propose the "Low Water Footprint Initiative". This March, at the UN 2023 Water Conference held nearly half a century after the previous one, Yili's Low Water Footprint Initiative was approved and Yili became the first Chinese company to join the UN Water Action Agenda.

YILI SUPPORTS SUSTAINABLE WATER USE

By 2030, Yili aims at significantly improve the water efficiency of all sectors and ensure sustainable extraction and supply of fresh water, so as to solve the water shortage. By 2030, the company aims to put in place comprehensive water resource management at all levels, including by means of cross-boundary cooperation where appropriate.

MEASURING WATER IS KEY

To find out how tight water supply is for Yili and its suppliers, Yili used World Resources Institute's Aqueduct tools and the AWARE tools developed by WULCA under the UNEP-SETAC Life Cycle Initiative. It generated a water risk map and guide the formulation of the water conservation targets for the industry. Activities are planned accordingly, including those regarding water conservation projects and best practices within its premise.

A TOTAL OF 1.7 MILLION TONS OF WATER WAS SAVED WITHIN THE YEAR.

In 2022, Yili focused on regions with high water shortage risks to explore potentials for water saving and launched 322 water

"Open a New Chapter in the Industry's Whole Chain Water Conservation by the "Global Low Water Footprint Initiative" Practice together."

Zhiyong Lv

saving projects covering all its production facilities for mineral water, milk powder, liquid milk, yogurt, ice cream and other products.

Yili manages water resources with a proprietary digital management platform which collects data of all of the company's water acquisition, use and recycling processes. To promote the Low Water Footprint Initiative, Yili initiated the Global Alliance for Low Water Footprint Initiative with a number of its strategic partners in 2022. In addition to setting its own water conservation goals, Yili also made water conservation plans for upstream and downstream companies and offered rewards to those who attained the goals.

REDUCING THE IMPACT OF ITS OPERATIONS ON THE ENVIRONMENT

By August 2023, Yili has completed water footprint verification for three factories and two products. LWFi not only helps Yili reduce its water consumption, but also will gradually increase alternative water consumption and lower water acquisition. The Global Alliance for Low Water Footprint Initiative will help suppliers achieve their goals of reducing production water consumption and make standards to measure the water footprint of raw materials, thus lowering the water footprint of dairy products on the whole and reducing pressure on water resources.

NEW PARTNERS TO JOIN THE GLOBAL ALLIANCE FOR LOW WATER FOOTPRINT INITIATIVE

Led by Yili, 36 strategic suppliers and four authoritative organizations joined the Global Alliance for Low Water Footprint Initiative. Yili made water saving plans for its partners along the industrial chain, and rewarded the partner companies based relevant performance. Together, they have opened a new chapter featuring global low water footprint for the dairy industry. By 2030, Yili will significantly improve the water efficiency of all its sectors, ensure sustainable fresh water extraction and supply, and reduce water footprint through close cross-industrial cooperation and collaboration.

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SOUTH AFRICA

Carbon footprint reduction over time: Lessons from pasture-based dairy farms

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ALIGNMENT WITH SDGS

THE BIG PICTURE

Trace & Save has been assessing GHG emissions on pasture-based dairy farms in South Africa for many years and there is a great opportunity to learn from farmers who have been able to reduce their emissions. These farmers have measured evidence which supports the emission reduction goals that are being set globally. Twenty farms were identified from the Trace & Save research database that have reduced their GHG emissions per kilogram (kg) of milk over the past five years. Within each of these examples are learnings which can potentially be applied on other farms, which could result in further overall emissions reductions.

"The same improvements that have led to reduced emissions on these farms are associated with increased farm profitability, since they are associated with decreased input costs and maintained milk production efficiency."

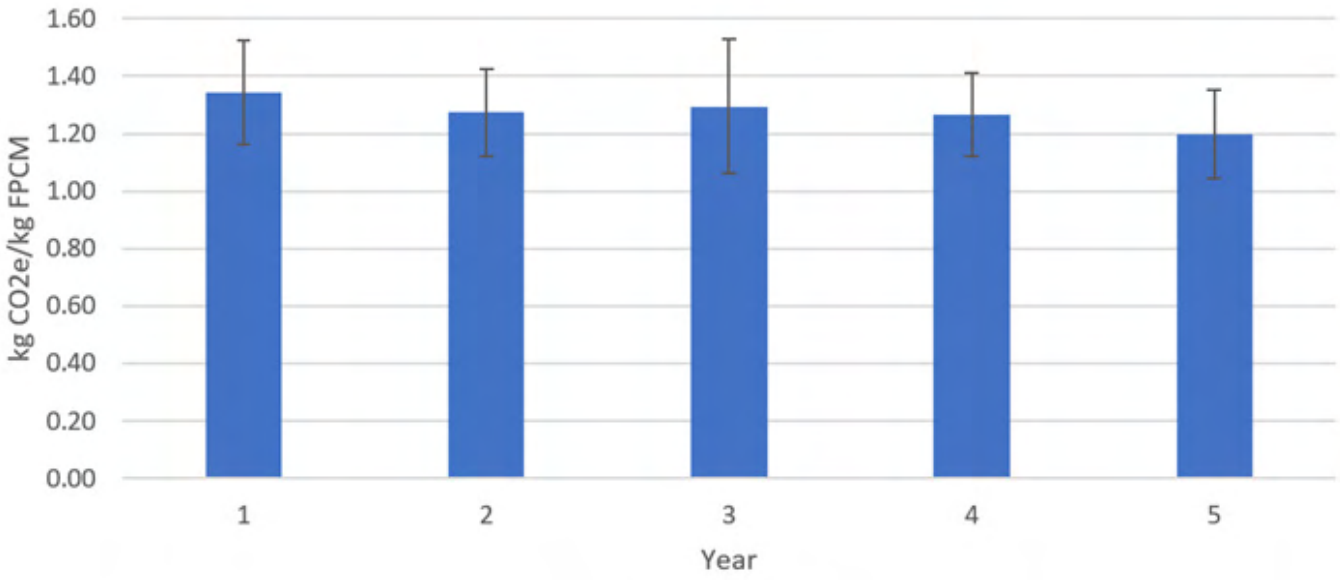
Craig Galloway

THE PREMISE

This study aimed to examine which emissions sources have had a reduction in GHG emissions on 20 pasture-based dairy farms in South Africa, and to explore the practices that farmers have adopted which have contributed to these reduced emissions.

MOVING THE WHEEL

A farm-gate lifecycle assessment of GHG emissions is carried out each year on farms that participate with Trace & Save. There are 95 farmers who have been participating for between one and ten years, providing a large database. Twenty farms were identified from this database



Average GHG emissions (with standard deviation bars) on 20 pasture-based dairy farms participating with Trace & Save in South Africa who were able to reduce their GHG emissions over the past five years.

that have reduced their GHG emissions per kilogram (kg) of milk over the past five years. The changes in GHG emissions per source were examined, as well as partial productivity measures used as indicators of farm systems and practices which are associated with reduced emissions.

THE HISTORY OF SUCCESS

The average carbon footprint for the 20 farms was 1.34 (±0.18) kg carbon dioxide equivalents (CO_2e) per kg fat- and protein-corrected milk (FPCM) five years ago. This figure reduced to 1.20 (±0.16) kg CO_2e/kg FPCM in year five. The most significant reductions are from pasture and crop production, purchased feed production and enteric fermentation, which have reduced by 0.04, 0.04 and 0.03 kg CO_2e/kg FPCM from year one to year five respectively. The most significant improvements have come from increased feed conversion efficiency, a higher proportion of pasture in the diet, and lower nitrogen fertiliser application rates.

THE VALUE OF THE INITIATIVE

The results from this study should be an encouragement to farmers that there is opportunity to improve the efficiency of farm management, leading to reductions in bought feed and fertiliser, which will have an associated decrease in GHG emissions. The same improvements that have led to reduced emissions on these farms are associated with increased farm profitability, since they are associated with decreased input costs and maintained milk production efficiency. This presents a mutually beneficial scenario for farmers, industry stakeholders and consumers alike.

NEW OPPORTUNITIES

Trace & Save will continue to assess the GHG emissions on pasture-based dairy farms, providing the farmers with insight on whether their emissions are reducing, and the impact that the practices they have adopted are having on their GHG emissions. This insight is also valuable to industry stakeholders, both to demonstrate whether progress is being made, and to create evidence of this progress. Continued research needs to identify further emissions reductions opportunities, especially beyond those which are associated with improved farm efficiency.

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A full article on this study, including more comprehensive results, can be found at http://traceandsave.com/carbon-footprint-reduction-over-time-lessons-from-pasture-based-dairy-farms-in-south-africa/

SWITZERLAND

On the road to climate-friendly and resource-efficient milk production -"KlimaStaR"

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ALIGNMENT WITH SDGS

The KlimaStaR project joins Swiss farmers, dairy companies, scientists and consultants in an effort to roll out, monitor and reward climate- and resource-friendly milk production practices.

DAIRY FARMING IS A MAINSTAY OF SWISS AGRICULTURE

In 2022, milk was produced on 19'495 farms, contributing 23.7% to national agricultural production value. Another 13.7% stem from beef production (Milchstatistik, 2023). More than half of the country's agricultural area serves to feed the dairy herds – and provide valuable ecosystem services. Dairy farming is a major emitter of greenhouse gases (GHG), with a share of 7.5% of national emissions in 2022 attributed to cattle (National greenhouse gas inventory, 2023). Switzerland is a signatory of the Paris Agreement and has pledged to achieve "net zero" by 2050. The national long-term strategy requires agriculture to reduce GHG emissions by 40% until 2050, compared to 1990, while meeting at least 50% of the nation's food demand (Federal Council, 2021). By 2018, agricultural GHG emissions had diminished by 13% compared to 1990. Dairy farmers will have to contribute much of the further emissions reduction.

THE PREMISE OF KLIMASTAR-MILCH

The project "KlimaStaR-Milch" aims at reducing the GHG intensity, expressed in CO2eq per kg ECM and the edible protein conversion ratio (ePCR), i.e. the human edible protein in feeds divided by the human edible protein in animal products, of milk production on the participating 232 farms by 20% each until 2027, compared to the baseline period 2019-2021.

"The learnings from KlimaStaR already inspire efforts at the whole sector level to move towards calculating GHG balances for all Swiss dairy farms."

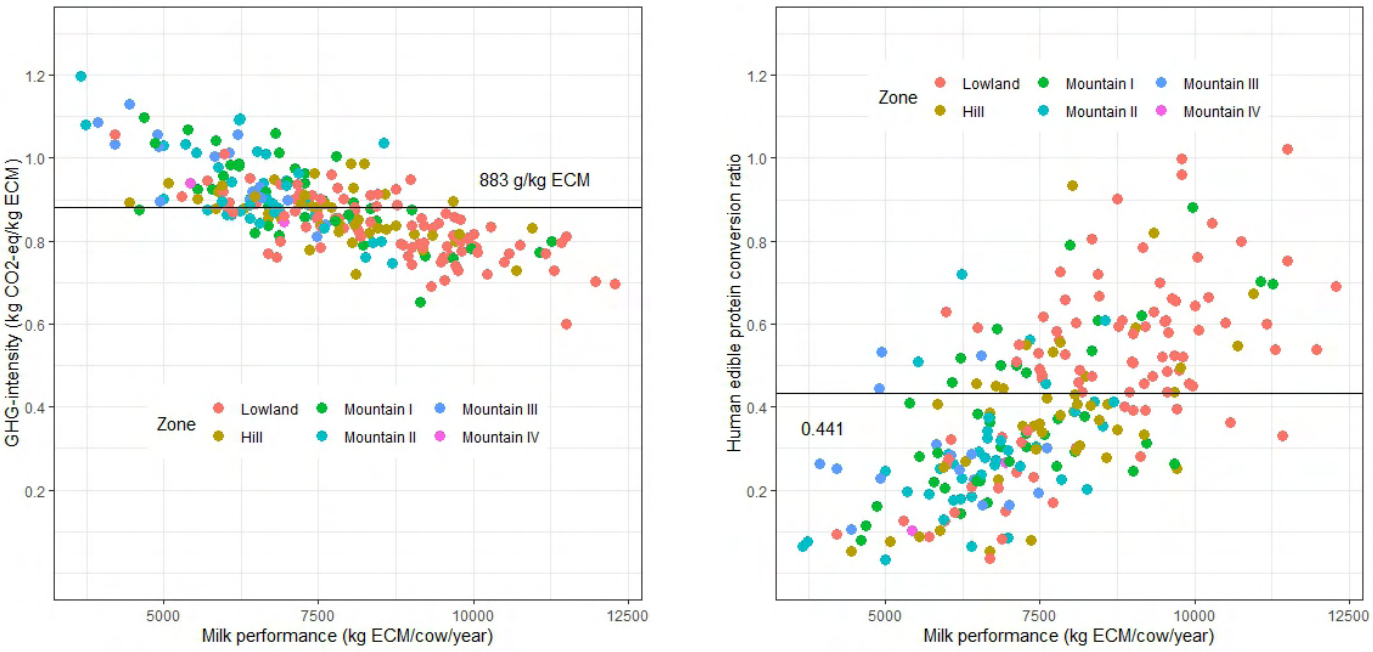
Dr. Jan Grenz

THE PROJECT IS IMPLEMENTED BY DAIRY COMPANIES, CANTONS AND RESEARCH INSTITUTIONS

The project is implemented by a consortium of two dairy companies (Emmi, Nestlé), a milk producer association (ZMP), three cantons (Berne, Aargau, Lucerne), a facilitating organisation (Agrofutura) and a research institution (BFH-HAFL). It is funded by the Federal Office of Agriculture FOAG. The farmers implement measures centred on feed optimisation, herd management and manure management. GHG intensity and feed-food competition are calculated annually for each farm using an online tool called KLIR (Köke et al., 2021; Zumwald et al., 2019). Reduction goals were set for each farm. Premiums are paid by FOAG (80%) and the dairy companies (20%) per kg ECM based on the achieved reductions of GHG intensity and feed-food competition. For a third of the farms the land use ratio is calculated and a holistic RISE sustainability analysis (Response-Inducing Sustainability Evaluation; Roesch et al., 2018) is done to investigate whole-farm development.

THE BASELINE FEED-FOOD COMPETITION INDEX OF 0.432 WAS REDUCED BY 9% IN 2022

From the beginning, the project attracted much interest from the dairy farming community: 474 farmers applied; only 232 could participate, as the ceiling of 60 million tons ECM/year was reached. Farm data collection and verification as well as communication on measures new to the farmers were challenges during the first year that were tackled successfully. The baseline GHG intensity was calculated as 881 g CO2eq/ kg ECM. In 2022, a reduction by 1% only was achieved due to adverse weather conditions' causing a decline in milk yields. The baseline ePCR of 0.432 was reduced by 9% in 2022 (Fig. 1). An ePCR value of 0 indicates that no human edible protein was fed to the cows, while values above 1.0 reflect a net loss of human edible protein.



Greenhouse gas intensity (left) and Feed-food competition (right) on Swiss dairy farms participating in the KlimaStaR project during the baseline period, 2019-2021, as affected by annual milk yield per cow. Note that higher ePCR values reflect lower conversion efficiency and thus lower resource use efficiency. The project aims at reducing ePCR. ePCR = human-edible protein conversion efficiency (ratio of human edible protein the cows' feed versus protein in produced milk and beef).

THE KLIMASTAR PROJECT HAS MANIFOLD BENEFITS

First and foremost, a tangible contribution is made to achieving the national GHG reduction and self-sufficiency goals. The feasibility of 21 proposed GHG reduction measures and the usefulness of the KLIR online tool are tested and improved under farm conditions. Farmers are familiarized with key figures and concepts needed for targeted reductions of the GHG intensity and the ePCR. Not least, the participating organizations have managed to establish an effective and efficient collaboration. The project also attracted major public interest and was featured on TV, radio and in newspaper publications

KLIMASTAR FOR THE CALCULATION OF GREENHOUSE GAS BALANCES OF ALL SWISS DAIRY FARMS

The project will run until 2027 and its organization and methodology will be further refined during this time. Scientific data evaluation has only started, and the collection of the first set of farm sustainability data is ongoing. Valuable quantitative insights into the intricacies of on-farm implementation of climate and resource efficiency measures can be expected.

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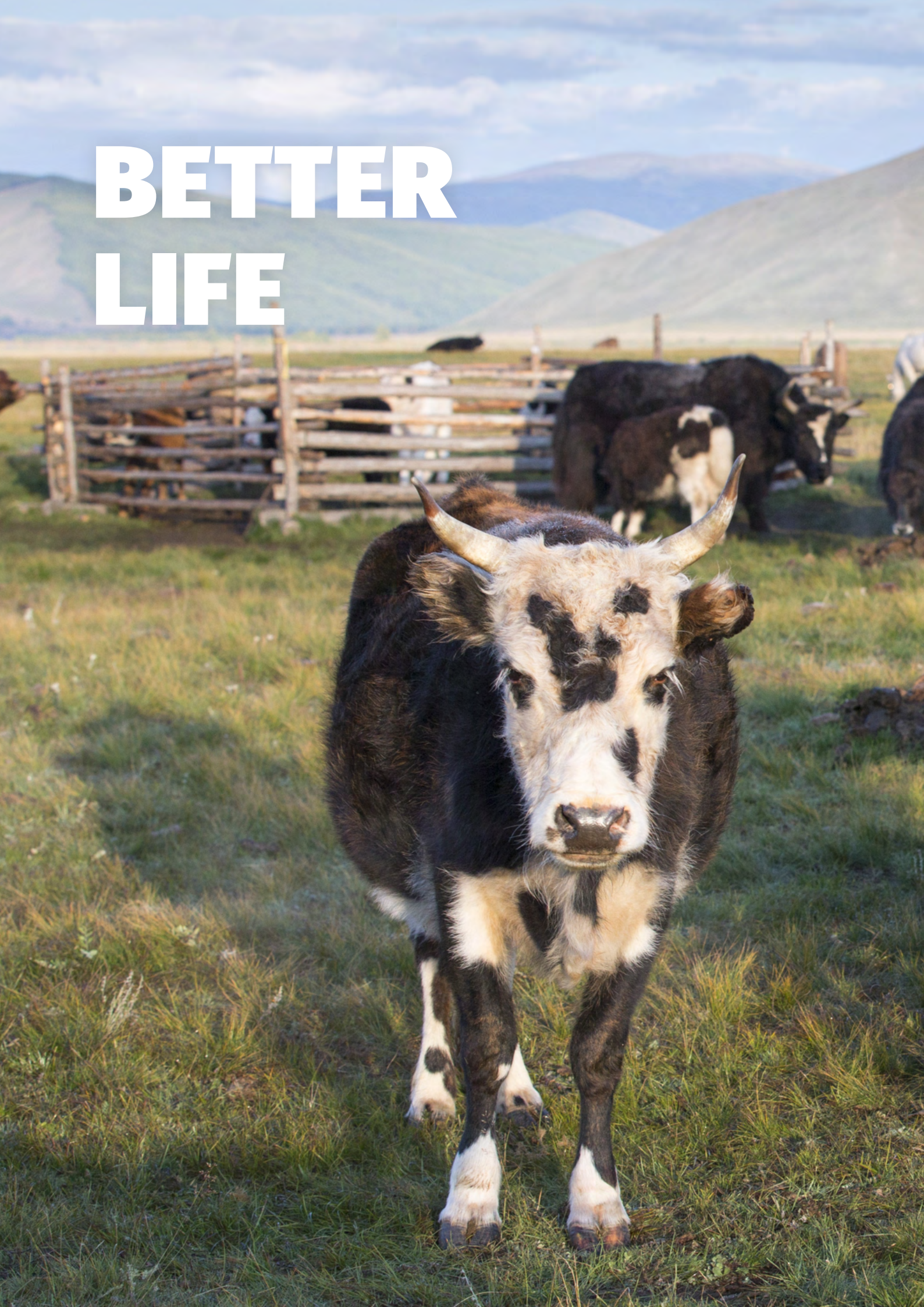
BETTER
LIFE


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"Arla Foods has earmarked up to 500 million EUR per year to reward climate actions on Arla farms through its Climate Check incentive and the new points-based Sustainability Incentive."

Kristina Andersen

DENMARK - SWEDEN

Sustainability Incentive rewarding Arla farmers for taking sustainability actions

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ALIGNMENT WITH SDGS

Arla Foods has earmarked up to 500 million EUR per year to reward climate actions on Arla farms through its Climate Check incentive and the new points-based Sustainability Incentive.

THE BIG PICTURE

In 2019, Arla committed to the ambitions of the Paris Agreement and pledged to reduce its scope 3 emissions by 30% per kg of raw milk and whey in the period 2015-2030 (approved by SBTi). With more than 80% of the emissions in its value chain originating at farm level, it is a given that Arla's efforts and resources are invested in this area.

The need for the sustainability incentive was clear already by 2019, however, the implementation of the Climate Checks program (the annual data set on the on-farm management, which enables the calculation of the unique carbon footprint per farm) was a prerequisite; insights into the tangible drivers of a farms' carbon footprint was needed in order to incentive the impactful activities. During autumn 2021, the incentive project was accelerated with regular steerco meetings with the top-management and members of the Board of Directors. As a cooperative, it was key that the model would not favour certain farm systems over others.

THE PREMISE

With the introduction of the incentive model, Arla puts its money where its mouth is: the sustainability incentive aims at funding and motivating actions required to hit the 2030-emission reduction target on farm. The more points achieved, the higher the milk price paid to the cooperative farmers.

MOVING THE WHEEL

Launched in October 2022, the Sustainability Incentive was drafted in close cooperation with Arla's farmer Board of Directors and by involving Arla's 8,500 farmer owners. Internally, the development of the model involved multiple stakeholders across the business, incl. Arla's agriculture and sustainability experts, finance, IT, and communications departments, just as the legal team provided ongoing reviews. Discussions with top-management and cooperative farmers were regular as well.

Initially, farmers voiced concerns that the Incentive could favour certain farm systems and add additional costs to the farm economy. The feedback led to a few changes of levers and points distribution before the model was finalized, which ensured a stronger support amongst Arla farmer owners.

Finally a system with 19 point-giving levers, which impact climate and environmental sustainability, was been approved.

THE HISTORY OF SUCCESS

When the Incentive was introduced, Arla anticipated the farmers were to achieve an average of 39 points out of a possible 80 in the new point system. However, the first inventory shows that the average farmer has achieved 48 points based on the initiatives registered by June 2023.

Thousands of documents have been uploaded to our systems and Arla is still to conclude analysing the data submitted and assessing the potential to accelerate change in certain areas.

THE VALUE OF THE INITIATIVE

The Incentive accelerates the climate and biodiversity transition at farm and has the potential to bring both top-line and bottom-line improvement to the farm economy. Top-line with the milk price now being depended on climate – and bio-diversity actions. Bottom-line, as several of the levers in the Incentive carry an efficiency potential, which optimises resource use and hence costs on farm.

The positive contribution to the environment and the global climate agenda has multiple beneficiaries, incl. the dairy sector at large, the Arla business and the customers it serves.

NEW OPPORTUNITIES

The Incentive is designed as a point-based model, in which currently 19 different levers are rewarded with points. 80 points have been available since the launch of the model in 2023 and further 20 points are set aside for more levers. Thus, a total of 100 points is expected to be available within a few years, as new science-based knowledge, innovative practices and technologies become available.

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INDIA

Rathi Cattle : A life line of desert in India

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ALIGNMENT WITH SDGS

RATHI CATTLE IS FULFILS LIVELIHOODS IN THE HEART OF THAR DESERT

The home tract of this breed lies in the heart of Thar Desert consisting of Bikaner, Ganganagar and Jaisalmer districts of Rajasthan. The eco system of this area is fragile, characterizes with scorching summer (50°C), chilly winter (2°C), dry monsoon (< 200 mm rainfall/annum) and dust storms, with prolonged periods of drought. Groundwater is scarce and saline. The dry lands in most part of this region, are not suited for farming. In the absence of agriculture, industries etc. the source of livelihood for the residents of these areas are very limited and livestock are found be the mainstay to fulfil major livelihood needs of the society.

Rathi, a mosaic Zebu breed of this region, is well adapted to the harsh climatic conditions with the higher thermoregulatory ability and capable of converting low-quality fodder especially dry forages or seasonal fodder like Sewam (Laisirus sindicus), Bhurut grass and crop residues, more efficiently into milk. These excellent features of this breed make it the foremost choice among the local farmers.

"Rathi cattle breed development & conservation project – transforming lives through sustainable dairying under fragile agro-climatic condition."

Dr. Sujit Saha

INCREASING RATHI'S PRODUCTIVITY

Keeping these in mind, the project was implemented to improve the productivity of the Rathi breed through breeding intervention and thereby improve milk production and socio-economic wellbeing of the farmers.

The project was initiated with the following objectives:

- Conservation & genetic improvement of Rathi cattle in their native tract through scientific breeding interventions and establishment of performance recording infrastructure
- Sustaining the dairy production and livelihoods of the farmers under harsh conditions

DEVELOPING RATHI CATTLE IN ITS BREEDING TRACT SINCE 2002

NDDB in partnership with Rajasthan Cooperative Dairy Federation (RCDF) and URMUL Trust took initiatives in developing Rathi cattle in its breeding tract in 2002. In the initial phase, selection of superior bulls for natural service from high yielding recorded animals was used as a tool in breeding intervention. Simultaneously, the project also created awareness on the impact of planned breeding and better husbandry practices to enhance animal productivity. During Phase-II, doorstep AI services were initiated and made available to the farmers on chargeable basis. Subsequently, one Pedigree Selection project on Rathi cattle was implemented with the establishment of 50 AI centres covering around 150 villages under National Dairy Plan – Phase I (NDP-I) during 2013-19. The project was later continued under Govt. of India's Rashtriya Gokul Mission (RGM) scheme. To popularize Rathi cattle in other dry and resource poor areas of the country, few Rathi animals were inducted in Amravati and Wardha districts of Vidarbha region of Maharashtra, where it got tremendous positive response.

OUTCOMES OF THE RATHI CATTLE BREED DEVELOPMENT AND CONSERVATION PROJECTS

- Population of Rathi cattle increased in their native tract.
- For genetic improvement of Rathi cows, doorstep Artificial Insemination (AI) delivery services through trained, unemployed educated youth has been initiated replacing natural services.
- Implementation of systematic performance recording system involving farmers herd under the project has helped to gain insight about the milk production potential of Rathi cattle.
- Under the project, around 92031 Rathi cows have been registered, 110813 AIs have been carried out, 6326 animals were put to milk recording. Since, 2012, a total of 55 high genetic merit superior breeding bulls have been produced for frozen semen production.
- The popularity of the breed has increased tremendously especially among the farmers from drought prone areas with less rainfall and limited or no availability of green fodder. Around 157 Rathi cows have been inducted by the progressive farmers of Maratha-

Vidarbha region of Maharashtra state.

WOMEN DAIRY FARMERS ARE THE MAJOR BENEFICIARIES

Small & marginal farmers particularly the women dairy farmers of these areas were the major beneficiaries from this project. Rearing Rathi cows resulted into production of considerable amount of milk at very low maintenance cost, which not only ensured nutritional security of the family but also paved the way for regular source of income from dairying. As the popularity of this breed increased in other dry and water scarce areas of the country, the demand for these cows increased significantly. As a result, the farmers also started earning handsome amount by selling pregnant heifers or lactating animals. Further establishment of doorstep Artificial Insemination delivery network created employment opportunity for the educated, unemployed rural youth of the area.

FUTURE GOALS:

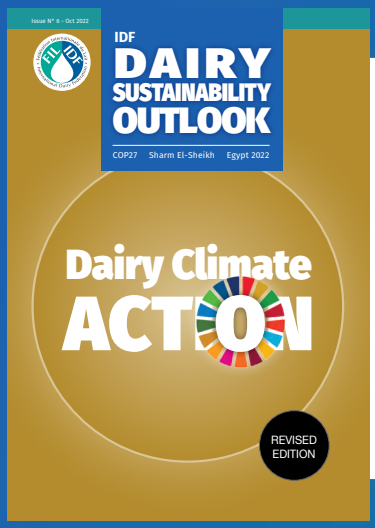
- To establish Rathi breed of cattle as a potential substitute for Sahiwal and Gir cattle, especially for drought prone areas of the country with scanty rainfall and limited availability of green fodder.
- Introduction of genomic selection to accelerate genetic progress in Rathi cattle population.

REFERENCES

https://www.dairyknowledge.in/dkp/article/rathi

https://idfwds2022.com/assets/Compendiumofabstracts_Posters.pdf

IDF DAIRY SUSTAINABILITY OUTLOOK FULL COLLECTION

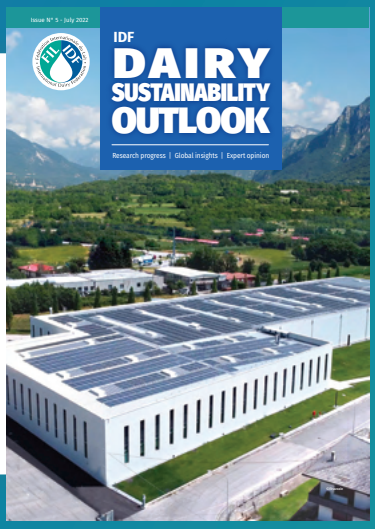


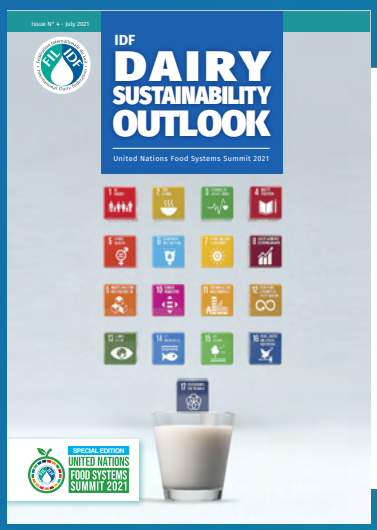
IDF DAIRY SUSTAINABILITY OUTLOOK COP27

The United Nations COP27 on Climate, which took place November 2022 in Egypt was an opportunity to discuss agriculture and food systems and how dairy climate actions can be part of the solution. The global dairy sector is fully committed to reducing its impact on GHG emissions, water and land use and at the same time optimizing the positive contribution to soil and ecosystem services. This commitment is expressed in the Dairy Declaration of Rotterdam, signed in 2016 between the IDF and the FAO. COP27 was an unparalleled opportunity to communicate the many efforts that the dairy sector is already engaged in to mitigate environmental impact and enhance Climate Action.

IDF DAIRY SUSTAINABILITY OUTLOOK #5

The fifth edition of the IDF Dairy Sustainability Outlook is bringing you once again a variety of inspiring projects and their impacts on how dairy delivers on the UN Sustainable Development Goals. The geographical diversity of these initiatives located in five continents prove that dairy's commitment to sustainability and to the UN SDG's is a global one, and that it has no boundaries or cultural barriers.



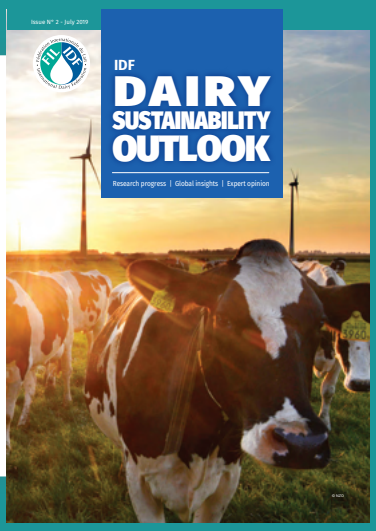


IDF DAIRY SUSTAINABILITY OUTLOOK #4

IDF Dairy Sustainability Outlook issue 4 is a special edition, dedicated to the United Nations Food Systems Summit. Guided by five Action Tracks of the Summit, case studies from the dairy community are presented, showcasing how the sector is committed to nourishing the global population with safe and nutritious foods through sustainable production systems.

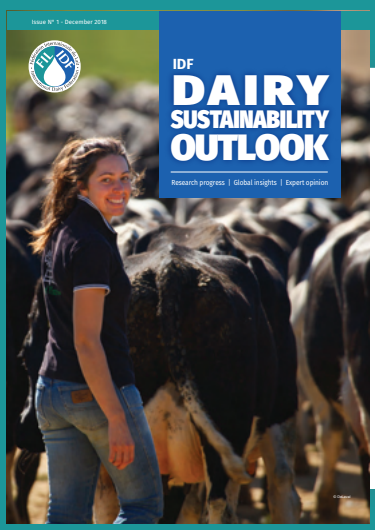
IDF DAIRY SUSTAINABILITY OUTLOOK #3

The dairy sector has been acknowledged for its leading role in sustainable practices for several years. Finding new ways to reduce impact on environment, manage resources efficiently and increase benefits to biodiversity and bioeconomy is a crucial part of the commitment of the dairy sector for continuous improvement. This third edition of The IDF Dairy Sustainability Outlook aims to provide a viewpoint from our global experts on sustainable development within the dairy sector. It offers an opportunity for those involved in the field to share ongoing activities and new measures taking place to ensure sustainable dairy through agriculture, quality education and improved milk quality, involving their contributions to SDGs.



IDF DAIRY SUSTAINABILITY OUTLOOK #2

The dairy sector has been acknowledged for its leading role in sustainable practices for several years. Finding new ways to reduce impact on environment, manage resources efficiently and increase benefits to biodiversity and bioeconomy is a crucial part of the commitment of the dairy sector for continuous improvement. This second IDF Dairy Sustainability Outlook aims to provide a viewpoint on sustainable development of relevant importance for the dairy sector.



IDF DAIRY SUSTAINABILITY OUTLOOK #1

Sustainable development is a collective effort that depends on collaboration between international organizations, governments, and the private sectors, as well as individuals. IDF recognizes the challenges and opportunities and is committed to contribute with relevant scientific information and good practices. This first International Dairy Federation (IDF) Dairy Sustainability Outlook aims at providing an outlook on sustainable development of relevant importance for the dairy sector. It offers an opportunity for those involved in the field to share ongoing projects and new research on sustainability of importance for the dairy sector and contributions to the SDGs.

HELPING NOURISH THE WORLD WITH SAFE AND SUSTAINABLE DAIRY

The IDF is the leading source of scientific and technical expertise for all stakeholders of the dairy chain. Since 1903, IDF has provided a mechanism for the dairy sector to reach global consensus on how to help feed the world with safe and sustainable dairy products.

A recognized international authority in the development of science-based standards for the dairy sector, IDF has an important role to play in ensuring the right policies, standards, practices and regulations are in place to ensure the world's dairy products are safe and sustainable.

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CELEBRATING 120 YEARS OF DAIRY EXPERTISE: PROUD TO BE DAIRY

IDF was founded in September 1903, during the first World Dairy Congress in Brussels. The original aims of the federation are much as they are today: to represent the dairy sector as a whole at international level by providing a global source of scientific expertise and knowledge in support of the development and promotion of quality milk and milk products so as to deliver consumers with nutrition, health and well-being.

For the last 120 years, IDF has contributed to the development of standards for the dairy sector and has closely collaborated with key stakeholders to share its expertise for milk and dairy products, with safe, sustainable and fair-trade practices at heart.

The creation of IDF was an act of innovation. It was so innovative that 60 years after that, the FAO and the WHO created Codex based on the standardization work that IDF had done with milk and dairy products.

120 years later, IDF is still developing dairy science, knowledge and innovation, and sharing them with the world through its publications, its awards and recognitions, and its events, like the IDF World Dairy Summit.

IDF has become a synonym of Dairy. That is why we not only say that we know Dairy. **We are Dairy.**