
# INTERNATIONAL DAIRY FEDERATION:
# Global dairy expertise since 1903

GLOBAL CHALLENGES OF TODAY: HOW TO MAINTAIN GLOBAL CONNECTIONS IN THE DAIRY INDUSTRY IN TIMES OF GLOBAL INSTABILITY.

DAIRY OLYMPICS, 22 MAY 2023

PIERCRISTIANO BRAZZALE, PRESIDENT
FIL/IDF

# TABLE OF CONTENT

- World Dairy Situation and Marketing Trends
- Milk alternatives and anti dairy narratives
- Global Key drivers
- Challenges, Opportunities
- Concluding remarks

# Global Dairy Markets & Global Marketing Trends

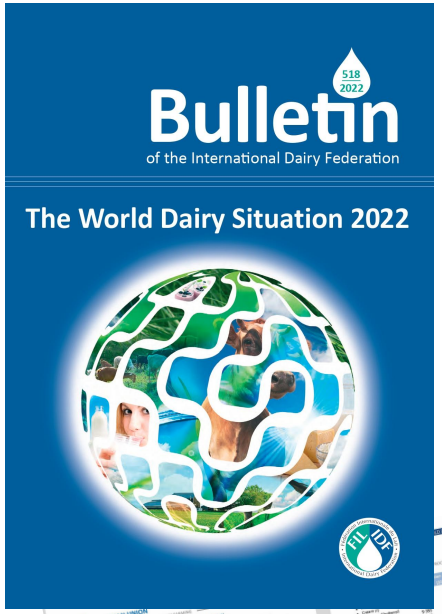
# A WORLD OF CHANGE AND UNCERTAINTIES

- Agriculture and food systems are been disrupted and challenged by a diversity of crisis:
  - climate (flood and dry)
  - public health (Covid-19 pandemic)
  - economics (inflation) and
  - geopolitics (conflict in Ukraine).

- The global dairy sector needs to be prepared to operate in this new world of uncertainty and change.
- RESILIENCE is key!

# TO A COMPREHENSIVE REPORT AND SET OF TOOLS

## PDF 243-page report



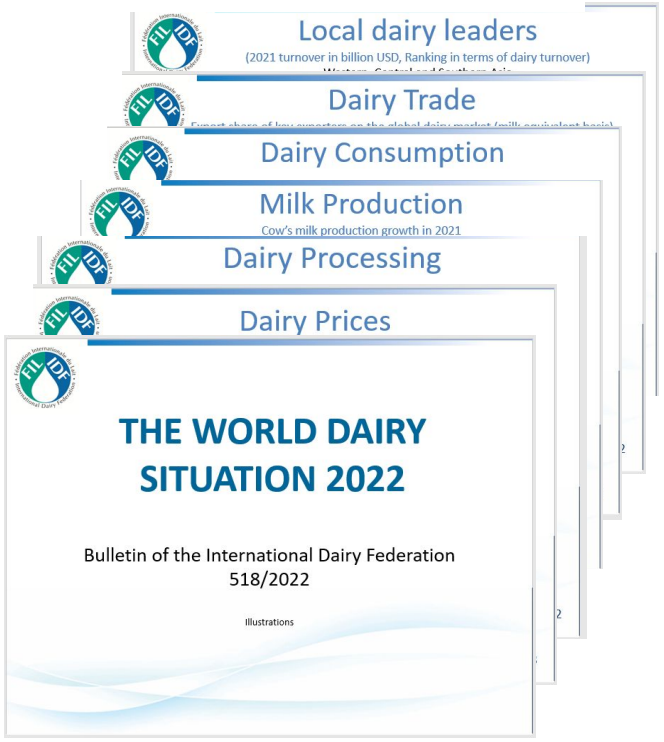

6 thematic chapters :

- Milk production
- Milk processing
- Dairy industry
- Consumption
- World dairy trade
- Prices (market and farmgate)

Over 50 Country Reports

## Slides

Graphs and Maps
(including Trade by product and Dairy leaders by region)




## XLS database

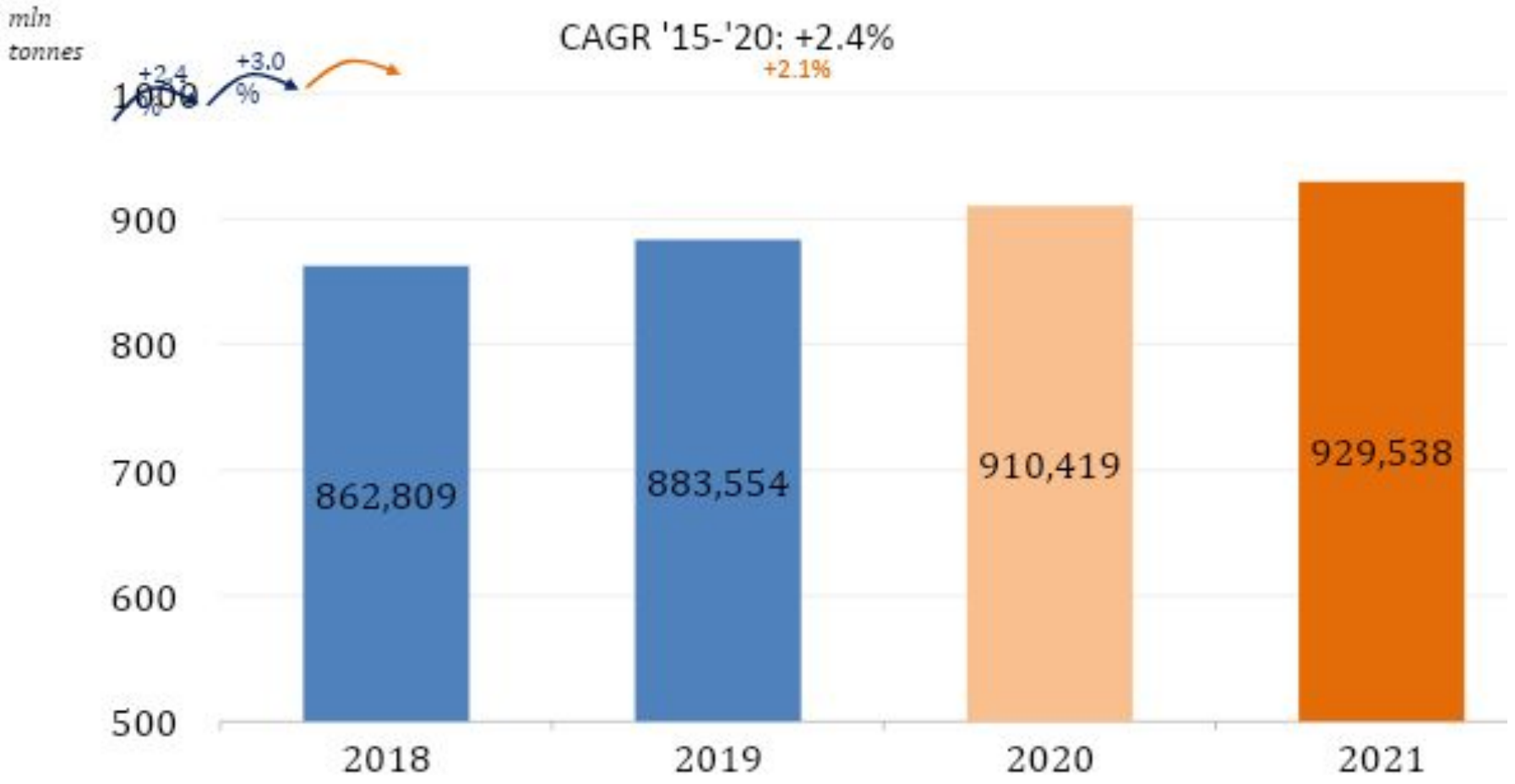
33 thematic tables

| '000 Country | 2019 | 2020 | 2021 | Annual growth '20-'21 | | CAGR '19-'21 | |
|---|---|---|---|---|---|---|---|
| **Asia** | | | | | | | |
| India | 69 434.0 | 68 722.4 | 68 722.4 | | 0.0% | - | 0.5% |
| Pakistan | 6 618.0 | 6 680.0 | 6 680.0 | | 0.0% | + | 0.5% |
| Nepal | 3 964.0 | 3 892.0 | 3 892.0 | | 0.0% | - | 0.9% |
| Turkey | 1 139.5 | 1 123.4 | 1 062.5 | - | 5.4% | - | 3.4% |
| Kazakhstan | 878.0 | 869.0 | 869.0 | | 0.0% | - | 0.5% |
| Japan | 15.0 | 14.4 | 13.8 | - | 4.2% | - | 4.1% |
| China (B) | 6.7 | 6.7 | 6.7 | | 0.0% | | 0.0% |
| Korea, Republic of | 5.0 | 4.9 | 4.7 | - | 3.8% | - | 3.0% |
| Israel | 0.7 | 0.7 | 0.7 | - | 1.6% | - | 2.6% |
| **Africa** | | | | | | | |
| Kenya | 1 944.0 | 2 000.0 | 2 000.0 | | 0.0% | + | 1.4% |
| Egypt | 651.4 | 658.4 | 658.7 | + | 0.0% | + | 0.6% |
| South Africa | 1.1 | 1.2 | 1.1 | - | 3.5% | - | 0.2% |
| Zimbabwe | 0.2 | 0.2 | 0.2 | + | 2.1% | + | 4.5% |
| **South America** | | | | | | | |
| Brazil | 1 152.0 | 1 140.6 | 1 129.7 | - | 1.0% | - | 1.0% |
| Colombia | 394.0 | 414.0 | 414.0 | | 0.0% | + | 2.5% |
| Argentina | 10.3 | 10.4 | 10.4 | + | 0.3% | + | 0.8% |
| Chile (C) | 4.5 | 4.4 | 4.4 | - | 1.1% | - | 1.1% |
| Uruguay | 3.4 | 3.3 | 3.2 | - | 3.9% | - | 3.2% |
| **EU 27** | **1 069.7** | **988.8** | **919.4** | - | **7.0%** | - | **7.3%** |
| Poland | 217.0 | 200.0 | 170.0 | - | 15.0% | - | 11.5% |
| Germany | 59.9 | 57.3 | 54.8 | - | 4.4% | - | 4.4% |
| France | 51.2 | 49.1 | 47.2 | - | 3.9% | - | 3.9% |
| Italy | 26.5 | 25.9 | 25.4 | - | 2.1% | - | 2.2% |
| Lithuania | 30.9 | 27.5 | 23.9 | - | 12.9% | - | 11.9% |
| Austria | 25.6 | 24.6 | 23.9 | - | 3.2% | - | 3.5% |
| Ireland | 18.3 | 18.3 | 18.3 | | 0.0% | | 0.0% |

**2022 Report available now!**

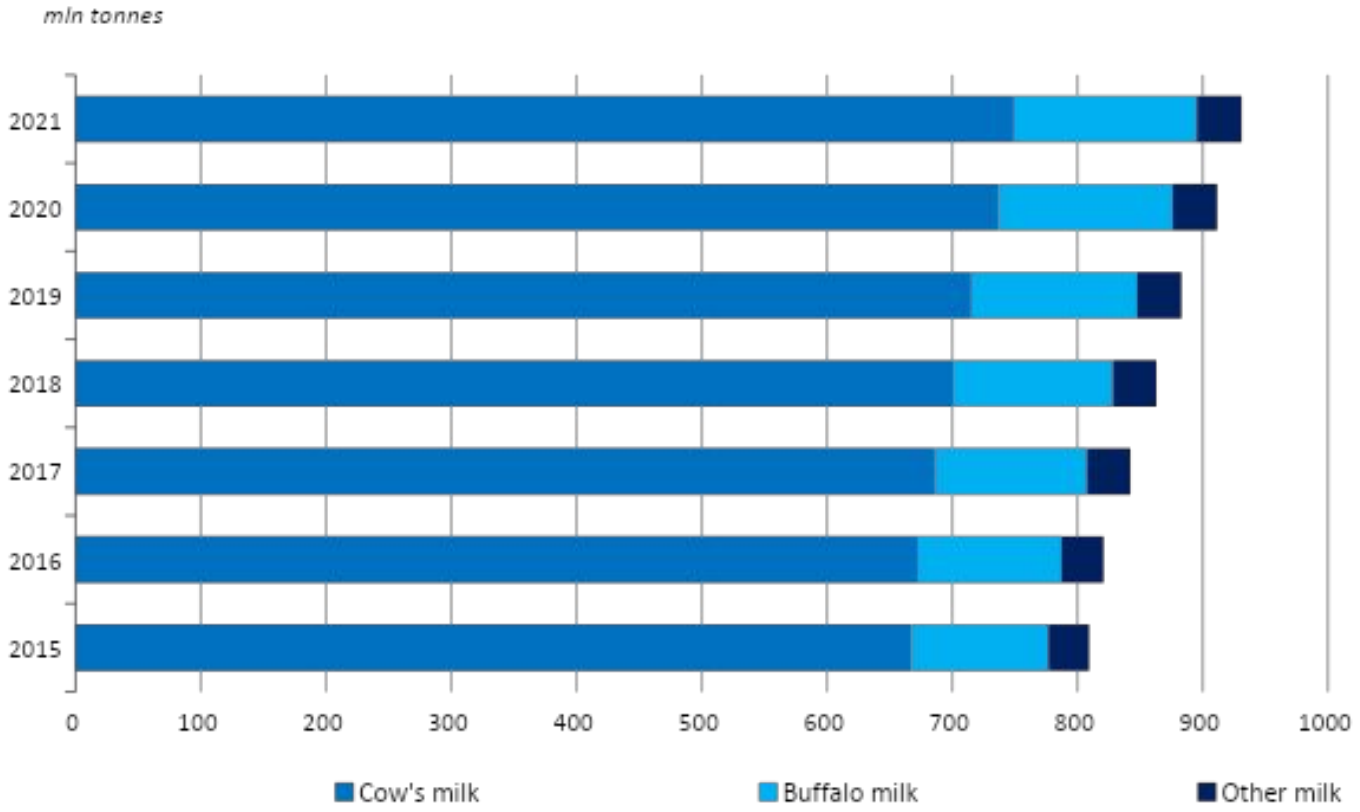
# Milk Production

World: outlook for milk production



# Milk Production

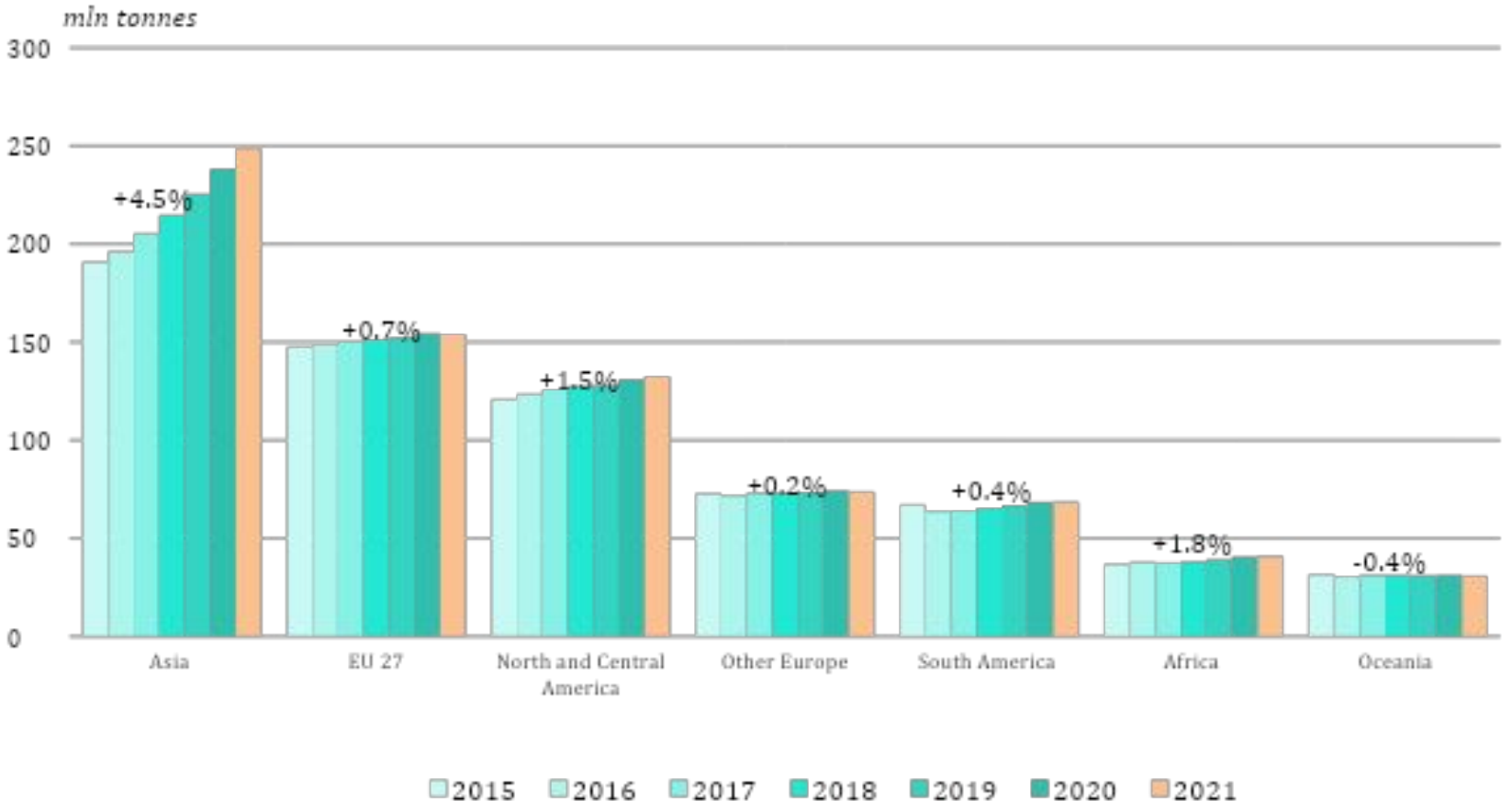
## World: milk production by species




Source : CNIEL, ZuivelNL, FAO, IDF National Committees, national statistics

# Milk Production

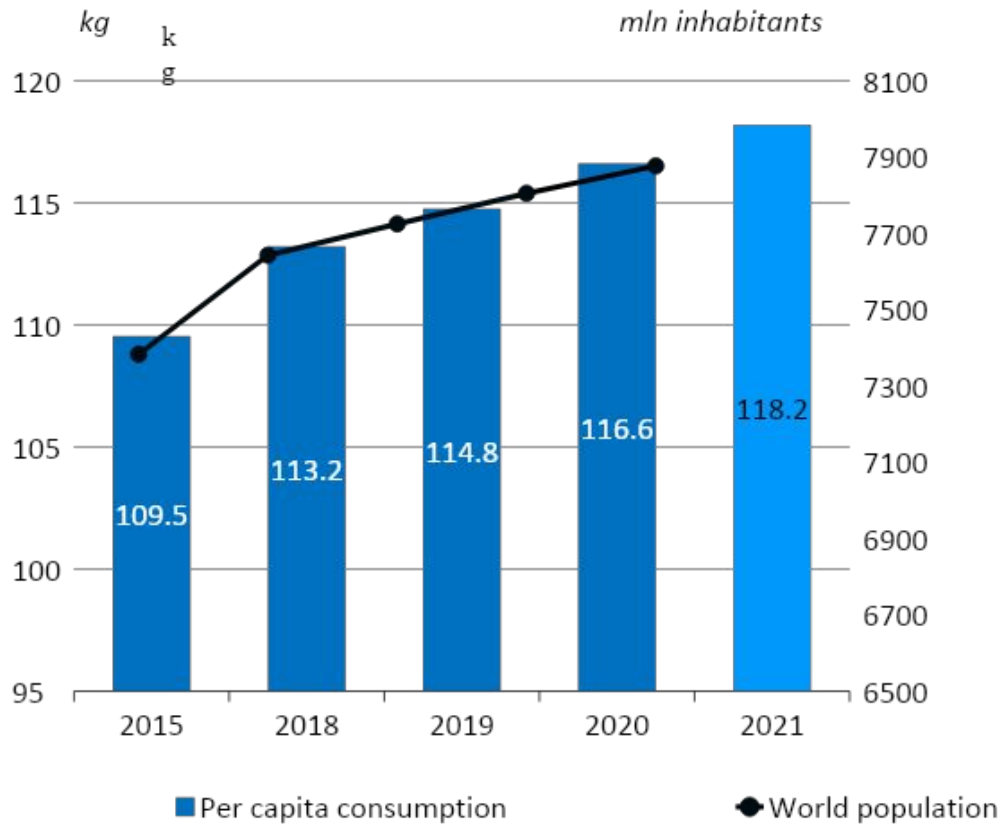
## Regional development of cow's milk production between 2015 and 2021 (CAGR '15-'21 in %)




**Source:** CNIEL, ZuivelNL, FAO, IDF National Committees, national statistics.

# Dairy Consumption

## World: per capita consumption and population




# Top 20 cow milk producers in 2021

Top 20 cow milk producers in 2021

| Country | 2021 mln tonnes | Growth 2020/21 (%) |
|---|---|---|
| EU 27 | 154.0 | -0.3% |
| Germany | 32.5 | -1.9% |
| France | 24.7 | -1.6% |
| Poland | 14.9 | 0.4% |
| Netherlands | 13.9 | -2.3% |
| Italy | 13.4 | 3.2% |
| India [B] | 110.7 | 7.0% |
| USA | 102.6 | 1.3% |
| China | 36.8 | 7.1% |
| Brazil | 35.9 | -1.7% |
| Russia | 32.3 | 0.4% |
| New Zealand | 22.0 | 0.1% |
| Türkiye | 21.4 | -1.7% |
| Pakistan [C] | 19.4 | 3.8% |
| United Kingdom | 15.7 | -0.1% |
| Mexico | 13.2 | 2.3% |
| Argentina | 11.9 | 4.0% |
| Uzbekistan | 11.2 | 2.9% |
| Canada | 10.5 | 1.7% |
| Australia [D] | 8.8 | -3.9% |
| Ukraine | 8.5 | -5.9% |
| Colombia | 8.1 | 5.8% |
| Belarus | 7.8 | 0.7% |
| Japan | 7.6 | 2.1% |
| Iran | 7.5 | 0.0% |

< 0% | 1 to 3%
0 to 1% | > 3%

# Local dairy leaders

## Top 25 World dairy leaders[A] (dairy turnover in bln USD)

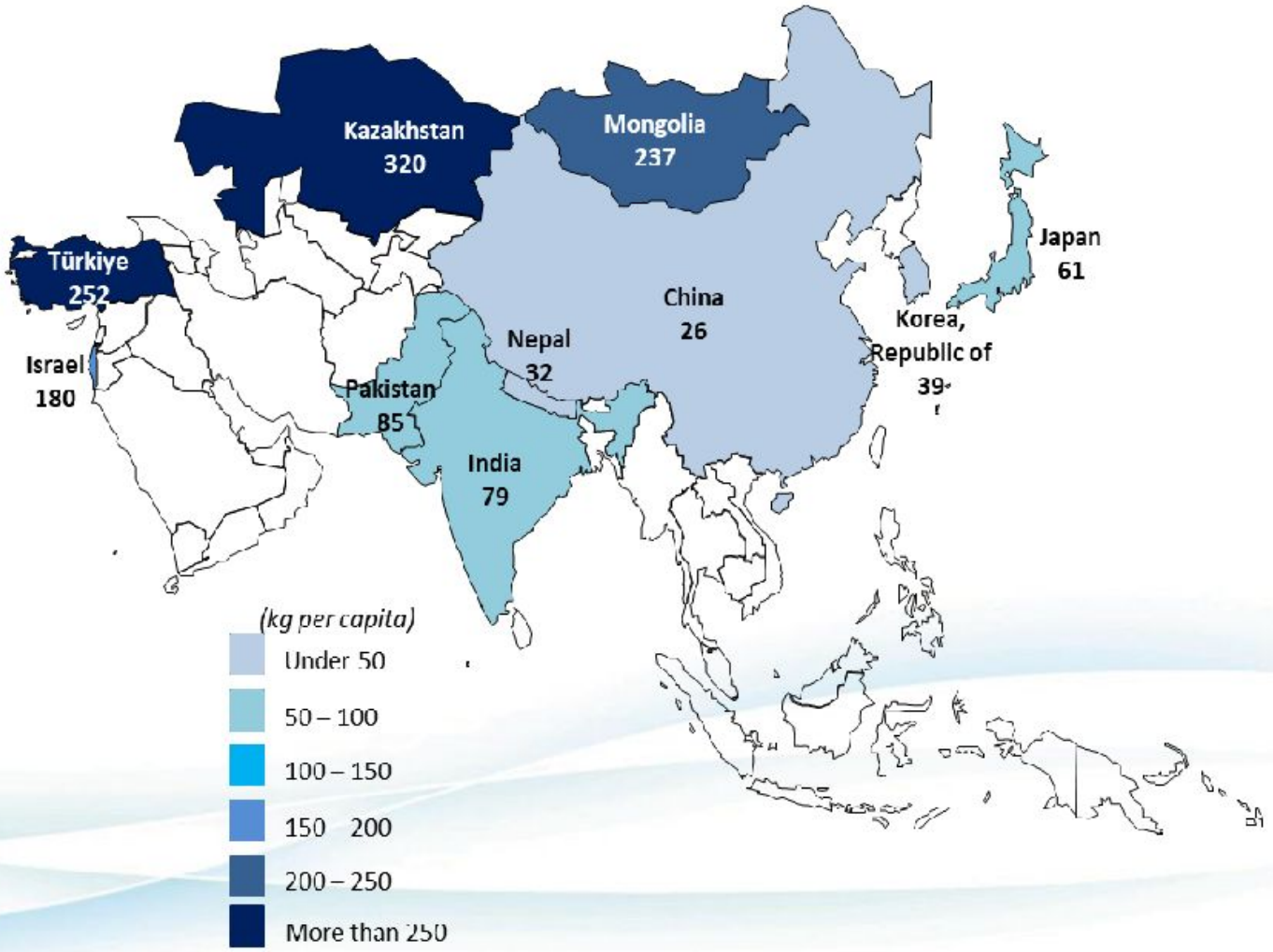
| | Company | Country | 2019 | 2020 | 2021 | Growth 2020/21 (%) |
|---|---|---|---|---|---|---|
| 1 | Lactalis | FR | 22.4 | 24.1 | 26.0 | +8% |
| 2 | DFA | US | 15.9 | 17.8 | 19.3 | +8% |
| 3 | Yili | CN | 13.1 | 14.0 | 17.1 | +22% |
| 4 | Danone [B], [C] | FR | 14.7 | 14.6 | 15.5 | +6% |
| 5 | Fonterra [D] | NZ | 13.5 | 13.3 | 14.8 | +11% |
| 6 | Mengniu | CN | 11.4 | 11.0 | 13.7 | +24% |
| 7 | FrieslandCampina | NL | 12.6 | 12.7 | 13.6 | +7% |
| 8 | Arla Foods | DK | 11.8 | 12.1 | 13.2 | +10% |
| 9 | Saputo | CA | 11.2 | 10.8 | 12.9 | +19% |
| 10 | Nestlé [B] | CH | 13.4 | 11.8 | 11.7 | -1% |
| 11 | Savencia | FR | 5.6 | 5.9 | 6.6 | +13% |
| 12 | DMK | DE | 6.5 | 6.4 | 6.5 | +2% |
| 13 | Amul [E] | IN | 5.4 | 5.3 | 6.2 | +18% |
| 14 | Agropur [F] | CA | 5.5 | 5.7 | 5.8 | +1% |
| 15 | Sodiaal | FR | 5.7 | 5.5 | 5.5 | +0% |
| 16 | Müller [e] | DE | 4.9 | 5.1 | 5.1 | - |
| 17 | Froneri International | GB | 3.0 | 4.5 | 5.0 | +11% |
| 18 | Schreiber [e] | US | 5.0 | 5.0 | 5.0 | - |
| 19 | Glanbia | IE | 4.3 | 4.4 | 5.0 | +14% |
| 20 | Conagra Foods [e] | US | 4.6 | 4.6 | 4.6 | - |
| 21 | Meiji Dairies [E] | JP | 4.6 | 5.1 | 4.6 | -10% |
| 22 | Bright Dairy | CN | 3.3 | 3.7 | 4.5 | +24% |
| 23 | Morinaga Milk Industry [E] | JP | 5.3 | 5.5 | 4.5 | -19% |
| 24 | Emmi | CH | 3.5 | 4.0 | 4.3 | +8% |
| 25 | Megmik Snow Brand [E], [G] | JP | 4.8 | 5.1 | 4.2 | -16% |

Source : CNIEL, company reports, international press

(A) Kerry, Unilever, PepsiCo and Mondelez not ranked.
(B) Infant formula excluded.
(C) Including plant-based substitutes from 2017 onwards.
(D) Year finishing in July.
(E) Year finishing in March of the following year.
(F) Year finishing in October.
(G) Including desserts and beverages.
(e) Estimate.

# Cow's milk production in Asia 2021

(expressed in kg per capita)



# Reports by country: Kazakhstan

Asia

## KAZAKHSTAN

### DAIRY FARMING

#### Key figures

| | |
|---|---|
| • Cow's milk production (x 1 000 tonnes) | 6 198 |
| % of worldwide milk production | 0.8% |
| • % cow's milk delivered | 25% |
| • Number of dairy cows (x 1 000 head) (A) | 2 540 |
| • Number of dairy farms (A) | 869 000 |

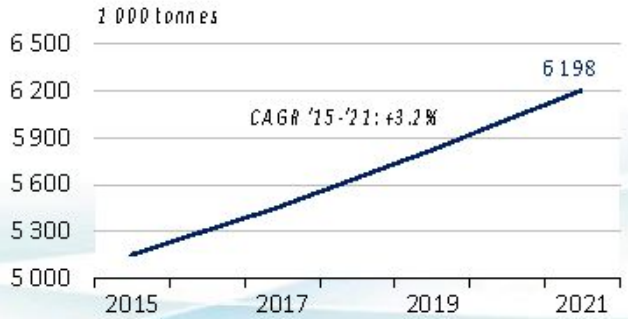
(A) Year 2020.

#### Cow's milk prices (B)


(B) Real fat and protein contents.

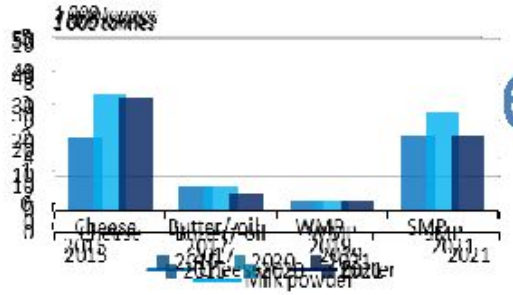
### PROCESSING INDUSTRY

#### Cow's milk production



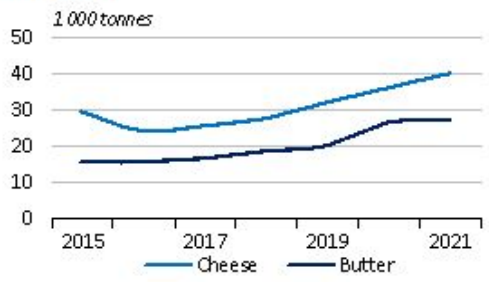

#### Main processors

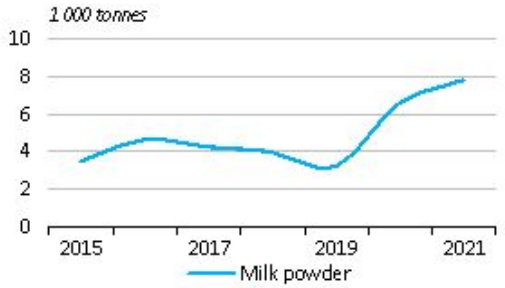
| | |
|---|---|
| • Food Master | www.foodmaster.kz |
| • Ecomilk | - |
| • Natige Milk | www.natige.kz |
| • Agroproduct | - |
| • Magnitka | www.magnitka.kz |



# eports by country: Kazakhstan

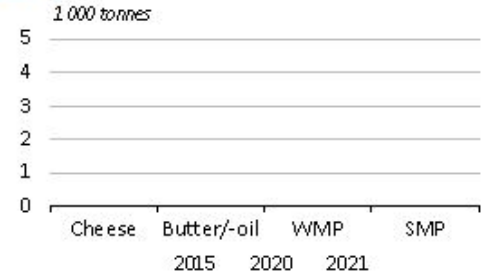
## Production



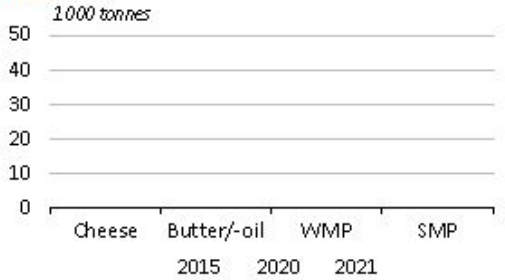




## TRADE

### Export




### Import




## CONSUMPTION

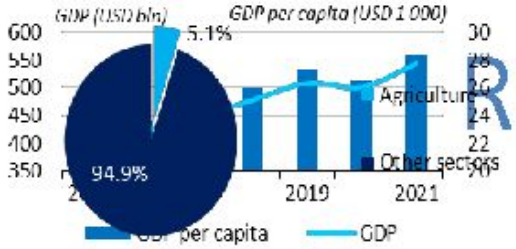
### Population

| | 2015 | 2021 |
|---|---|---|
| • Total (mln inhabitants) | 17.8 | 19.2 |
| rural (% of total) | 42.8 | 42.2 |

### Consumption

| | x1 000 tonnes | kg per capita |
|---|---|---|
| • Milk (C) | 603 | 31.4 |
| • Butter | 28 | 1.5 |
| • Cheese | 69 | 3.6 |

(C) Including cream




# Reports by country: Kazakhstan

## PROCESSING AND TRADE

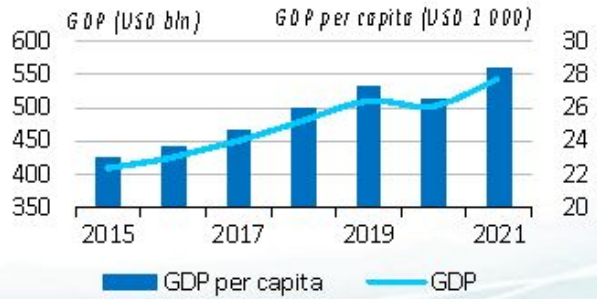
**Summary** (see general remarks)

| Volume (x 1 000 tonnes) | Production 2021 | Production (2020=100) | Import 2021 | Import (2020=100) | Export 2021 | Export (2020=100) |
|---|---|---|---|---|---|---|
| • Liquid milk and cream | 612 | 99 | 24 | 85 | 32 | 86 |
| • Fermented products | 239 | 105 | 43 | 107 | 15 | 118 |
| • Butter and butteroil (D) | 27 | 103 | 5 | 75 | 5 | 301 |
| • Cheese | 40 | 110 | 33 | 96 | 4 | 111 |
| • Milk powder | 8 | 119 | 25 | 79 | 1 | 55 |
| - Whole milk powder | - | - | 3 | 102 | 0 | 206 |
| - Skimmed milk powder | - | - | 22 | 77 | 0 | 27 |

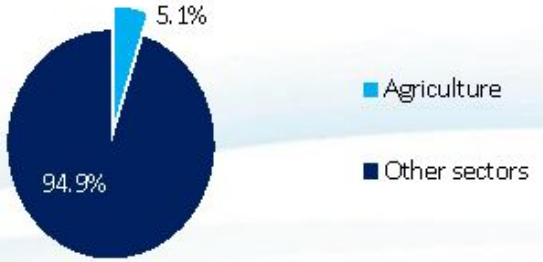
(D) Production: butter only.

## ECONOMY

### GDP (Purchasing power parity)



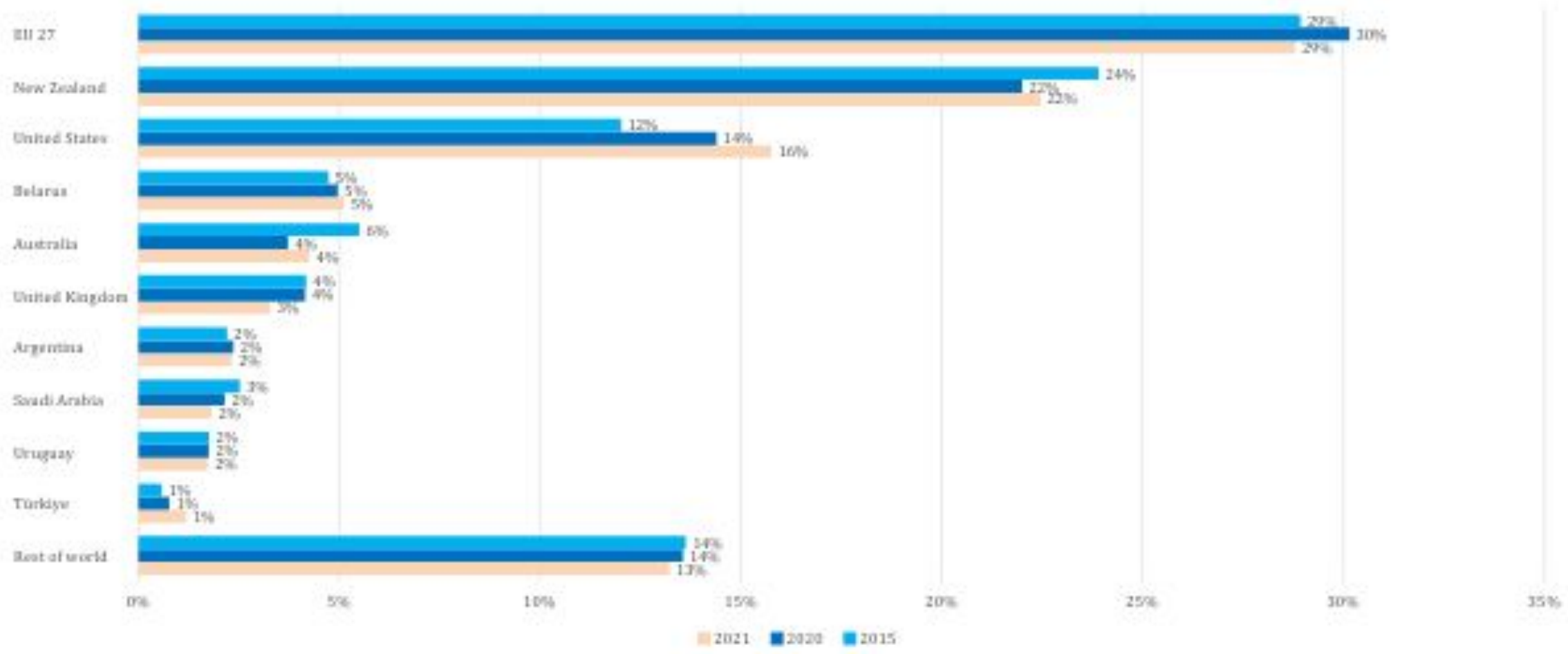

### GDP Sector Composition




## KEY DEVELOPMENTS

# Dairy Trade

Export share of key exporters on the global dairy market (milk equivalent basis)



# IDF GLOBAL MARKETING TRENDS

## Covid-19 and War in Ukraine
## Understanding changes in dairy consumption in the world

Bulletin
522
2023
of the International Dairy Federation

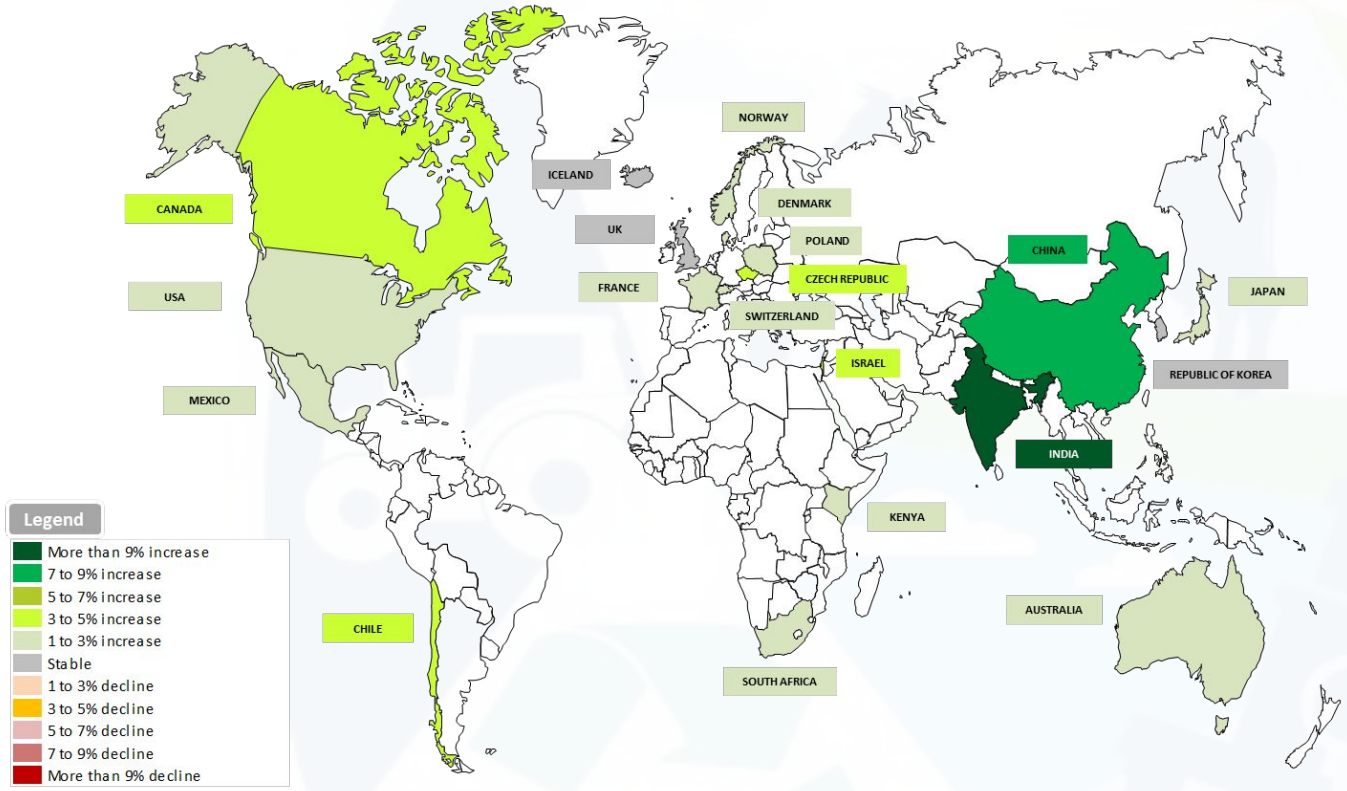
# Global Marketing Trends

## Understanding changes in dairy consumption around the world

# Market evolution

**How did your country's food market change between 2018 and 2019**
(food and beverage retail, online shopping and convenient service total sales / household expenditures in value)?

## GLOBAL FOOD MARKET




*Number of respondents: 20*

# **Consumers expectations have changed** a lot during the last 2 years

a return of emotional and pleasure dimensions, cooking at home and an acceleration of local product demand,
a development of online delivery and collection purchases

| | 2019 | 2020 | 2021 |
|---|---|---|---|
| DRIVERS | ▪ Consumers expectations and habits<br>2. Healthy lifestyles concerns<br>3. Demand for convenience<br>4. Change in purchasing habits<br>5. Image of pleasure<br>6. Demand for meal kit<br>▪ Economic situation<br>▪ Instore and Online availability<br>▪ Natural evolution of population | ▪ Consumers expectations and habits<br>2. Evolution of home meals<br>3. Change in purchasing habits<br>4. Change in eating habits<br>5. Healthy lifestyle concerns<br>6. Image of pleasure<br>7. Ease of use in cooking<br>▪ Online availability | ▪ Consumers expectations and habits<br>2. Change in purchasing habits<br>3. Evolution of home meals<br>4. Local food concerns<br>5. Healthy lifestyle concerns<br>▪ Online availability |
| BARRIERS | **Consumers expectations and habits**<br>• Change in eating habits | **Economic situation**<br>**Household income**<br>**Supply chain disruptions**<br>**Consumers expectations and habits** (a shift of dairy products category) | **Consumers expectations and habits**<br>• Change in eating and purchasing habits<br>• Demand for plant-based alternative products<br>**Economic situation** (household income and inflation) |

# **3 major issues** for the future of dairy markets

Have the issues for milk/dairy products below evolved in the recent years in your country?

### France

We are witnessing a shift in health concerns towards animal welfare, living conditions of animals and environment.

### Czech republic

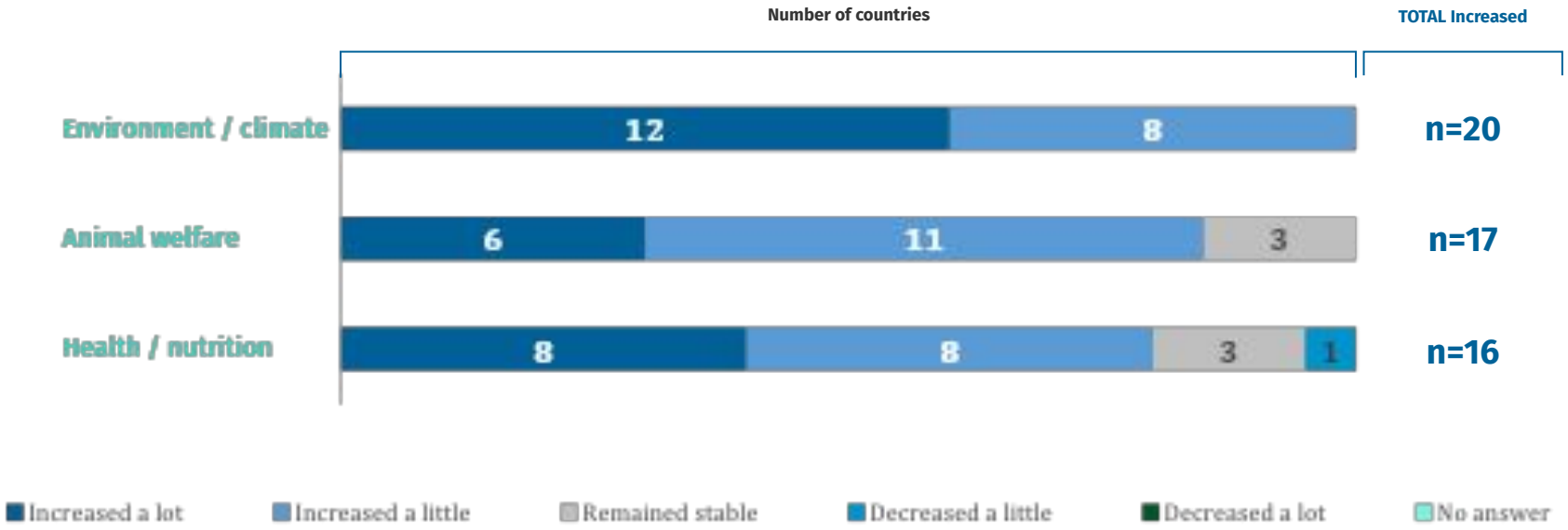
Agitation of milk opponents and proponents of the vegan diet; incorrect marketing communication of plant-based products-producers.

### UK

Highly emotive discourse around animal welfare issues including the fate of bull calves, cow-calf separation ant the environmental damage caused by farming.

### Japan

Negative health effects such as lactose intolerance and non-infectious diseases of milk. Environmental impact of the dairy industry and animal welfare issues.




*Number of respondents: 20*

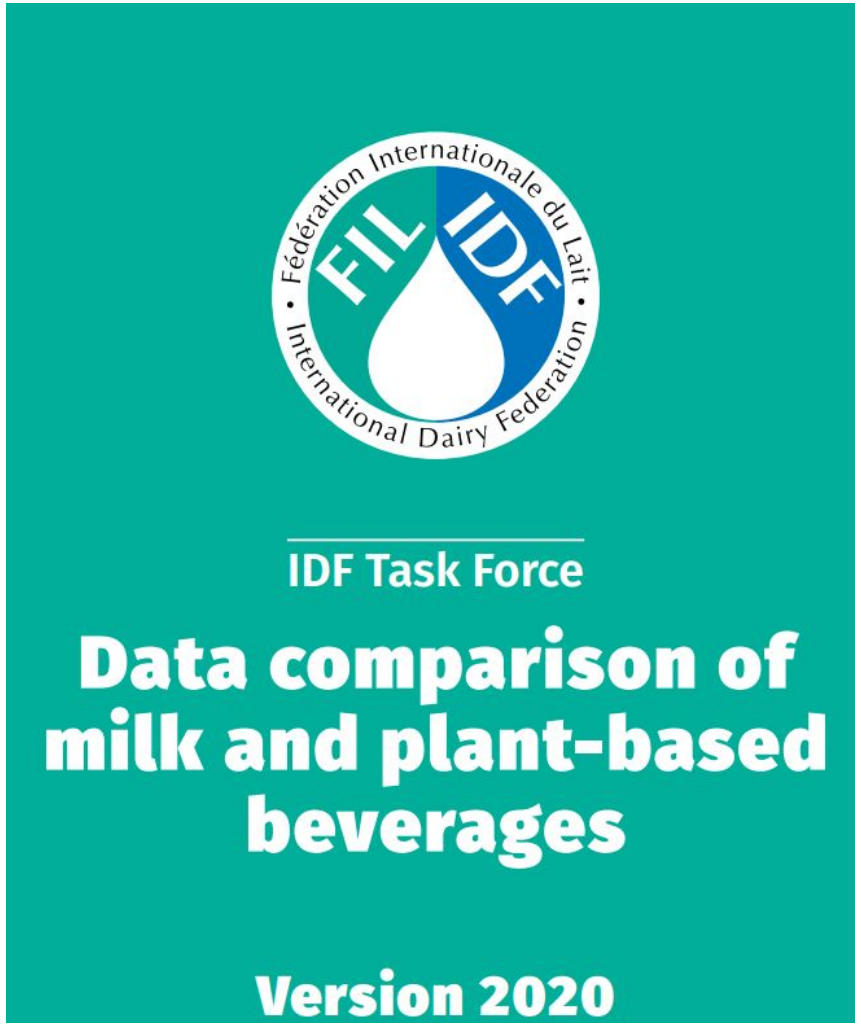
# **Uncertainties affecting dairy products** in the future

- **Climate crisis: weather affecting dairy production**
  (heat stress, water stress, decrease in fodder production, increase in input costs...)
- **Geopolitical and economic instability,**
  a source of market volatility (high risks in certain countries, protective customs barriers, etc.)
- **Impact of agro-ecology policy**
- **Employment** and **workforce disruptions**
- **Increase in vegetarianism or vegan diets** and higher consumption of plant-based drinks and dairy product substitutes

# Milk alternatives and anti dairy narratives

# Sustainable diet, the commitment of IDF

## Sustainable: comparison between milk and vegetable drinks




### 1. NUTRITION AND HEALTH

**KEY FINDINGS**

The milk matrix provides a naturally nutrient-rich package in comparison to formulated plant-based beverages (PBB).

Studies show milk has many health benefits. However, there is currently little scientific evidence supporting the health benefits of PBB per se

PBB can be a consumer choice, however, are not nutritionally equivalent to milk and therefore cannot be considered as an alternative in terms of nutrition.

### 2. ENVIRONMENT

**KEY FINDINGS**

Reducing the environmental impacts of the food system is a lot more complex than just plant versus animal products. The food system needs a multidimensional approach, as plants and animals work best as an integrated system.

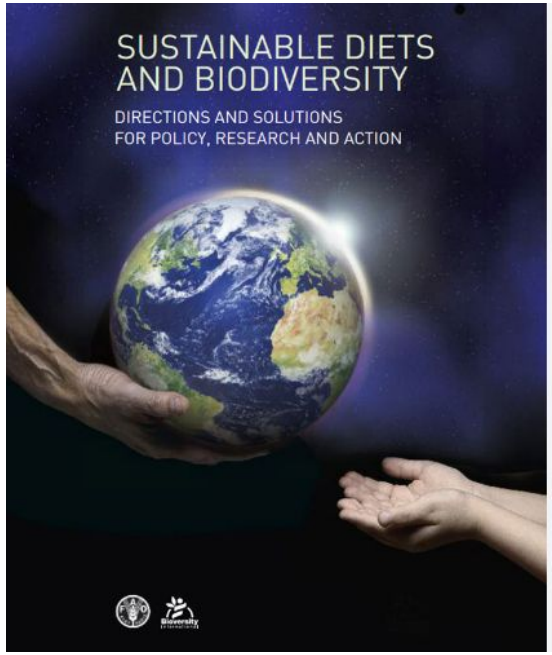
Environmental impacts of PBB may generally look better per kg of product, but milk could perform better when the impacts are expressed per nutritional value.

The dairy sector provides a portfolio of benefits (biodiversity, biomass, rural vitality, traditional landscape, grassland…) compared to mono-culture plant production.

There is a lack of scientific evidence supporting the environmental benefits of various PBB. Very few scientific peer reviewed articles have been published on their impacts.

Dairy has a better knowledge of its life cycle impact from production to utilization and higher waste processing.

# FAO vision of a sustainable diet




The key passage:
From one
sustainable diet
to one
healthy and sustainable diet


## FAO, 2010:
## DEFINITION OF SUSTAINABLE DIETS

*Sustainable Diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources.*

## FAO – WHO, 2019
## AIMS OF SUSTAINABLE **HEALTHY** DIETS

*Sustainable Healthy Diets are dietary patterns that promote all dimensions of individuals' health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable. The aims of Sustainable Healthy Diets are to achieve optimal growth and development of all individuals and support functioning and physical, mental, and social wellbeing at all life stages for present and future generations;*

FAO and WHO have introduced the «concept of healthy»

# The 4 pillars of a healthy and sustainable diet

**1. NUTRITION (nutritionally adequate)**

**2. ENVIRONMENT (with the lowest possible environmental impact)**

**3. ECONOMY (affordable)**

Figure 1. The 4 principal dimensions of sustainable diets


*Peters S., Voeding Magazine 2 - 2019*

**4. CULTURE (culturally acceptable, respecting the habits and traditions of the different populations)**

# Definition of Sustainable Diet according to FAO 2019

A sustainable diet is a healthy and nutritionally adequate diet, convenient, accessible and culturally acceptable for all, with an environmental impact that is as low as possible

↓ requires to

identify FUNCTIONAL UNITS (units of expression of the result) that take into account the nutritional value of the food

# Healthy and sustainable diet: the commitment of IDF

IDF's response to the FAO report

2023

POSITION PAPER

## IDF position on FAO report on integration of environment and nutrition in life cycle assessment of food items

IDF supports the report of the **FAO Integration of environment and nutrition in life cycle assessment of food items: opportunities and challenges** (1); stating that when different food products are compared for their environmental impact consideration should be given to their nutritional value.

In late 2021, the FAO published the report which is the outcome of a consensus building project aiming to agree on best practices for environmental and nutritional life cycle assessment (nLCA) methodology of food items, as well as identify future research needed.

It is abundantly clear that comparing LCA data of foods on a simple mass or volume-based i.e., kg functional unit is not feasible and will lead to highly controversial outcomes as an incomplete picture of a food contribution to sustainable diets is provided (single domain). While the report concludes that the nutrition and health domain should be considered, an nLCA study should report the quantities of as many essential nutrients as possible and aim to provide information on the nutritional quality and/or health impacts in addition to nutrient quantities. However, the road towards a best practice for nLCAs in terms of which (complimentary) functional units or impact categories should be used, remains open.

The primary intent of the LCA is not to set public health policy. However, if it is used for this purpose then the choice of an appropriate functional unit should take into account the nutritional quality and or health impact of the food, as outlined in the FAO report 'Integration of environment and nutrition in life cycle assessment of food items: opportunities and challenges'.

# Matrix effect, the commitment of IDF - SCNH

## 023 Nutrition and Health Conference: BEYOND NUTRIENTS: THE HEALTH EFFECTS OF FOODS


**Reserve your place at the IDF Nutrition and Health Symposium 2023!**

**Virtual event - Free to attend**

**Date: 3 May 2023**

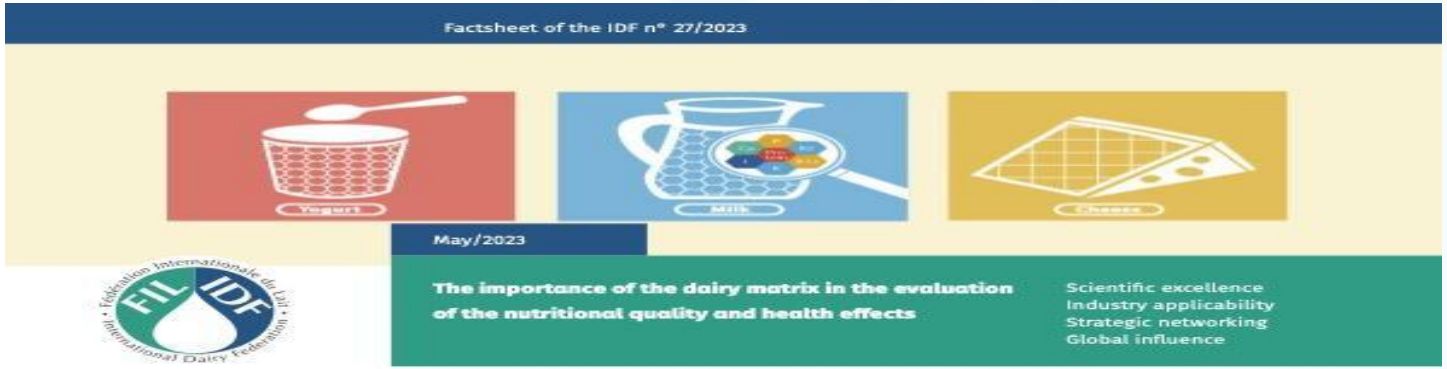
**Two sessions with the same presentations:**
**Session 1: 7h00 am - 9h30 am CEST**
**Session 2: 16h00 pm - 18h30 pm CEST**

=506cf1f668

# Matrix effect, the commitment of FIL-IDF
# NEW FACTSHEET

**Main topics**

**The importance of the dairy matrix in the evaluation of the nutritional quality and health effects**
**Definitions of dairy matrix and dairy matrix health effects (proposal)**
**The dairy matrix**
**The dairy matrix health effects**
**Conclusions**
**References**




Introduction

Nutrition research has traditionally focused on identifying the specific associations through which single nutrients impact health outcomes - for example, calcium and bone health, protein and skeletal muscle and, saturated fat and heart disease. The approach to studying individual nutrients in relation to health has been described as a 'reductionist' perspective (Messina et al., 2001). However, the focus of nutrition research has shifted to examine the association of whole foods and dietary patterns with health (Mozaffarian et al., 2018). This includes recognizing not only that foods have numerous nutritional attributes but also that the effect of one attribute is likely dependent on the combination of nutritional components contained in the whole food and the resulting structure. This focus shift is also based on the fact that people consume nutrients as part of a food, and not in isolation. Moreover, foods are usually also eaten as part of a meal. Based on



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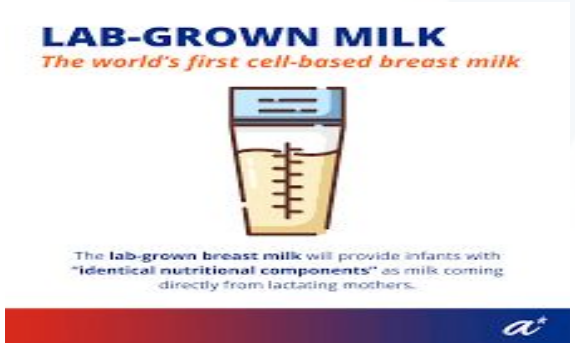

# HOW CAN IDF ADDRESS LAB MILK?

Statements of facts:

- IDF recognizes the importance of new technologies for the dairy sector.
- IDF is concerned by the positioning that lab created milk is equivalent or better than milk.
- Milk is a unique and complex pack of natural nutrients.
- Even if the formulation of such products was compositionally close to that of dairy, there is no evidence that the bioavailability of nutrients would be equivalent or health outcomes.
- Milk and dairy foods are available and accessible and affordable in most countries around the world from cities to remote communities. Dairy contributes to livelihood.

CODEX ALIMENTARIUS COMMISSION

Food and Agriculture Organization of the United Nations

World Health Organization

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Agenda Item 4

CX/EXEC 22/83/4
October 2022

**JOINT FAO/WHO FOOD STANDARDS PROGRAMME**

**EXECUTIVE COMMITTEE OF THE CODEX ALIMENTARIUS COMMISSION**

**Eighty-third Session**

**14 - 18 November 2022**

# CCEXEC SUB-COMMITTEE ON NEW FOOD SOURCES AND PRODUCTION SYSTEMS – REPORT

*(Prepared by the Chairperson of the sub-committee)*

## Introduction

1. Since FAO and WHO first introduced new food sources and production systems (NFPS) as an issue that needed attention, Codex has held discussions and collected information on several occasions. Discussions began at 81st session of the Executive Committee of the Codex Alimentarius Commission (CCEXEC81), which established a CCEXEC sub-committee to consider this issue further[1]. CAC44 subsequently considered the issue, supported the need for Codex to be prepared to address cross-cutting, overarching and emerging issues, and requested the Codex Secretariat to issue a Circular Letter[2] (CL) to collect information from Members and observers on ongoing developments related to NFPS. The CCEXEC sub-committee supported the development of the CL and in addition a letter was sent to all Codex Members and observers inviting informal conversations with the Chairperson and Vice-Chairpersons of the Commission to share views on this issue. A detailed overview of this first phase of the work was presented to CCEXEC82as an interim report of the sub-committee[3].

## Overview of discussions at CCEXEC82 and ongoing work of the sub-committee[4]

2. CCEXEC82 considered the interim report of the sub-committee and underlined the complexity of this area. CCEXEC Members expressed different views about the pathway forward, including the need for sufficient time to consider the issues, and the need for specific expertise, or other working mechanisms to engage with the wider Codex membership (e.g. the establishment of an electronic working group (EWG) of the Commission). CCEXEC82 recognised that this ongoing CCEXEC work on NFPS did not preclude Codex committees from undertaking new work on such emerging issues falling within their respective mandates, using existing Codex working mechanisms. In noting the interim report of the sub-committee, the comments put forth during the debate and the extensive amount of data received in response to the CL, CCEXEC82 agreed that the subcommittee should continue its stepwise consideration of the issues, informed by an analysis of the information collected through the CL, CRDs and report of CCEXEC82.

3. With the support of FAO, a summary of the replies to the CLs was subsequently commissioned and is included as Appendix 2 to this report. This was considered further by an informal virtual meeting of the sub-committee.

4. Based on the summary of the replies from the CL, which allowed for a better understanding of the breadth of information about NFPS that was collected through the CL and the informal discussions, a virtual meeting of the sub-committee considered the potential way forward. Members recognized that NFPS presented both a

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[1] REP21/EXEC 22/82/4, para 110

[2] The CL received replies from 25 Members and 10 Observers. Informal conversations were held with the six Regional Coordinators, CCAFRICA (Uganda), CCASIA (China), CCEURO (Kazakhstan), CCLAC (Ecuador), CCNASWP (Fiji) and CCNE (Saudi Arabia) and with the European Union, FAO, the Good Food Institute (GFI), International Dairy Federation (IDF), Germany and the United States of America

[3] CX/EXEC 22/82/4

[4] REP22/EXEC1, paragraphs 70-85

Food and Agriculture Organization of the United Nations

World Health Organization

# FOOD SAFETY ASPECTS OF CELL-BASED FOOD

CARBON FOOTPRINTING | Open Access | Published: 26 August 2022

# Comparison of carbon footprint and water scarcity footprint of milk protein produced by cellular agriculture and the dairy industry

Katri Behm, Marja Nappa, Nina Aro, Alan Welman, Stewart Ledgard, Marjut Suomalainen & Jeremy Hill

*The International Journal of Life Cycle Assessment* **27**, 1017–1034 (2022) | Cite this article



## Abstract

### Purpose

This paper studies the carbon footprint and water scarcity footprint (WSF) of a milk protein, beta-lactoglobulin, produced by cellular agriculture and compares this to extracted dairy protein from milk. The calculations of the microbially produced proteins were based on a model of a hypothetical industrial-scale facility. The purpose of the study is to examine the role relative to dairy of microbially produced milk proteins in meeting future demand for more sustainably produced protein of high nutritional quality.

DIVE BRIEF

# Beyond Meat sued by investors who claim they were misled

Published May 15, 2023

Megan Poinski
Senior Reporter


*Courtesy of Beyond Meat*

**Dive Brief:**

- Beyond Meat was sued by investors last week who claimed the publicly



MOST POPULAR


Beyond Meat sued by investors who claim they were misled


CRISPR-edited Conscious Greens officially debut in foodservice



## Environmental impacts of cultured meat: A cradle-to-gate life cycle assessment

Derrick Risner[1], Yoonbin Kim[1], Cuong Nguyen[2], Justin B. Siegel[3,4,5,6], Edward S. Spang[1,6]

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[2]Division of Agriculture and Natural Resources, University of California, Holtville, CA 92250, USA

[3] Genome Center, University of California, Davis, CA 95616, USA

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*Correspondence: esspang@ucdavis.edu; Tel.: +1-530-754-544

### Abstract

Interest in animal cell-based meat (ACBM) or cultured meat as a viable environmentally conscious replacement for livestock production has been increasing, however a life cycle assessment for the current production methods of ACBM has not been conducted. Currently, ACBM products are being produced at a small scale and at an economic loss, however ACBM companies are intending to industrialize and scale-up production. This study assesses the potential environmental impact of near term ACBM production. Updated findings from recent technoeconomic assessments (TEAs) of ACBM and a life cycle assessment of Essential 8™ were utilized to perform a life cycle assessment of near-term ACBM production. A scenario analysis was conducted utilizing the metabolic requirements examined in the TEAs of ACBM and a purification factor from the Essential 8™ life cycle assessment was utilized to account for growth medium component processing. The results indicate that the environmental impact of near-term ACBM production is likely to be orders of magnitude higher than median beef production if a highly refined growth medium is utilized for ACBM production.

### Introduction

Livestock production is an integral component of the global food system, providing staple proteins (milk, eggs, and meat) consumed worldwide, contributing to crop productivity via utilization of manure as fertilizer, and providing critical nutrition and income to underprivileged households in low to middle income countries (Gilbert et al., 2018; Robinson et al., 2011). Global meat production has increased from 70.57 million tonnes in 1961 to 337.18 million tonnes in 2020, though the consumption of different meat sources is highly regionalized (FOA, 2022; Ritchie et al., 2019). In 2020, beef and buffalo meat accounted for ~22% of global meat production, and poultry and pork accounted for ~39% and ~32% of worldwide meat production, respectively (FOA, 2022; Ritchie et al., 2019).

BEEF CENTRAL

## Cell-based meat could emit 25 times more than retail beef, study

**Beef Central, 15/05/2023**

RESEARCHERS from a renowned university in the United States say traditional meat production is likely to have less of an environmental footprint than producing meat in a lab.

The group from University of California Davis recently did life-cycle assessments on lab-grown meat and compared it to the warming potential of conventional meat. It has released the findings of the report, with the peer-review still to come.

Lab-grown meat, or animal cell-based meat, has been tipped as a more environmentally friendly alternative way of producing protein. But previous Beef Central articles have raised doubts about its viability.

The results have shown that its environmental impact could be four-to-25 times greater than retail beef. The study focused on energy used to grow the animal cells and says it was likely to show the minimal impact of lab-grown meat.

"We also acknowledge that our analysis may be viewed as minimum environmental impacts due to several factors including incomplete datasets," the study says.

"The exclusion of energy and materials required to scale the ACBM industry and exclusion of the energy and materials needed to scale industries which would support ACBM production."

### Measuring a burgeoning industry

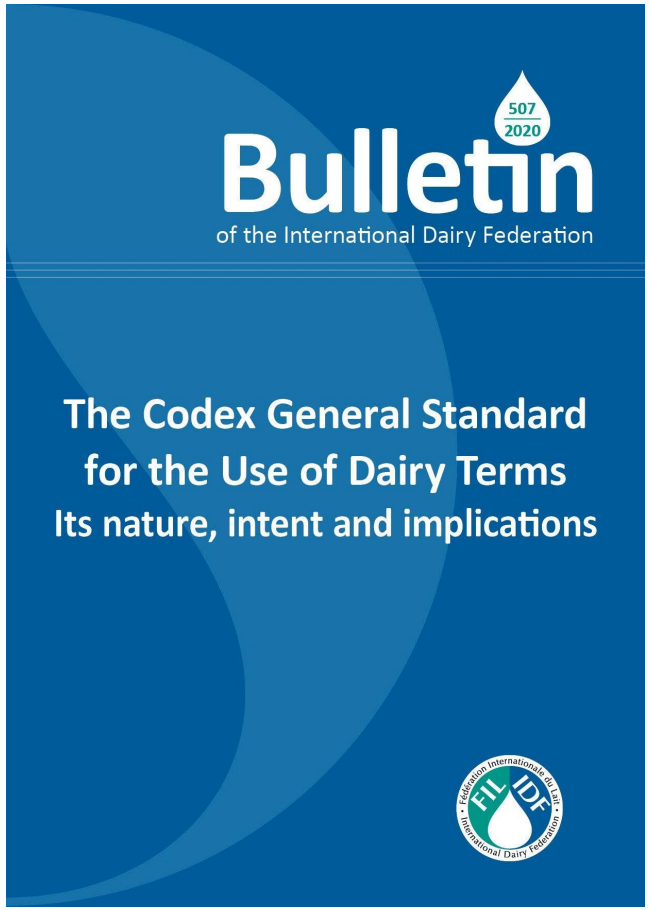
One of the main limiting factors to the study was the small-scale nature of the cell-based meat industry. The study was based on impact of a scaled-up cell-based meat industry.

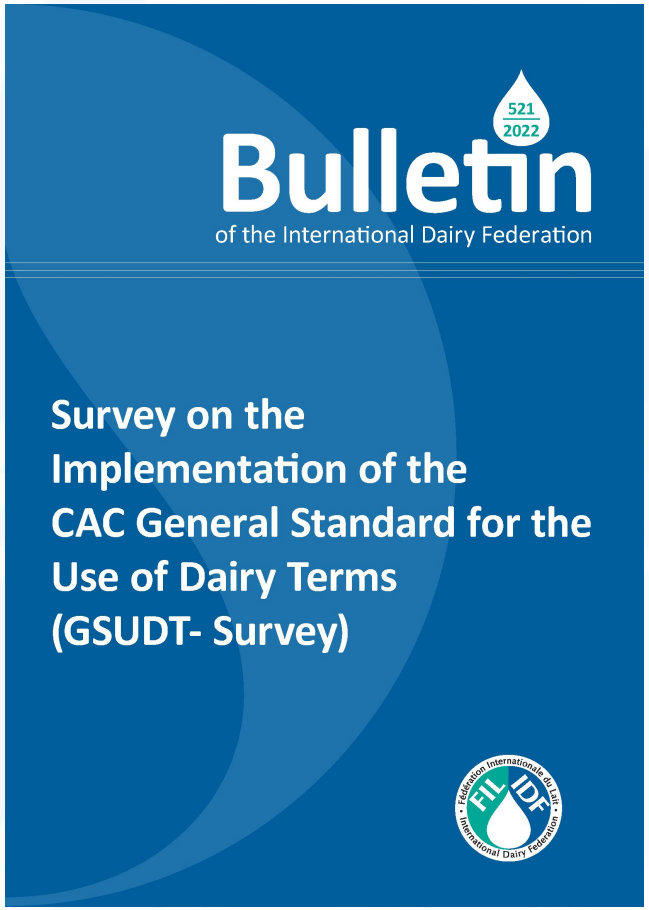
"Currently, ACBM products are being produced at a small scale and at an economic loss, however ACBM companies are intending to industrialise and scale-up production," it says.



Fédération Internationale du Lait • International Dairy Federation • FIL IDF

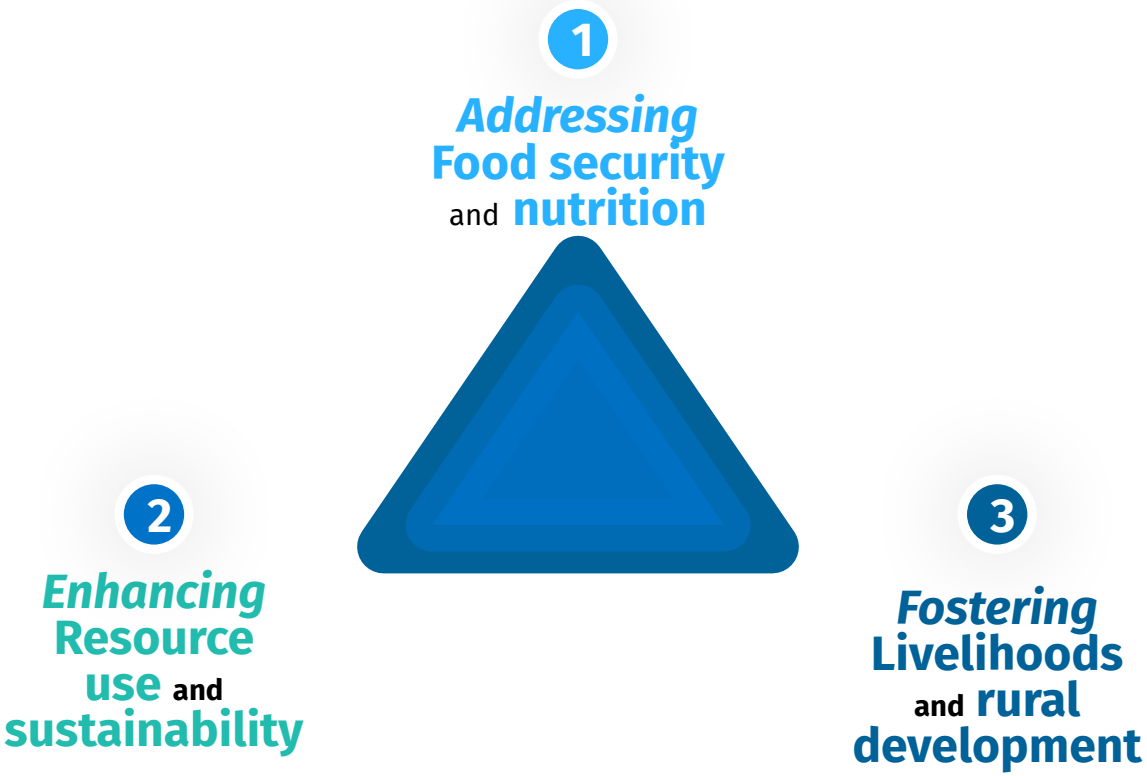
# IDF WORK ON PROTECTING DAIRY TERMS



# **Three main challenges** for the future

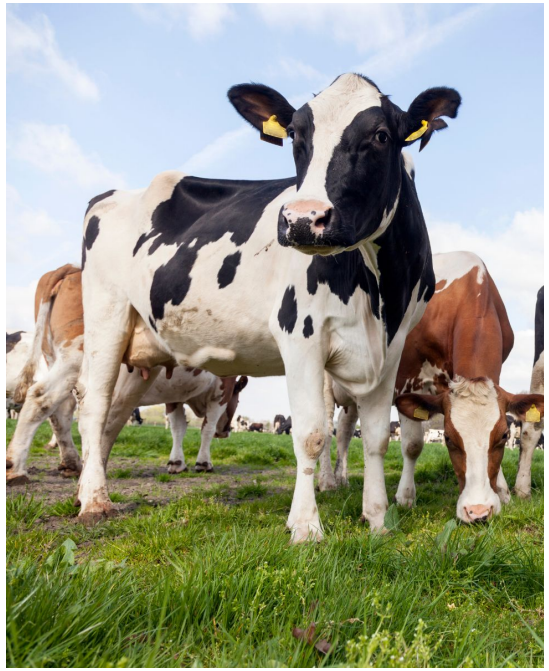
- The dairy industry will be expected to contribute to the triple challenge by…



# GLOBAL KEY DRIVERS:
# DAIRY QUALITY AND SAFETY & ANIMAL HEALTH AND WELFARE

Dairy Quality and Safety

Animal Health and Welfare



# GLOBAL KEY DRIVERS: PRODUCTIVE AND HEALTHY CATTLE

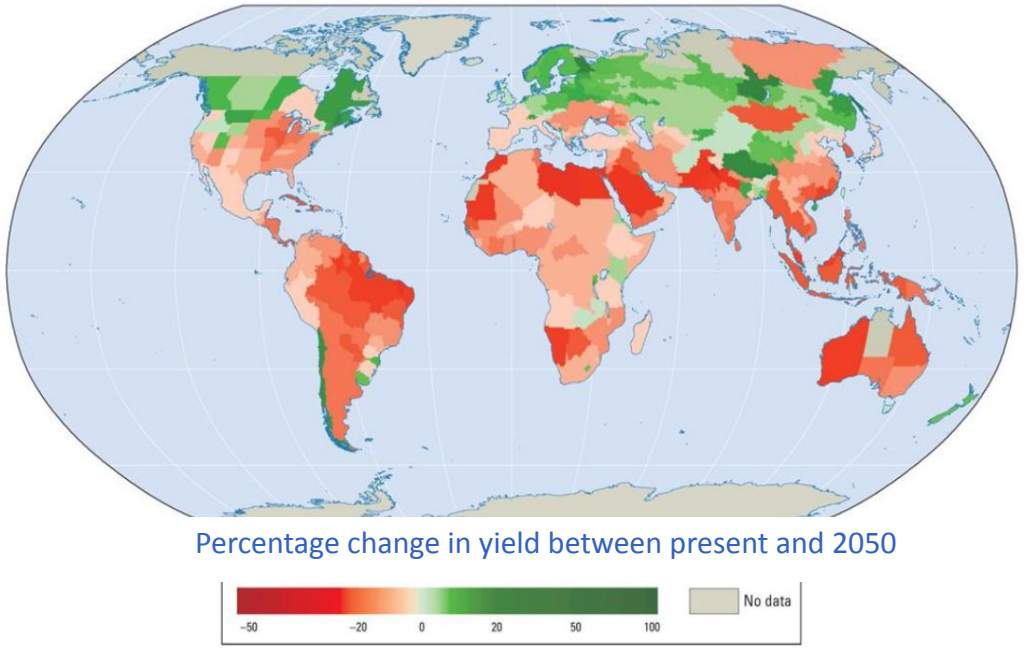
One Health


Animal Health and Welfare

# GLOBAL KEY DRIVERS:
## POPULATION GROWTH, CLIMATE CHANGE

By 2050 >9 billion

Projected percentage in agricultural yields by 2050 given current agricultural practices and crop varieties



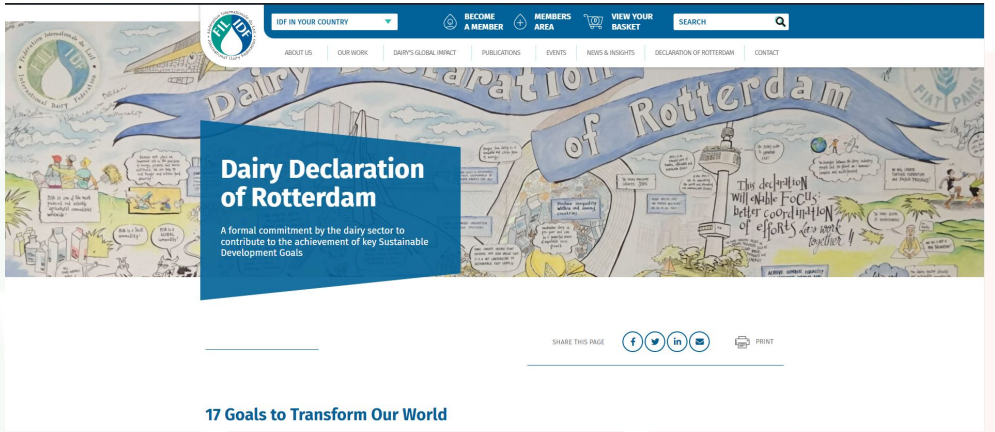

Percentage change in yield between present and 2050

Source: World Bank (Development Report 2010)

# DAIRY'S COMMITMENT TO SUSTAINABILITY

The dairy sector and the FAO signed on to the **Dairy Declaration of Rotterdam** in 2016:

*"We, representative of the one-billion-person global dairy community, gathered in Rotterdam at the World Dairy Summit, are committed to the sustainable development of the dairy sector to generate widespread benefits for people and the planet."*




Food and Agriculture Organization of the United Nations

THE DAIRY DECLARATION OF ROTTERDAM

The dairy community accepts sustainability challenge

We, representatives of the one billion person global dairy community, gathered in Rotterdam at the World Dairy Summit, are committed to the sustainable development of the dairy sector to generate widespread benefits for people and the planet.

We recognize:

- the UN 2030 Agenda for Sustainable Development as the overarching framework that guides our actions towards sustainable development from a social, environmental, economic and health perspective;
- the vital role of dairy for food security and poverty reduction and the important livelihood and development opportunities for family farmers, small holders and pastoralists;
- the critical contribution the dairy sector makes to Sustainable Development, including:
  - the essential role of dairy products for balanced, nutritious and healthy diets;
  - the major contribution that dairy makes to countries' economies, income, employment and livelihood
  - the key function of the dairy sector in the management of terrestrial ecosystems and the need to address environmental degradation and climate change, and to support biodiversity;
- the diversity of dairy production systems and dairy breeds, contexts and priorities;
- the need for continuous and open dialogue and joint actions at all levels.

We agree to:

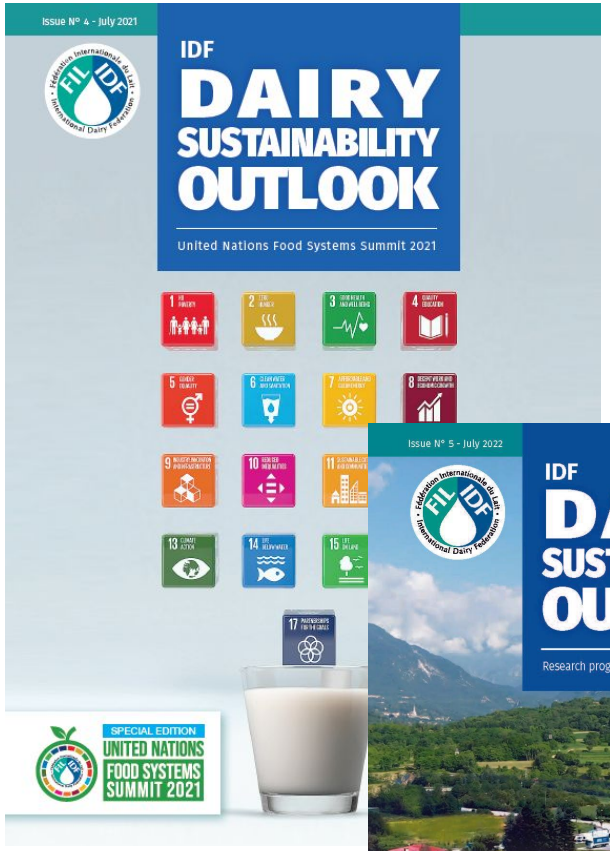
- Take an integrated approach to promote the sustainability of dairy systems, jointly taking into consideration social, economic, health and environmental dimensions;
- Give particular attention to the needs of family farmers, small holders and pastoralists;
- Build, implement and disseminate tools and guidelines to facilitate the identification and adoption of sustainable practices in the dairy sector;
- Build capacity in support of sustainable practices and provide enabling conditions;
- Measure and report on sustainability outcomes.
- Strengthen multi-stakeholder dialogue for consensus building, reviewing progress and continuous improvement.

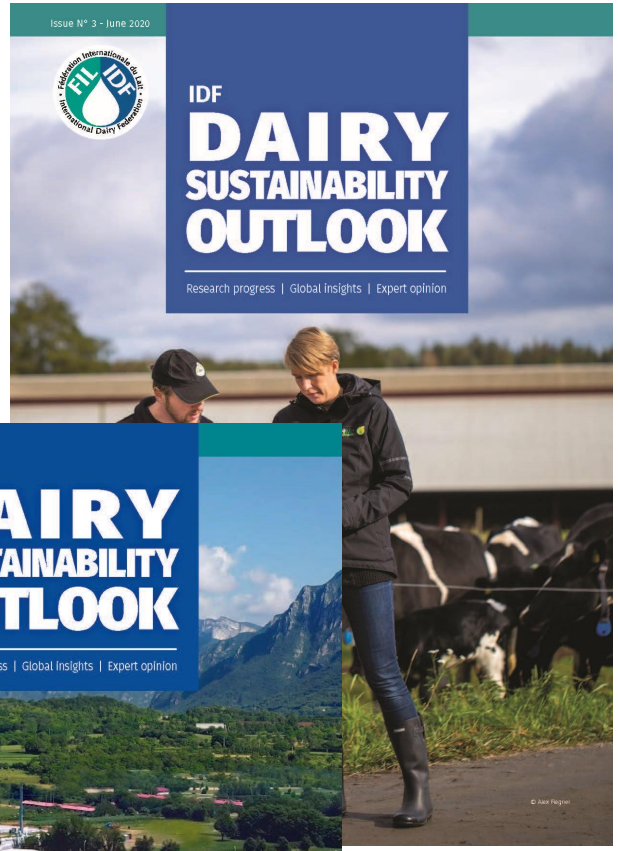
Rotterdam, 19 October 2016

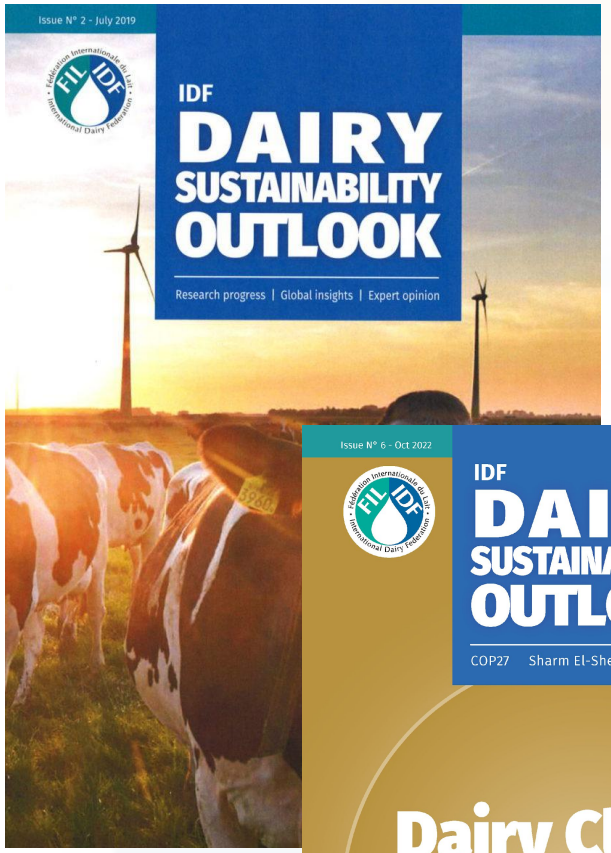
Jeremy Hill,
President, International Dairy Federation 2016

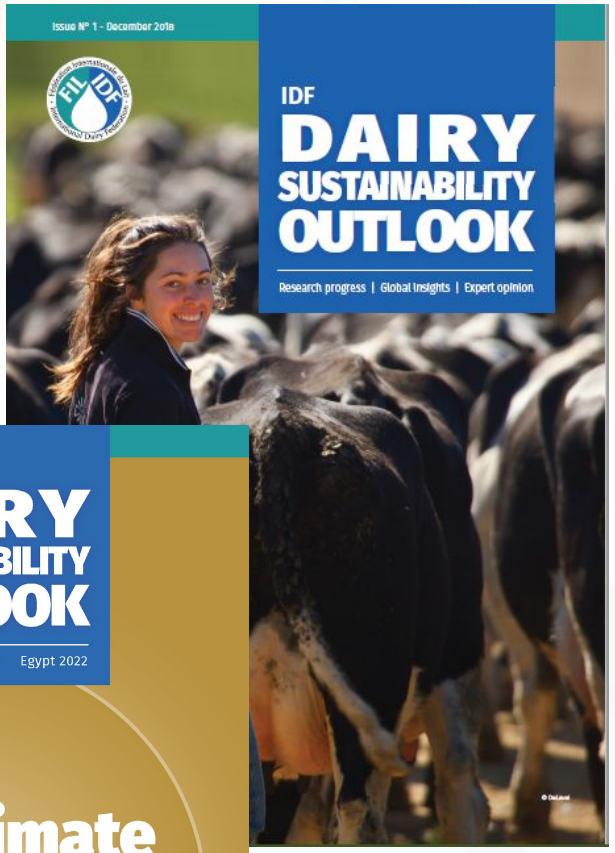
Ren Wang,
Assistant Director General, Food and Agriculture Organization of the United Nations

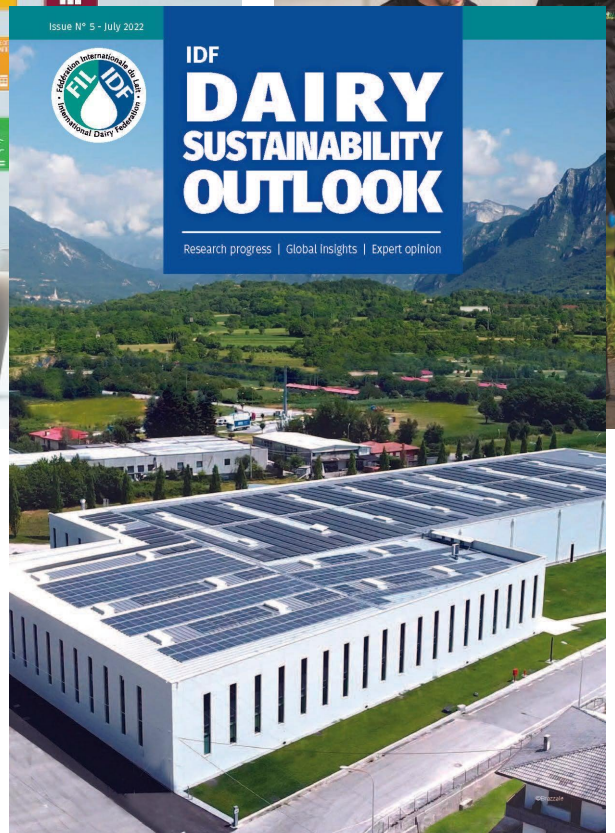
# THE SERIES EXPLORES CASE STUDIES OF SUSTAINABLE PRACTICES & INNOVATIONS ACROSS THE DAIRY SECTOR

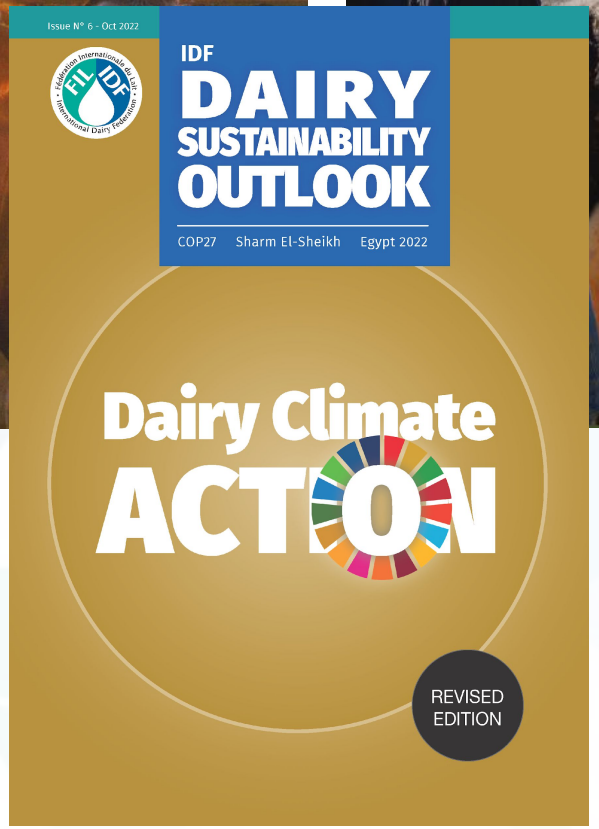


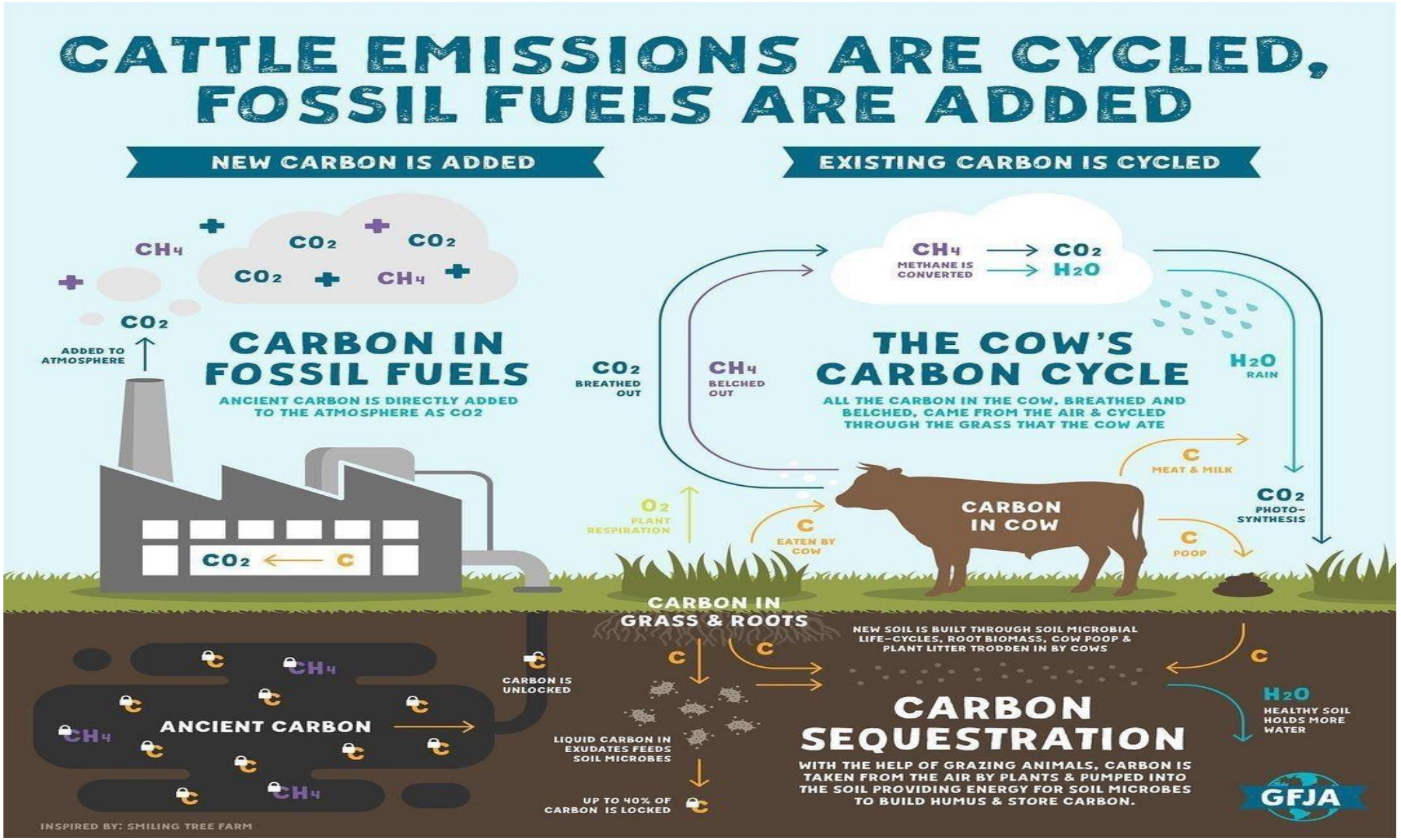



# IDF METHODOLOGIES AND SUSTAINABLE PRACTICES


CATTLE EMISSIONS ARE CYCLED, FOSSIL FUELS ARE ADDED
NEW CARBON IS ADDED
EXISTING CARBON IS CYCLED
CH4
CO2
CO2
CO2
CH4
CO2
ADDED TO ATMOSPHERE
CARBON IN FOSSIL FUELS
ANCIENT CARBON IS DIRECTLY ADDED TO THE ATMOSPHERE AS CO2
CO2 ← C
CH4 → CO2
METHANE IS CONVERTED
H2O
CO2 BREATHED OUT
CH4 BELCHED OUT
THE COW'S CARBON CYCLE
ALL THE CARBON IN THE COW, BREATHED AND BELCHED, CAME FROM THE AIR & CYCLED THROUGH THE GRASS THAT THE COW ATE
H2O RAIN
C MEAT & MILK
CO2 PHOTO-SYNTHESIS
O2 PLANT RESPIRATION
C EATEN BY COW
CARBON IN COW
C POOP
CARBON IN GRASS & ROOTS
NEW SOIL IS BUILT THROUGH SOIL MICROBIAL LIFE-CYCLES, ROOT BIOMASS, COW POOP & PLANT LITTER TRODDEN IN BY COWS
CARBON IS UNLOCKED
CH4
ANCIENT CARBON
CH4
CH4
LIQUID CARBON IN EXUDATES FEEDS SOIL MICROBES
UP TO 40% OF CARBON IS LOCKED
CARBON SEQUESTRATION
WITH THE HELP OF GRAZING ANIMALS, CARBON IS TAKEN FROM THE AIR BY PLANTS & PUMPED INTO THE SOIL PROVIDING ENERGY FOR SOIL MICROBES TO BUILD HUMUS & STORE CARBON.
H2O HEALTHY SOIL HOLDS MORE WATER
GFJA
INSPIRED BY: SMILING TREE FARM

# CHALLENGES FOR THE GLOBAL DAIRY SECTOR

- Social license to operate: environment, animal health & welfare
- Food policies on sugar, fat and salt: Front of pack labelling, sugar tax, marketing ban, review of government-issued dietary guidelines
- Multiplication of protein offers
- Perception that plant based products are more sustainable
- The importance of science based facts in a world of social media

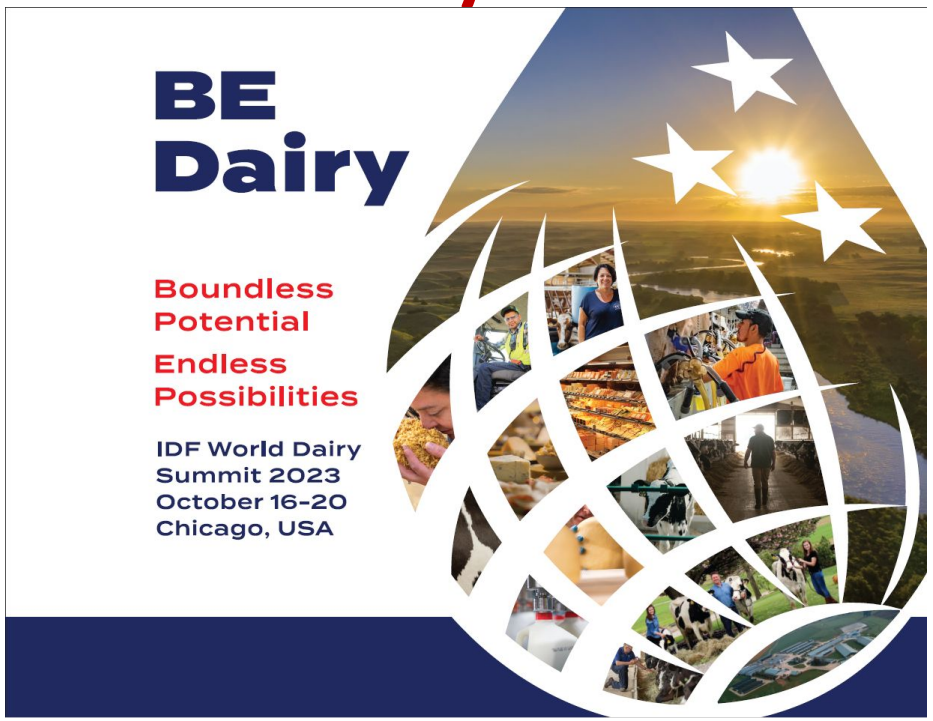
# OPPORTUNITIES

- Promote the role of dairy in healthy diets produced in a sustainable manner and the contribution of dairy to the UN SDGs. E.g. UN Food Systems Summit.
- Provide knowledge and expertise to IGO such as Codex and OIE and regulators.
- Develop guidelines and methodologies to facilitate implementation of international standards and regulations and support the actors of the dairy chain to provide safe, sustainable and nutritious dairy products.
  - There is no food security without food safety!
- Continue to support research and innovation and promote the science behind dairy.

# IDF Dairy Innovation Awards built-in sustainability and UN SDGS

# IDF World Dairy Summit 2023

# #BE Dairy in 2023




# See you in Chicago!

# GLOBAL DAIRY EXPERTISE SINCE 1903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