



Plant based alternatives to dairy: threat or opportunity? A nutrition perspective.

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What is a plant-based diet?

A plant based diet is based on Foods and Beverages derived from plants, including vegetables, wholegrains, legumes, nuts, seeds and fruits, with few or no animal products.

Flexitarian

- **Semi-vegetarians**
- **Primarily consumes plant based, vegetarian or vegan products**
- **Occasionally includes meat, poultry, fish and or other animal based foods**



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Vegetarian

- **Pescetarians – eat fish and/or shellfish.**
- **Lacto-ovo vegetarians – eat dairy foods and eggs;**
- **Ovo-vegetarians – include eggs but not dairy;**
- **Lacto-vegetarians – eat dairy foods but not eggs.**



Vegan

- **Do not consume any animal foods or drinks at all, including honey, dairy and eggs.**
- **Do not use any animal related products as part of their lifestyle**



Why choose to follow a plant-based diet?



People choose a plant-based diet for a **variety of reasons**:

- health reasons
- concern about the treatment of animals
- environmental concerns
- taste preference
- social pressure

Plant-based diets are generally perceived in a positive light.

Barriers to consuming plant-based diets:

- health concerns
- unwillingness to make dietary changes
- enjoyment of eating meat

BDA, Plant-based diet, Food Fact Sheet, September 2017
Corrin and Papadopoulos, Understanding the attitudes and perceptions of vegetarian and plant-based diets to shape future health promotion programs. *Appetite*. 2017, 1;109:40-47.

Across categories, Plant based options are in full bloom

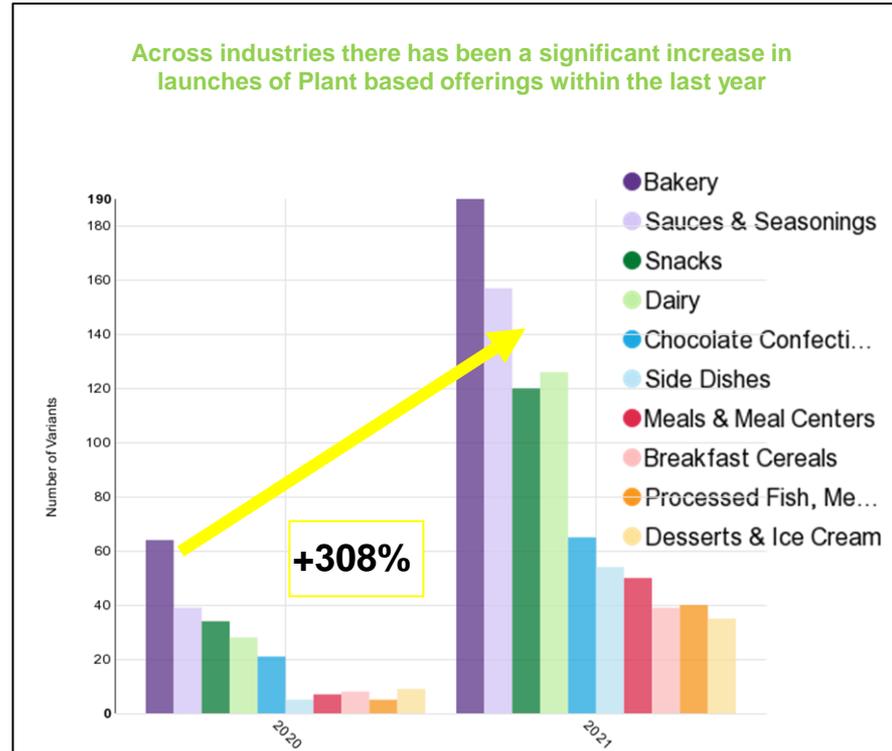
60% of South African adults agree that plant-based foods are better for the environment than meat and dairy products

29% of South African adults limit their meat intake all/most of the time

Despite being a nation of meat lovers, more South Africans are opting for a vegan and plant-based lifestyle

As health is increasingly at the forefront of consumers' minds, opting for a vegan or plant-based diet is a way that many are finding matches their desire to lead a healthier lifestyle.

Across industries there has been a significant increase in launches of Plant based offerings within the last year



Source: 1. Mintel's 35-market consumer research study. Source: Lightspeed/Mintel, December 2019, Base: 1,000 urban internet users aged 18-45+ 2. Mintel GNPD 2018 - 2020

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Plant based diets fit perfectly into the consumer desire to lead healthier and more sustainable lifestyles

Plant based and vegan food options are becoming more readily available and fit well with the desire to consume more natural and wholesome foods

SUSTAINABILITY

73%

of consumers are eating less meat because they believe it is more sustainable

FLEXIBILITY

26%

of consumers identify as flexitarians

ENVIRONMENT FRIENDLY

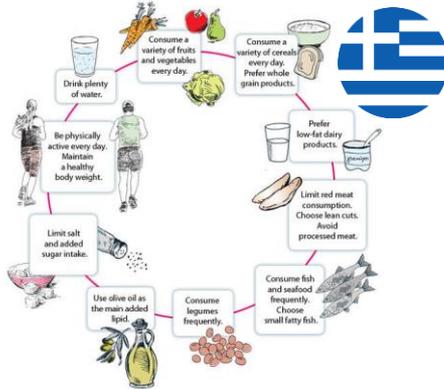
65%

of consumers believe that food, drink, and supplement brands should be doing more to protect the environment



Source: 1. FMCG Gurus, January 2021, Global; 2. GlobalData 2020 Market Pulse Survey, Asia Pacific and Latin American, September 2020

Plant-based foods and healthy eating guidelines



MORE
Vegetables, fruit and berries
fish and shellfish
nuts and seeds
exercise



SWITCH TO
wholegrain
healthy fats
low-fat dairy products

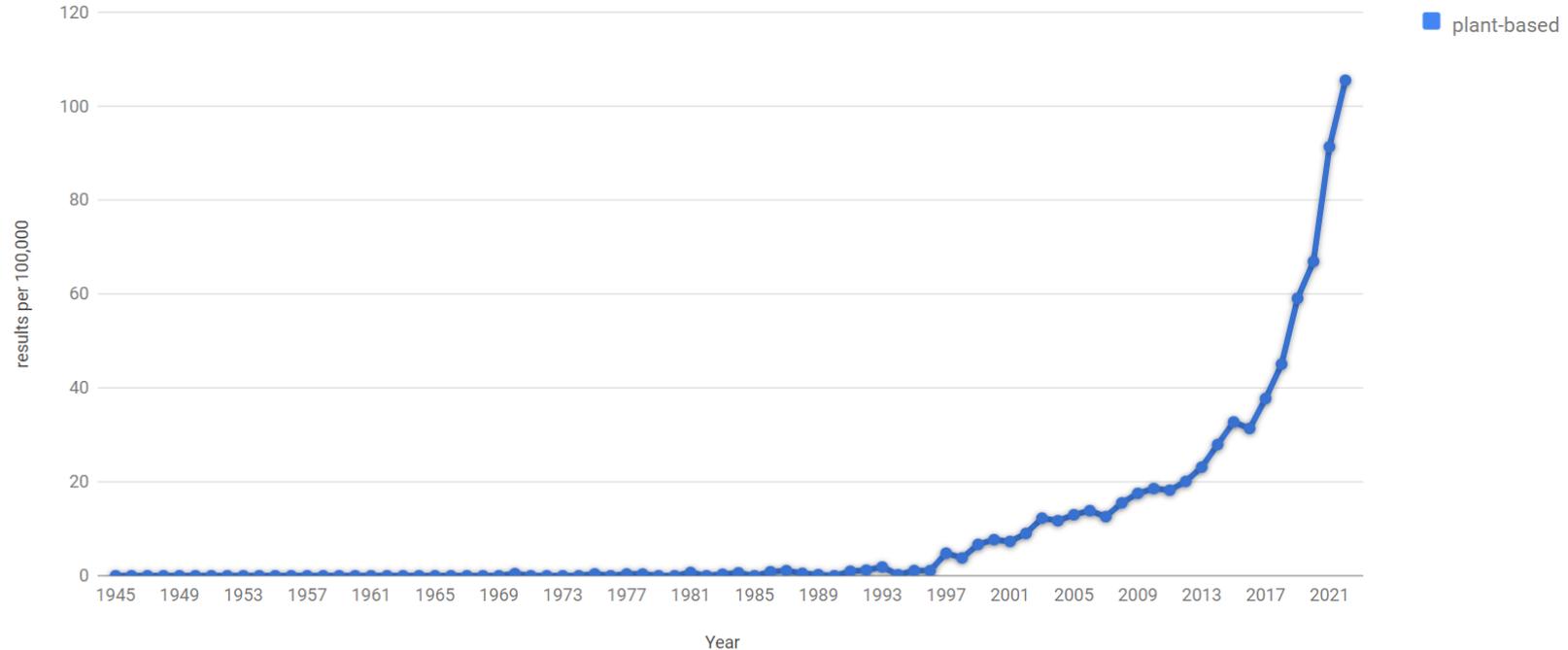


LESS
red and processed meat
salt
sugar
alcohol



Increasing research in plant-based diets

Results per 100,000 citations in PubMed
proportion for each search by year, 1945 to 2022



Health benefits associated with plant-based eating

Plant-based diets versus conventional diets

8 - 25%
reduced risk
of **Coronary
Heart
Disease**

18%
reduced risk
of **Type 2
diabetes**

8 - 15%
reduced risk
of **Cancers**

Better **body
weight status,
metabolic and
gut health**

How can plant-based diets improve health?

Inherent benefits to eating a wide variety of health-promoting plants.

Additional benefit from limiting/avoiding more harmful constituents found in animal products.

Dinu et al. Vegetarian, vegan diets and multiple health outcomes: A systematic review with meta-analysis of observational studies. *Crit Rev Food Sci Nut* 2017; 57(17)

Satija et al. Healthful and unhealthful plant-based diets and the risk of coronary heart disease in US adults. *J Am Coll Cardiol*. 2017; 25; 70(4): 411-422.

Medawar et al. The effects of plant-based diets on the body and the brain: a systematic review. *Translational Psychiatry* 2019; 9:226

↑ Beneficial
nutrients



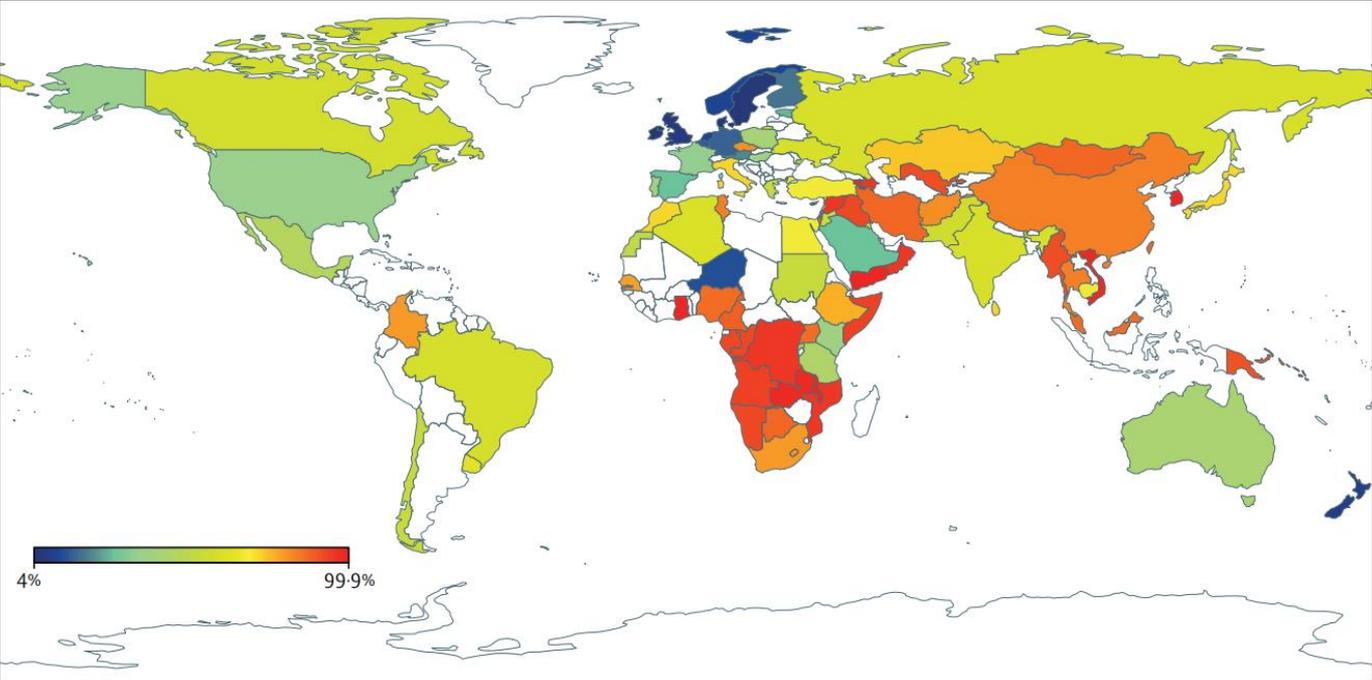
Phytochemicals

↓ Red meat
consumption

↓ Saturated
fats



Prevalence of lactose malabsorption in different countries



Storhaug CL, Fosse SK, Fadnes LT. Country, regional, and global estimates for lactose malabsorption in adults: a systematic review and meta-analysis. *The Lancet. Gastroenterology & Hepatology.* 2017;2(10):738–746.

Nutritional considerations of plant-based diets



A plant-based diet can meet the current recommendations of all nutrients but it has to be very well planned

Nutrients of consideration:

- **Protein** – quality of protein
- **Calcium** – if dairy products are avoided
- **Omega-3 fatty acids** – especially if oily fish is omitted
- **Vitamin B12 and zinc** – especially if all animal products are avoided
- **Iron** – poorly absorbed iron in plant-sourced

Research shows that bone mineral density (BMD) is approximately 4% lower in vegetarians than in omnivores, at both the femoral neck and the lumbar spine.

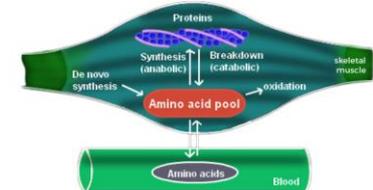
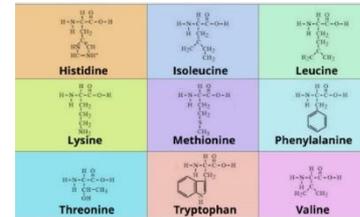
Protein quality: not all proteins are equal!



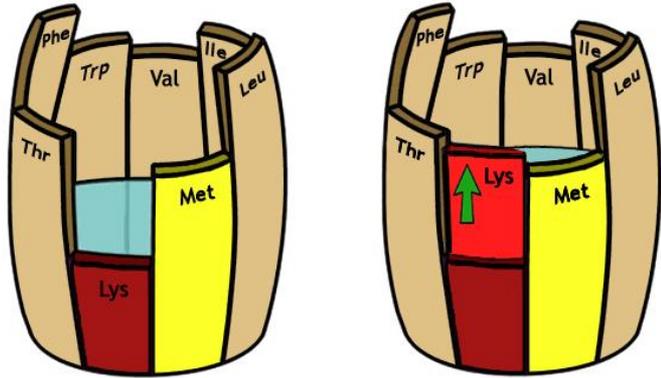
Protein Quality

Essential amino acid content of a protein

Digestibility and bioavailability of protein-rich foods



Complimentary plant proteins: combining for balanced protein



Various proteins e.g. pea, chickpea and oat protein can be combined for improving protein scores

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Not all that glitters is gold

| SOY  | ALMOND  | OAT  | COCONUT  | RICE  |
|---|---|--|--|--|
| <ul style="list-style-type: none"> ✓ High protein content and quality ✓ Vegan, lactose-free | <ul style="list-style-type: none"> ✓ Rich source of Vitamin E, B vitamins and minerals calcium, magnesium and potassium ✓ Vegan, lactose-free | <ul style="list-style-type: none"> ✓ Good source of dietary fibre ✓ Moderate amount of protein and lipids ✓ Vegan, nut-free, lactose-free | <ul style="list-style-type: none"> ✓ Rarely causes allergies ✓ Contains medium-chain triglycerides (fats) ✓ Contains Vitamin E ✓ Vegan, lactose-free | <ul style="list-style-type: none"> ✓ Least allergenic of dairy alternatives therefore can be suitable for people with multiple allergies ✓ Low in fat ✓ Vegan, nut-free, lactose-free |
| <ul style="list-style-type: none"> ✗ Soy is a common allergen for adults and children | <ul style="list-style-type: none"> ✗ Contains lower amount of protein and lacks in essential amino acids ✗ Almond is a common allergen | <ul style="list-style-type: none"> ✗ Lacks in essential amino acid lysine ✗ Contain potential allergens (gluten) due to crop cross-contamination | <ul style="list-style-type: none"> ✗ Contains the highest amount of calories, fat and one of the lowest amount of protein among plant-based choices | <ul style="list-style-type: none"> ✗ Very low in protein, lacking essential amino acids ✗ Finished product may contain higher amounts of added sugar |



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Nutritional value of dairy-alternatives at a glance

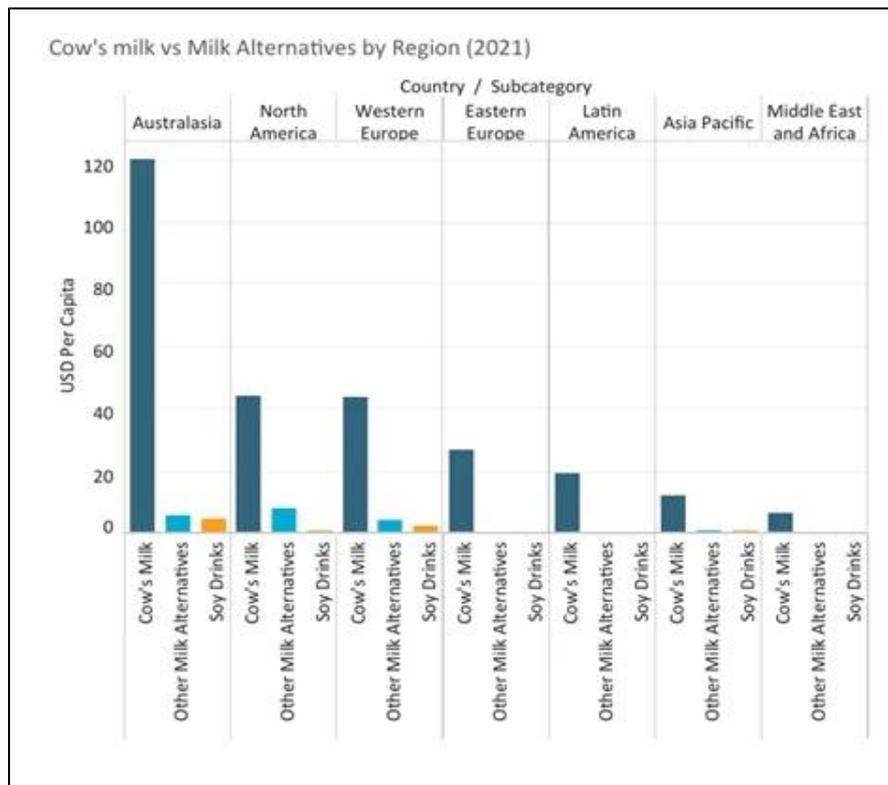
| |  (Low-Fat) COW'S MILK ¹ |  SOY ² |  ALMOND ² |  COCONUT ² |  RICE ¹ |
|---|---|---|--|---|--|
| CALORIES AND NUTRIENTS | | | | | |
| Calories | 110 | 110 | 60 | 80 | 120 |
| Protein | 8g | 8g | 1g | <1g | 1g |
| Fat | 2.5g | 4.5g | 2.5g | 5g | 2.5g |
| Carbohydrates | 12g | 9g | 8g | 7g | 23g |
| VITAMINS AND MINERALS^{***} (% Daily Value*) | | | | | |
| Calcium | 30% | 45% | 45% | 45% | 30% |
| Phosphorus | 25% | 25% | N/A ^{***} | N/A | 15% |
| Potassium | 10% | 10% | 1% | 1% | 15% |
| Riboflavin | 25% | 30% | 30% | N/A | N/A |
| Vitamin B-12 | 20% | 50% | 50% | 50% | 25% |
| Vitamin A | 10% | 10% | 10% | 10% | 10% |
| Vitamin D | 25% | 30% | 25% | 25% | 25% |
| <div style="display: flex; justify-content: space-between; align-items: center;">  Naturally Occurring  Good Source = 10%–19% DV  Excellent Source = 20%+ DV </div> | | | | | |

National Dairy Council, 2015



Plant-based alternatives are on the rise

- Milk alternatives continue to surge in popularity across the globe, but the spotlight remains on Western countries
- The plant-based milk market is relatively smaller than its dairy-based counterpart but is **growing at a faster rate**
- Dairy and CPG companies are including plant-based milk products in their portfolios



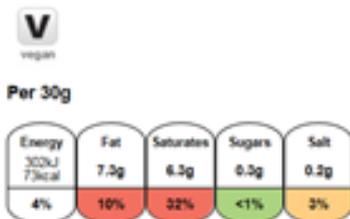
New challenges with non-dairy alternatives



Popularity of various non-dairy alternatives such as yoghurts and cheeses is increasing

These products require texture, stability, clean label and to be nutritionally balanced

Although fruit and vegetables tend to be inherently lower in saturated fats, managing fat content, especially saturated fat content in dairy alternatives can become challenging in some products when these fats are added for functional benefits such as texture and mouthfeel



of the reference intaker
Typical values per 100g: Energy 1007kJ / 244kcal

WHAT MIGHT BE LESS AMAZING

In order to give this fraiche a super creamy texture and rich taste we need to use a saturated fat from a vegetable based source. In other words we need a saturated non-animal based fat. Our search for this fat includes extended studies and analysis into every possible solution available to create the best quality product for you, from both a health and sustainability standpoint.

New challenges with non-dairy alternatives

- ✓ Aflatoxins B1, B2, G1, G2
- ✓ Allergens
- ✓ Foreign bodies
- ✓ Heavy metals
- ✓ Hydrocyanic acid
- ✓ Parasites
- ✓ Pesticides (phosphonic acid, cypermethrin, chlorpyrifos, etc.)

Almond



- ✓ Fusarium toxins (DON, T2-, HT2 toxin), ochratoxin A
- ✓ Gluten
- ✓ GMO
- ✓ Heavy metals
- ✓ Pesticides (chlormequat, glyphosate, etc.)
- ✓ Pyrrolizidine alkaloids, tropane alkaloids

Oat



Soybean



- ✓ Aflatoxins B1, B2, G1, G2, ochratoxin A
- ✓ Dioxins and PCBs
- ✓ GMO
- ✓ Heavy metals and nickel
- ✓ Pesticides (paraquat, glyphosate, phenoxyalkane-carboxylic acids, etc.)
- ✓ Pyrrolizidine alkaloids, tropane alkaloids
- ✓ Valuable substances (e.g. isoflavones)

Rice



- ✓ Aflatoxins B1, B2, G1, G2, ochratoxin A
- ✓ Fumigants (phosphane, etc.)
- ✓ GMO
- ✓ Heavy metals
- ✓ Mineral oils
- ✓ Pesticides (tebucanazole, isoprothiolan, imidacloprid, tricyclazole, etc.)

 eurofins

Dairy consumption is recommended by global food-based dietary guidelines



South Africa

Consume milk, maas, or yogurt daily.



Ireland

Consume 3 servings of low fat milk, yogurt, and cheese daily. Make third largest component of diet.



Germany

Consume milk and dairy products daily. Make third largest component of diet.



China

Consume 300 g of milk and dairy products daily. Make fourth largest component of diet.



Mexico

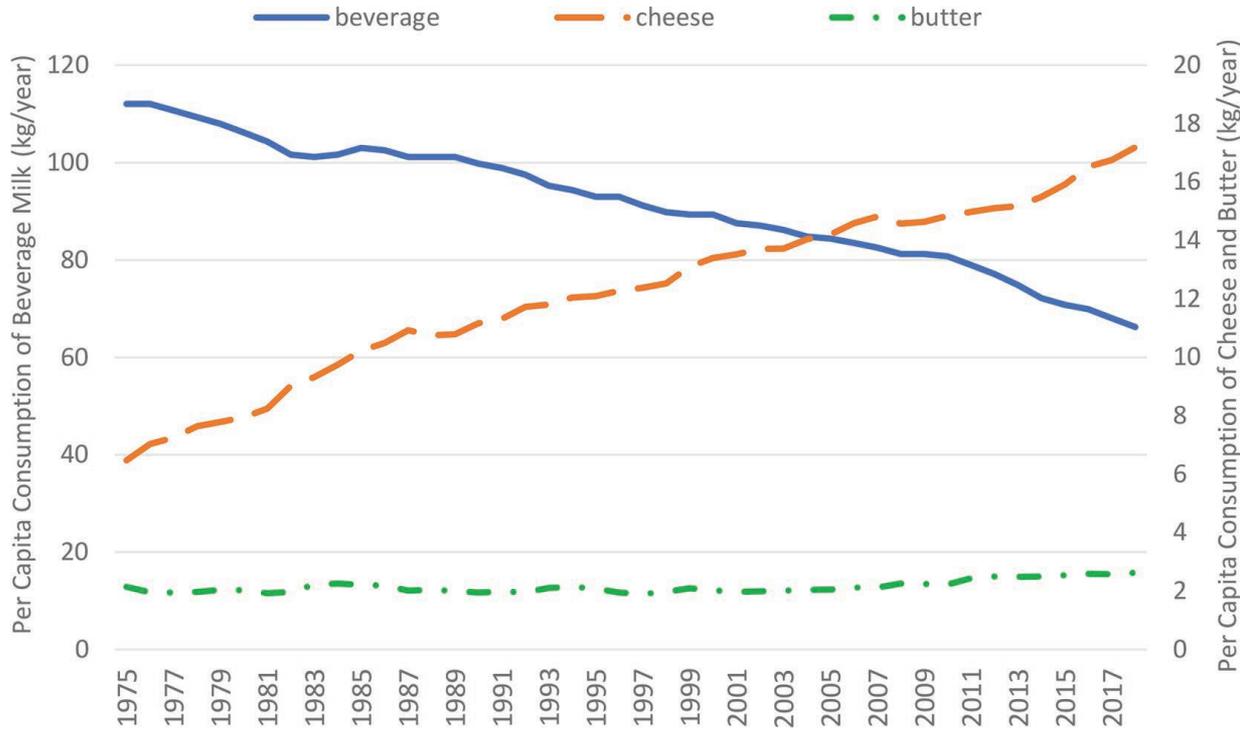
Make 1/3 of diet (together with other foods of animal origin and legumes).



Colombia

Consume milk and dairy daily; at least 2 glasses of milk or dairy products daily. Make ¼ of diet.

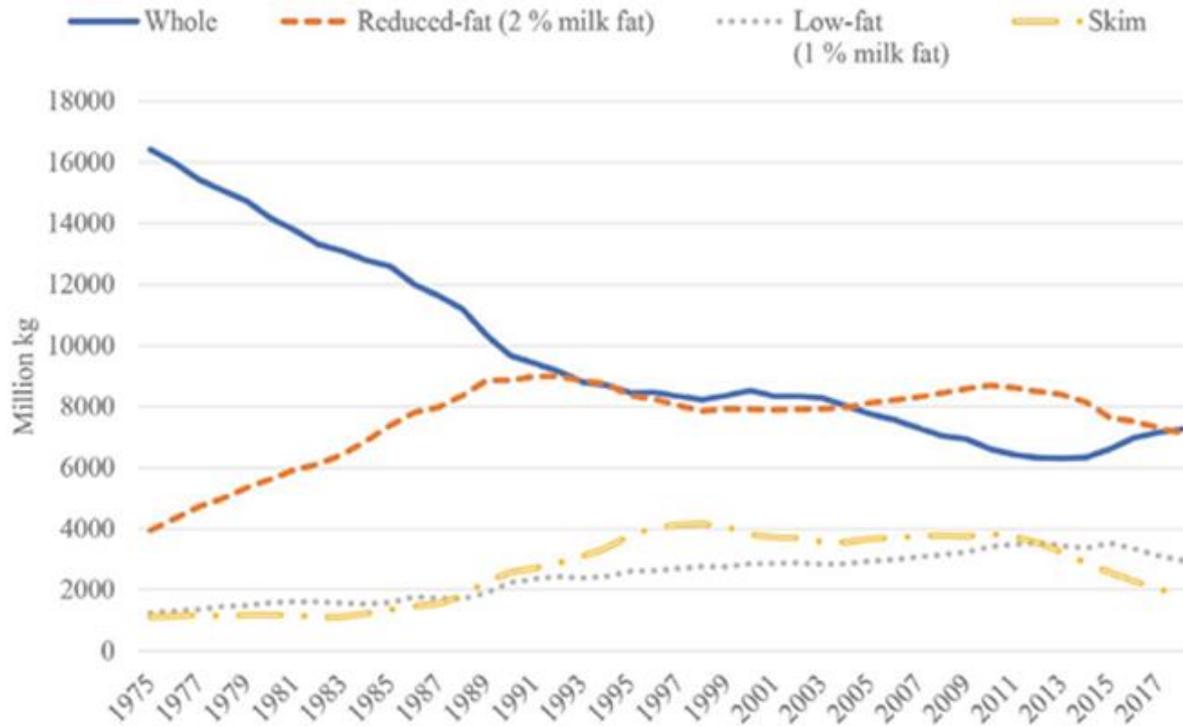
However..Milk consumption is declining



Wolf et al. 2020. J. Dairy Sci. 103:11209–11217

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Milk consumption by type: there are some differences



Milk consumption is declining but overall dairy is not



Per capita total dairy product consumption in the United States, milk equivalents milkfat basis.

Wolf et al. 2020. J. Dairy Sci. 103:11209–11217; USDA ERS (2020).

Who is switching from dairy to plant-based beverages?

Table 4. Likelihood of substituting plant-based beverage for dairy milk by consumer cluster¹

| Substitution case | Consumer cluster | | |
|------------------------------|------------------------|------------------------|------------------------|
| | Dairy | Flexitarian | Plant-based |
| No. of observations | 613 | 155 | 227 |
| As a beverage | 4.2 ^a (1.7) | 2.5 ^b (1.4) | 2.6 ^b (1.4) |
| In coffee or tea | 4.1 ^a (1.7) | 2.5 ^b (1.4) | 2.7 ^b (1.5) |
| On cereal | 4.1 ^a (1.9) | 2.2 ^b (1.4) | 2.2 ^b (1.5) |
| In a smoothie or shake | 3.8 ^a (1.7) | 2.2 ^b (1.3) | 2.2 ^b (1.3) |
| Baking or cooking ingredient | 3.8 ^a (1.7) | 2.4 ^b (1.3) | 2.7 ^b (1.6) |
| In a dessert | 3.9 ^a (1.7) | 2.4 ^b (1.3) | 2.6 ^b (1.5) |
| For children | 4.1 ^a (1.8) | 2.6 ^b (1.6) | 2.8 ^b (1.7) |

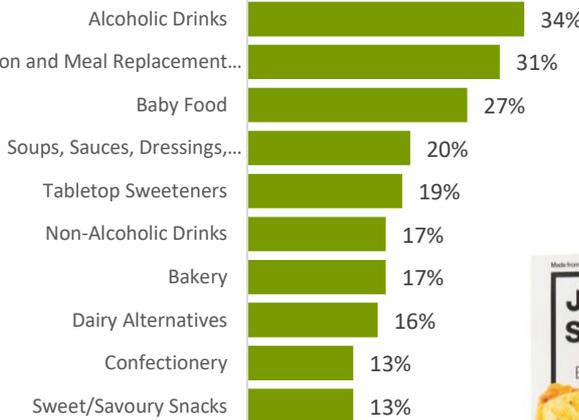
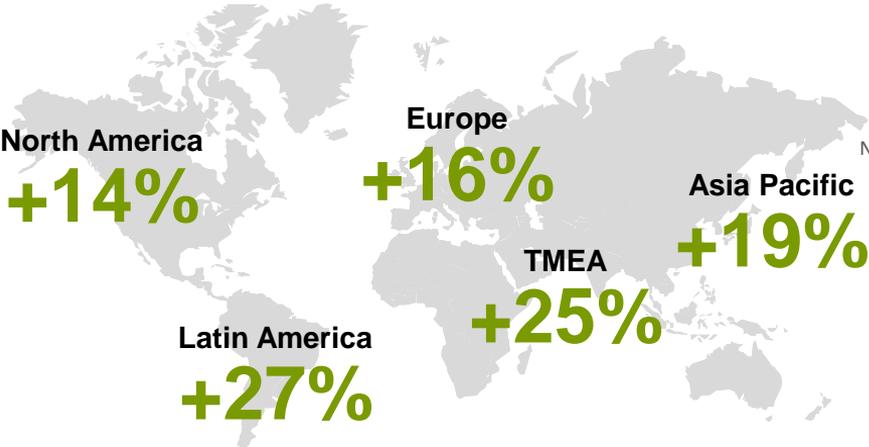
^{a-c}Means within a row with different superscripts differ ($P < 0.05$).

¹Mean values are based on responses to “How likely are you to substitute a plant-based alternative for the traditional dairy product”? 1 = very likely; 2 = likely; 3 = somewhat likely; 4 = unlikely; 5 = very unlikely; and 6 = I would never substitute. Numbers in parentheses are standard deviations.

Plant Based innovations are booming, globally and locally



In 2020, 8% of all food and drink launches globally were Plant based



Across categories, the number of plant based innovations has grown by 25% in TMEA in the last 5 years



Source: 1. FMCG Gurus, January 2021, Global; 2. GlobalData 2020 Market Pulse Survey, Asia Pacific and Latin American, September 2020

Dairy companies are showing up within Non-Dairy



Danone to acquire WhiteWave, a USD 4 bn sales Global Leader in Organic Foods, Plant-based Milks and related products

Arla introduces new brand and plant-based products



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Saputo acquires vegan cheese maker Bute Island Foods



Take-home messages

The trend towards choosing to follow plant-based diets does not appear to be subsiding → This has a strong effect in dairy (liquid milk, in particular) consumption



Dairy consumption, because of nutritional and health benefits, is still highly recommended by global food-based dietary guidelines



Dairy and CPG companies are including more plant-based milk products in their portfolios

Plant-based diets have been associated with various health benefits



Nutrient, formulation and safety considerations should be further addressed in plant-based products



Dairy and plant-based alternatives have the potential of co-existing in a flexitarian diet, leveraging on each other's strength points

Thank you!

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