The role of dairy foods in a healthy, sustainable diet

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ORIGINAL CONTRIBUTION

The role of dairy foods in lower greenhouse gas emission and higher diet quality dietary patterns

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Compliance with ethical standards

Conflict of interest The authors declare no conflicts of interest. The authors exercised freedom in designing the research, performing the analyses and making the decision to publish research results. Dairy Australia (DA) partially funded this research. However, DA did not have any role in design of the study, analysis of data or interpretation of results. The decision to publish was made prior to funding and before the results were known. DA had no role in the preparation of the manuscript.

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Sustainability is a complex topic

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; contribute to preventing all forms of malnutrition (i.e. undernutrition, micronutrient deficiency, overweight and obesity); reduce the risk of diet-related NCDs; and support the preservation of biodiversity and planetary health. Sustainable healthy diets must combine all the dimensions of sustainability to avoid unintended consequences.

- Promote health and wellbeing
- Accessible
- Affordable
- Safe
- Culturally acceptable
- Nutrition across life stages
- All forms of malnutrition
- Low environmental impact

http://www.fao.org/3/ca6640en/ca6640en.pdf

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Warning!

Public Health Nutrition: 19(14), 2654–2661 doi:10.1017/S1368980016000495

Do low-carbon-emission diets lead to higher nutritional quality and positive health outcomes? A systematic review of the literature

Charlotte LR Payne,*, Peter Scarborough and Linda Cobiac
British Heart Foundation Centre on Population Approaches to Non-Communicable Disease Prevention, Nuffield Department of Population Health, University of Oxford, Old Road Campus, Headington, Oxford OX3 7LF, UK

Submitted 22 June 2015: Final revision received 5 January 2016: Accepted 17 February 2016: First published online 15 March 2016

Lower-GHG-emission diets were linked to worse nutritional and health indicators, including higher sugar intake and lower micronutrient intake

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Local solutions are needed

- Food systems vary in different regions
- Environmental challenges differ in different regions
- Food cultures differ
- Public health nutrition challenges vary
- Important sources of under-consumed nutrients differ
- Intervention opportunities are within a local food system

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Study design greatly influences the results

- Environmental aspect considered
- Environmental metric used
- Method of evaluating healthiness
- Chosen comparison

	Water-scarcity footprint L-eq/serving	Serving
Lamb	5.5	65 g cooked
Chicken	8.5	80 g cooked
Pork	9.5	65 g cooked
Beef	11.8	65 g cooked
Egg	13.6	2 large
Tofu	20.0	170 g

https://www.mdpi.com/2072-6643/11/8/1846

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The GWP has become the default metric for transferring emissions of different gases to a common scale; often called 'CO_2 equivalent emissions' (e.g., Shine, 2009). It has usually been integrated over 20, 100 or 500 years consistent with Houghton et al. (1990). Note, however that Houghton et al. presented these time horizons as 'candidates for discussion [that] should not be considered as having any special significance'. The GWP for a time horizon of 100 years was later adopted as a metric to implement the multi-gas approach embedded in the United Nations Framework Convention on Climate Change (UNFCCC) and made operational in the 1997 Kyoto Protocol. The choice of time horizon has a strong effect on the GWP values — and thus also on the calculated contributions of CO_2 equivalent emissions by component, sector or nation. There is no scientific argument for selecting 100 years compared with other choices (Fuglestvedt et al., 2003; Shine, 2009). The choice of time horizon is a value judgement because it depends

	GWP*	GWP100
	kg CO2e/kg	kg CO2e/kg
Egg	1.51	1.51
Chicken meat	2.66	2.56
Pig meat	3.78	9.13
Lamb meat	-4.80	17.4
Whole milk	1.23	1.36

Livestock Science 246 (2021) 104459

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	Beef
Diet quality score	Y
Nutrient density	Y
Negative nutrients	X
NCD risk factors	X

Saturated Fats and Health: A Reassessment and Proposal for Food-Based Recommendations

JACC State-of-the-Art Review

Arne Astrup, MD, DMSc,[a] Faidon Magkos, PhD,[a] Dennis M. Bier, MD,[b] J. Thomas Brenna, PhD,[c,d,e] Marcia C. de Oliveira Otto, PhD,[f] James O. Hill, PhD,[g] Janet C. King, PhD,[h] Andrew Mente, PhD,[i] Jose M. Ordovas, PhD,[j] Jeff S. Volek, PhD, RD,[k] Salim Yusuf, DPhil,[l] Ronald M. Krauss, MD[l,m]

Adults

The sodium ULs for adults 18 + years were updated in 2017.

Age	UL
Adults 18 + yr	
Men	Not determined
Women	Not determined
Pregnancy	
18 + yr	Not determined
Lactation	
18 + yr	Not determined

also apparent that the health effects of foods cannot be predicted by their content in any nutrient group without considering the overall macronutrient distribution. Whole-fat dairy, unprocessed meat, and dark chocolate are SFA-rich foods with a complex matrix that are not associated with increased risk of CVD. The totality of available evidence does not support further limiting the intake of such foods. (J Am Coll Cardiol 2020;76:844-57) © 2020 The Authors.

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Yet the evidence underpinning many widely touted recommendations about what to grow and eat is remarkably sparse and generally biased.

Putting all foods on the same table: Achieving sustainable food systems requires full accounting

Benjamin S. Halpern[a,b,1], Richard S. Cottrell[c,d], Julia L. Blanchard[c,d], Lex Bouwman[e,f,g], Halley E. Froehlich[a,h,i], Jessica A. Gephart[j,k], Nis Sand Jacobsen[l], Caitlin D. Kuempel[a], Peter B. McIntyre[m], Marc Metian[n], Daniel D. Moran[o], Kirsty L. Nash[c,d], Johannes Többen[o], and David R. Williams[b,p]

18152–18156 | PNAS | September 10, 2019 | vol. 116 | no. 37

Conclusions

Although the number of journal articles on the subject of environment and diet has grown enormously in recent years, this remains a relatively new area of research and the evidence base to inform dietary interventions for reduced environmental impact is rather incomplete and scant.

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Conflicting advice about dairy in a healthy sustainable diet

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Current conflicting advice about dairy

Most Australians need more:

- Vegetables and fruit, particularly green, orange and red vegetables, such as broccoli, carrots, capsicum and sweet potatoes, and leafy vegetables like spinach, and legumes/beans like lentils.
- Grain (cereal) foods, particularly wholegrain cereals like wholemeal breads, wholegrain/high fibre breakfast cereals, oats, wholegrain rice and pasta.
- Reduced fat milk, yoghurt and cheese varieties (reduced fat milks are not suitable for children under the age of 2 years as a main milk drink).
- Lean meats and poultry, fish, eggs, nuts and seeds and legumes/beans (except many Australian men would benefit from eating less red meat).
- Water instead of soft drinks, cordials, energy drinks, sports drinks and sweetened fruit juices and/or alcoholic drinks.

https://www.eatforhealth.gov.au/

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Australian Dietary Guidelines

For more information go to:
www.eatforhealth.gov.au

Minimum recommended number of serves of milk, yoghurt, cheese and/or alternatives per day, mostly reduced fat

	Serves per day		
	19-50 years	51-70 years	70+ years
Men	2½	2½	3½
Women	2½	4	4
Pregnant women	2½	-	-
Breastfeeding women	2½	-	-

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Some sustainability advocates suggest dairy should be reduced or avoided

EAT Lancet global reference diet

- Moderate dairy consumption as an option (p16)
- Dairy foods: 250 g per day (Reference Diet, p7)
- Even small increases in dairy above the reference diet threaten planetary boundaries (Summary, p3)

Food and Climate Research Network

- Dairy products or alternatives (e.g. fortified milk substitutes and other foods rich in calcium and micronutrients) eaten in moderation.

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Australian evidence

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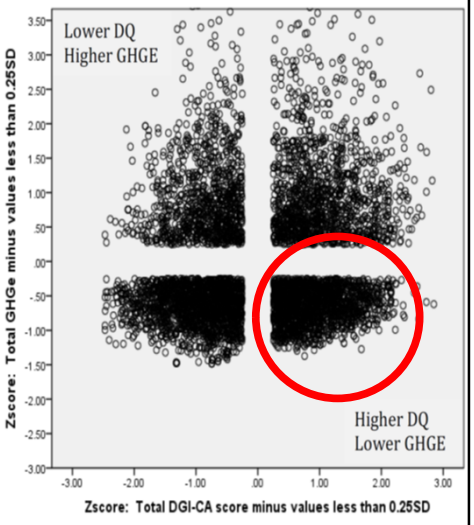
GHG emissions and diet quality

Dietary intake data
- Australian Health Survey
- 24-h recall
- 9,341 adults (19 y and above)
- 5,645 individual foods

Diet quality score
- Overall compliance with Australian Dietary Guidelines
- Index (0-100)

GHG emissions
- Highly disaggregated input-output model of the Australian economy
- 192 food-related sectors



Nutrients **2016**, 8, 690; doi:10.3390/nu8110690

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Importance of the HQLE subgroup

- Reflects the dietary habits of everyday Australians with more desirable dietary characteristics
- Whole diet and real foods
- These habits could realistically be adopted by Australians who presently have poorer diets or high emission diets

- 43% lower dietary GHG emissions

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More about the HQLE subgroup

- N=1732
- 37% higher diet quality score
- 43% lower dietary GHG emissions
- Main differentiating factor: lower discretionary food intake (2.1 serves compared to 5.1 serves)
- More likely to be in normal weight range
- Less likely to be obese
- Greater physical activity levels
- Lower incidence of smoking
- Higher level of educational attainment
- No difference in socio-economic status

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Analysis of the HQLE subgroup

Group	Number	Dairy foods: Mean intake[a] (serves day^{-1})	Non-dairy alternatives: Mean intake (serves day^{-1})	% meeting recommended intake[b]
Low dairy intake tertile	603	0.31	0.09	1.2
Medium dairy intake tertile	669	1.43	0.02	0.3
High dairy intake tertile	489	3.16	0.02	59.8
Dairy avoiders	90	0.89	0.20	7.7
Meeting recommended intake of "dairy and alternatives"	301	3.56	0.09	100

[a] Intake refers to core dairy foods (i.e. milk, cheese and yoghurt), and excludes butter, cream, ice-cream and other discretionary foods. [b] Recommended intake refers to dairy foods and non-dairy alternatives.

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1. Can a lower GHG emission diet include dairy?

Table 3 Prevalence of core dairy food[a] consumption (% of daily diets) in the higher diet quality and lower GHG emission (HQLE) subgroup of Australian adult (19+ years) daily diets (N=1732)

Gender	19-30 years	31-50 years	51-70 years	70 + years	19+ years
Male	90.9	88.4	87.6	90.8	88.9
Female	83.3	92.4	93.1	94.7	91.1
All adults	87.6	90.3	90.3	93.0	90.0

[a] Core dairy foods include milk, cheese and yoghurt, and exclude discretionary dairy foods and non-dairy alternatives.

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2. Is the recommended intake of dairy necessary?

- The recommended intake of dairy may seem high
- More than 300 diets in the HQLE sample achieved it
- These 300+ diets had the greatest likelihood of achieving the recommended intake of a broad range of nutrients
- HQLE diets with low levels of dairy had much lower likelihood of achieving RDIs

HQLE diets meeting RDI (%)

	HQLE diets meeting Aust Dietary Guidelines for dairy (or alternatives)	HQLE diets in the lowest tertile of diary food intake
Calcium	94.4	5.4
Protein	97.1	71.6
Vitamin B12	97.3	46.9

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Nutrient	RDI/AI[a]					EAR[a]				
	Low dairy	Med dairy	High dairy	Avoiders	Meeting ADG	Low dairy	Med dairy	High dairy	Avoiders	Meeting ADG
Protein	71.6	86.5	94.9	74.3	97.1	88.8	94.2	98.6	86.3	99.6
Linoleic acid	31.5	37.6	33.3	49.1	33.9					
ALA[b]	48.5	56.7	57.0	53.4	54.3					
Omega 3	42.1	38.0	37.0	43.9	31.9					
Dietary fibre	46.7	48.3	54.1	60.4	52.8					
Thiamin (B1)	56.1	66.2	75.8	59.0	78.3	66.7	79.1	84.4	70.4	85.3
Riboflavin (B2)	48.5	82.2	97.3	75.6	99.1	60.2	89.2	98.9	80.1	99.6
Niacin (B3)	96.1	97.6	99.9	97.2	99.6	98.6	99.6	100	100	100
B6	44.8	46.8	47.9	47.6	56.9	54.5	57.8	62.8	57.5	69.6
B12	46.9	71.2	96.1	61.3	97.3	58.0	82.9	97.8	72.2	97.9
Folate	69.9	81.4	91.3	62.7	91.0	82.1	88.8	94.8	83.0	95.2
Vitamin A	38.8	44.5	51.3	38.9	53.7	55.5	60.1	72.5	62.8	76.6
Vitamin C	78.0	80.7	72.8	81.9	75.8	86.9	89.8	84.3	92.1	87.5
Vitamin E	62.1	65.6	61.4	79.4	58.7					
Calcium	5.4	21.4	73.9	22.2	94.4	9.1	42.2	90.8	30.1	98.9
Phosphorus	58.2	84.1	98.3	69.0	99.4	95.0	99.4	100	94.7	100
Zinc	30.3	37.2	47.5	41.2	46.7	44.0	53.4	66.7	48.9	68.3
Iron	47.0	55.8	65.9	50.1	65.5	81.1	83.8	86.4	89.2	85.5
Magnesium	35.9	51.9	63.1	48.0	66.4	55.6	66.0	83.1	74.1	85.8
Iodine	40.7	59.7	91.1	54.0	91.2	67.9	87.9	97.9	68.8	97.2
Selenium	66.9	64.5	72.0	66.4	71.2	79.0	79.4	85.1	71.8	85.6
Potassium	25.6	37.1	57.1	37.6	61.6					

[a] RDI (Recommended Dietary Intake), AI (Adequate Intake) and EAR (Estimated Average Requirement) as defined by the Australian Government, National Health and Medical Research Council [49] [b] ALA, Alpha-linolenic acid

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3. Are dairy avoiders achieving RDIs?

- The HQLE subgroup included 90 “dairy avoiders”
- On average: 0.9 serves of dairy + 0.2 serves of alternatives
- Only 7.7% met the Dietary Guidelines for “dairy (and alternatives)”
- Likelihood of achieving recommended nutrient intakes was also low

HQLE diets meeting RDI (%)

	HQLE diets meeting Aust Dietary Guidelines for dairy (or alter4atives)	HQLE diets of dairy avoiders
Calcium	94.4	22.2
Protein	97.1	74.3
Vitamin B12	97.3	61.3

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Implications

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Implications

- Many lower GHG diets linked to poor nutritional and health indicators
- Current dairy recommendations no barrier to a lower GHG emission diet
- In Australia, risks to adequate nutrition of lower GHGE diets with low to moderate dairy intake
  - Eatwell Guide: “some dairy or dairy alternatives”
  - Canadian Food Guide: dairy no longer a unique food group with recommended serves
- Dairy avoiders:
  - Rarely consume sufficient alternatives to make up for the avoided dairy
  - Not generally making up for “lost nutrients” through meal planning
- In Australia, the evidence suggests that many dairy avoiders are motivated by media or friends and have perceptions that dairy is unhealthy or fattening
- Dairy alternatives may include equivalent calcium, but don’t offer an equivalent nutritional profile
- Is there a PHN need to raise awareness of this?

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Study is published in Eur J of Nutrition

ORIGINAL CONTRIBUTION

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Abstract

Introduction

European Journal of Nutrition
https://doi.org/10.1007/s00394-020-02245-w

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Any questions

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Links to further Australian research on healthy sustainable diets

- Australian diets and water scarcity:
- https://www.mdpi.com/2072-6643/11/8/1846
- https://www.cambridge.org/core/journals/public-health-nutrition/article/an-assessment-of-the-water-use-associated-with-australian-diets-using-a-planetary-boundary-framework/87CE99E328A9E7B8C6189FFEF0E7F981
- Australian diets and cropland demand:
- https://www.mdpi.com/2072-6643/12/5/1212
- Australian diets and climate footprint
- https://www.mdpi.com/2072-6643/13/4/1122
- Climate footprint of livestock production in Australia
- https://www.sciencedirect.com/science/article/pii/S095965262035304X
- https://www.sciencedirect.com/science/article/pii/S1871141321000676?dgcid=author

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