

MEASURE TO MANAGE
CENTER FOR SUSTAINING AGRICULTURE AND NATURAL RESOURCES
WASHINGTON STATE UNIVERSITY

OM-6:OM-3 Ratios of Organic and Conventional Milk: The Nutritional Significance

March 10, 2014

Dr. Charles M. Benbrook

Winter Seminar Series
Soil, Plant, Animal, and Human Nutrition: the Integrated Nature of Sustainability
Oregon State University, ARS, BPP, CSS, FES, and HORT

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COCONUT MILK	HAZELNUT MILK	ALMOND MILK	COW'S MILK
CALCIUM, MAGNESIUM, SODIUM, ZINC, IRON	PROTEIN, POTASSIUM, CALCIUM	CALCIUM, POTASSIUM, MAGNESIUM, PHOSPHORUS	RIB, BLOOD, HORMONES, ANTIBIOTICS

COW'S MILK: Contains millions of pus cells. Leads to mastitis. Contains antibiotics and growth hormones. Is very harmful to our planet. Causes emotional & physical suffering for cows. Supports the real industry. IS FOR BABY COWS. IF YOU CAN READ THIS, YOU'VE LONGER BEEN MILK FROM ANYONE'S MAMMARY GLANDS!

1% lowfat and fat free milk:

- Are better for your heart.
- Are healthier because they have less fat.
- Have the same calcium and vitamins as 2% and whole milk.

La leche baja en grasa (1%) y la leche sin grasa:

- Son mejores para tu corazón.
- Son más saludables porque tienen menos grasa.
- Tienen el mismo calcio y vitaminas que la leche de 2% y la leche completa.

2% Milk is NOT Low in Fat!
¡La leche de grasa reducida (2%) NO es baja en grasa!

Carlos says, "Mooove to 1% lowfat or fat free milk!"
Carlos dice, "¡Muúévete hacia la leche baja en grasa (1%) y la leche sin grasa!"

For adults and children 2 years and older.
Para adultos y niños de 2 años de edad y mayores.

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Open Heart 2014 Editorial

The cardiometabolic consequences of replacing saturated fats with carbohydrates or Ω -6 polyunsaturated fats: Do the dietary guidelines have it wrong?

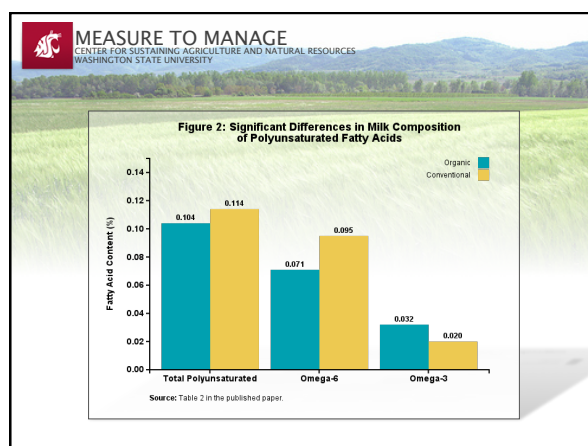
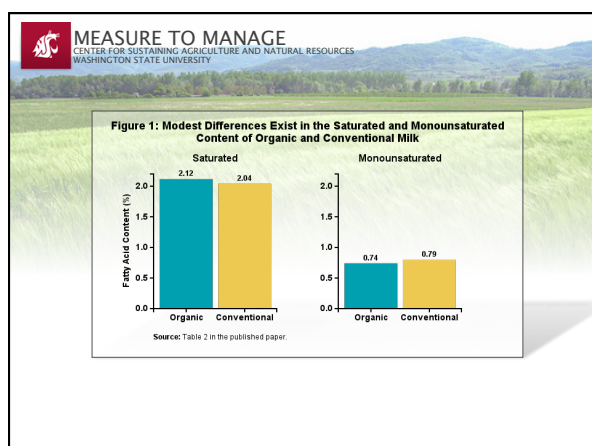
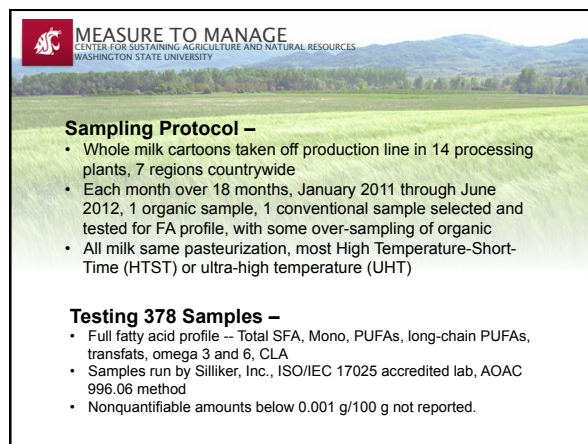
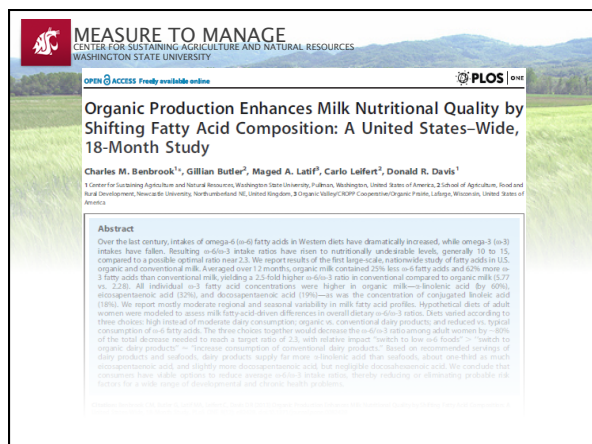
Dr James J DiNicolantonio
Cardiovascular Research and Doctor of Pharmacy, Ithaca, New York, USA

Introduction

A recent publication by Malhotra¹ was refreshing, inspiring and hit on an important topic that has been heavily debated for over 50 years, that is, are saturated fats as bad as we have been led to believe?

History of the low-fat 'diet-heart' hypothesis

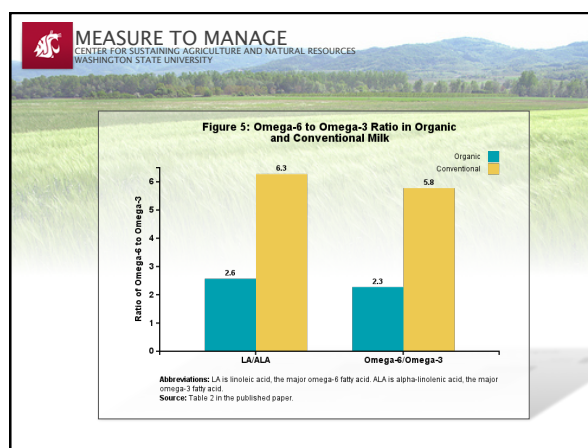
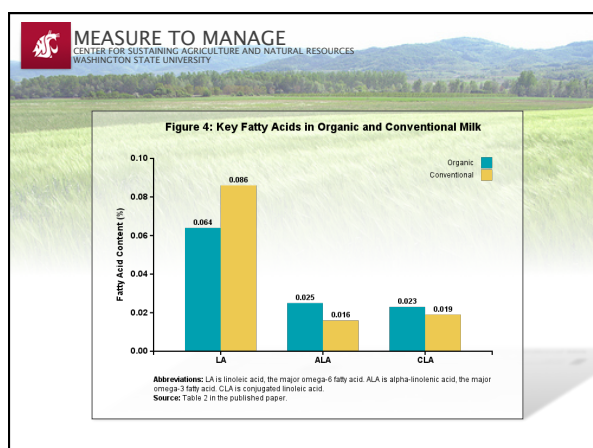
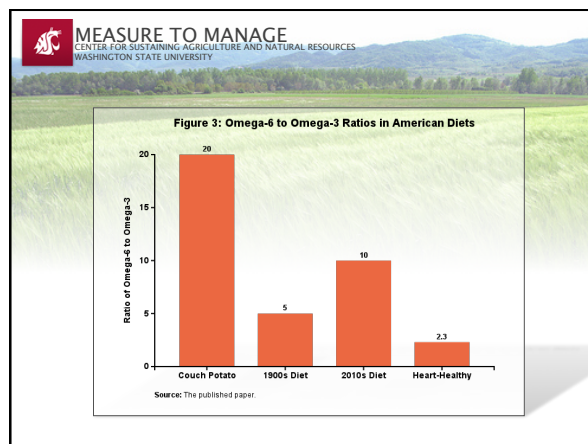
The vilification of saturated fat by Keys² began two decades before the seven countries study, where Keys showed a curvilinear association between fat calories as a percentage of total calories and death from degenerative heart disease from six countries. However, he excluded data from 16 countries that did not fit his hypothesis...

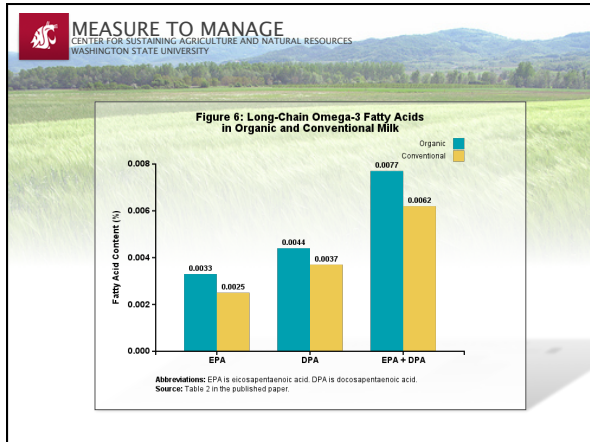


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Why We Focused on the Omega-6/Omega-3 Ratio as the Benchmark for Fatty Acid-Related Milk Quality?

- Most studies of FAs in milk report total omega-6, omega-3 and the omega-6/omega-3 ratio
- Thousands of clinical trials, epi studies, animal experiments utilize the omega-6/omega-3 ratio as a potential risk driver
- Extensive body of literature on enzymatic conversion of LA and ALA
- Same enzymes drive both conversions – one health-promoting (ALA>>EPA, DPA, DHA) and one not (LA>>AA)
- Past studies suggest optimal conversion of ALA to long-chain PUFAs when dietary omega-6/omega-3 intakes are ~2.3:1
- Clear evidence of more extensive, efficient conversion, with greater implications for health outcomes, with vegans, pregnant and lactating women, and children through adolescence

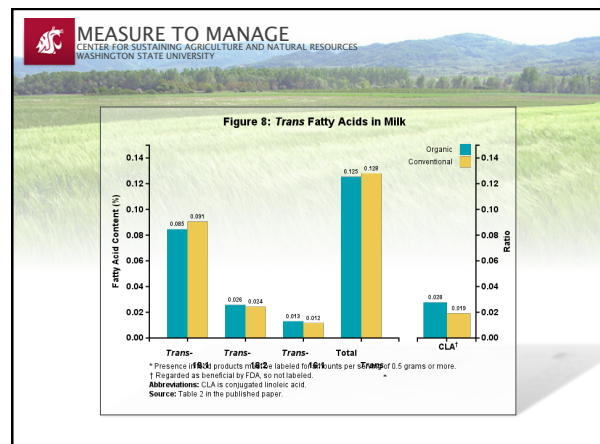
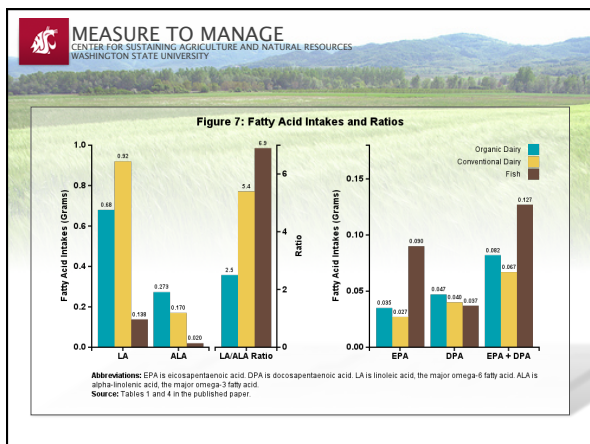


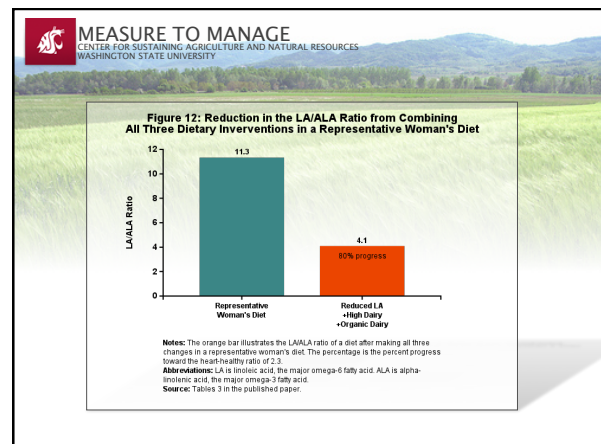
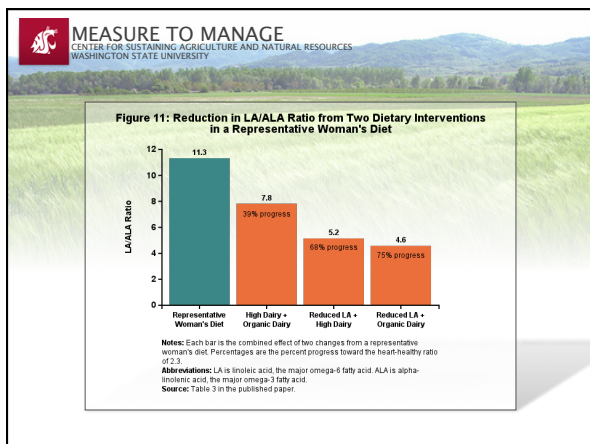
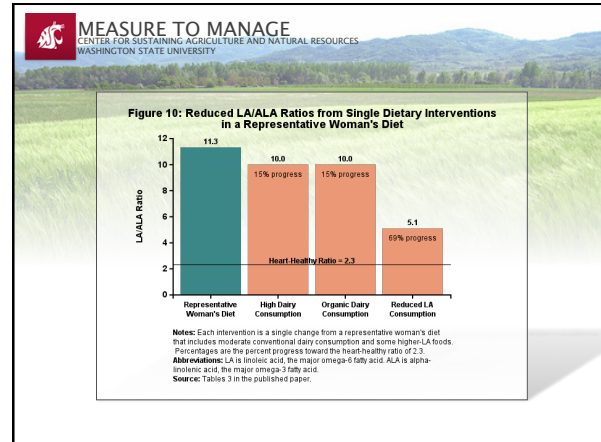
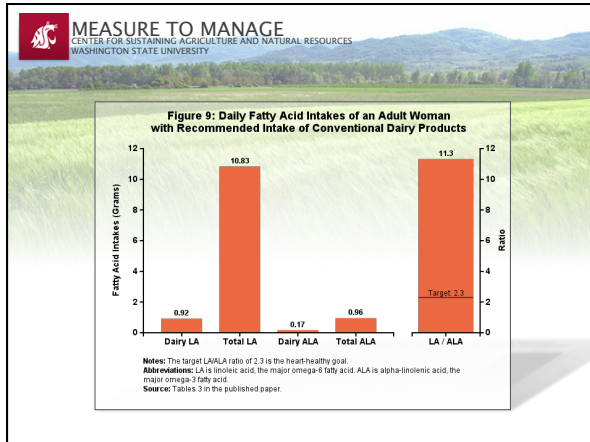


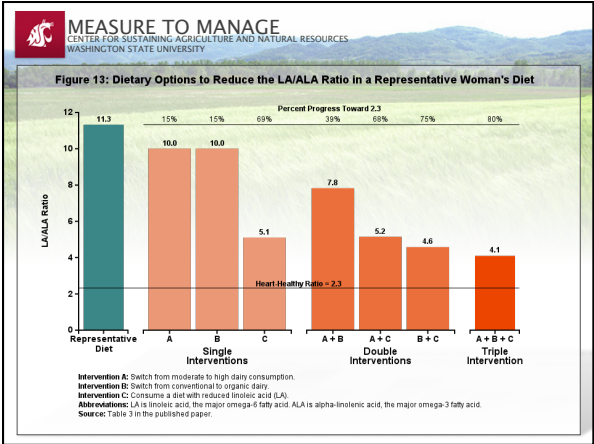
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Challenges from the PLOS ONE Review Editor and Review Process –

- Model daily diets to determine if changes in milk FAs and the omega-6/omega-3 ratio leads to a meaningful change in overall intakes and health outcomes
- Compare milk and dairy products to fish as a source of fatty acids, based on USDA recommended daily intakes of milk/dairy products (equivalent to 24 ounces/day) and fish (8 ounces/week, to avoid excessive PCB, mercury intakes)







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Fatty Acid Content, g/100 g Total Fatty Acids (Percent of Total Fatty Acids)

Value Measured	Authors	Benbrook, et al. 2013	O'Donnell, et al. 2010	Butler, et al. 2011	Palupi, et al. 2011	Stergiadis et al. 2012	Šrednicka-Tober, et al. draft
	Year	2013	2010	2011	2011	2012	7-9-13 draft
	Samples	Retail	Retail	Retail	Mostly raw	Raw	[Tables 3a, 3b]
	Location	US	US	N East UK	8/9 UK, Eur	N East UK	Meta
Total fat, g/100 g milk (Measured or calculated)	Organic	3.33	Not stated	3.75	3.69	3.99	Not stated
	Conven.	3.32	Not stated	3.49	3.59	3.97	Not stated
	Org/Conven						
Linoleic acid, LA	Organic	2.06	2.55	2.01	2.16	1.67	1.90
	Conven.	2.77	3.50	1.75	2.73	1.91	2.17
	Org/Conven	0.74	0.73	1.15	0.79	0.87	0.88
α-Linolenic acid, ALA	Organic	0.82	0.85	0.69	0.76	0.86	0.74
	Conven.	0.51	0.41	0.44	0.48	0.51	0.44
	Org/Conven	1.61	1.59	1.57	1.59	1.69	1.67
ω-6/ω-3 (calculated)	Organic	2.17	3.24	2.64	2.54	1.90	2.20
	Conven.	4.36	7.28	3.76	4.92	3.48	3.41
	Org/Conven	0.50	0.45	0.70	0.52	0.55	0.65
CLA	Organic	0.73	0.70	0.74	0.84	0.74	1.08
	Conven.	0.62	0.57	0.56	0.68	0.69	0.82
	Org/Conven	1.18	1.23	1.32	1.27	1.07	1.21

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