Enhancing the Fatty Acid Profile of Milk Through Forage-Based Rations

Paper By:
Charles Benbrook
Donald R. Davis
Bradley J. Heins
Maged A. Latif
Carlo Leifert
Logan Peterman
Gillian Butler
Ole Faergeman
Silvia Abel-Caines
Marcin Baranski

"Enhancing the Fatty Acid Profile of Milk through Forage-Based Rations, with Nutrition Modeling of Diet Outcomes"

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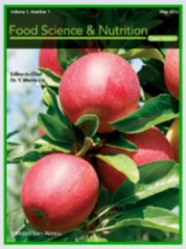
- Peer reviewed journal
- Focused on the impacts of ag production systems on food quality, nutrition, and health



THE TEAM -- PAPER CO-AUTHORS

Charles M. Benbrook, Donald R. Davis, Bradley J. Heins, Maged A. Latif, Carlo Leifert, Logan Peterman, Gillian Butler, Ole Faergeman, Silvia Abel-Caines, Marcin Baranski

Resources on the study accessible at: Hygeia Analytics

www.Hygeia-Analytics.com

https://hygeia-analytics.com/nutrition/organic-vs-conventional-foods/2018-grassmilk-paper/

Study Outline

DURATION

2014 36 months of testing 2016

GRASSMILK SAMPLES

1,163 raw milk

69 processed + bottled

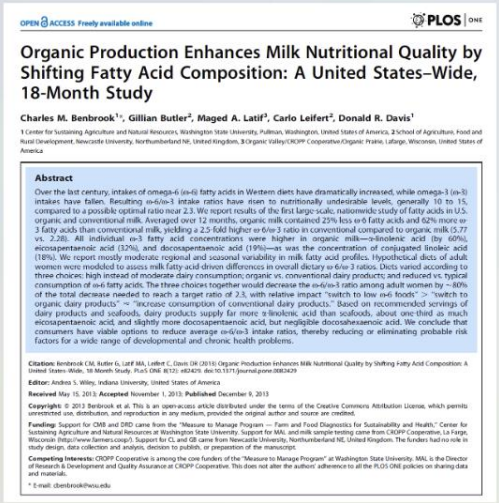
INDEPENDENT, ACCREDITED LAB

SILLIKER
a Mérieux NutriSciences Company

MILK FROM THREE REGIONS

Northeast, Midwest, and California

Conventional and organic milk fatty acid content from Benbrook et al., 2013



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Organic Production Enhances Milk Nutritional Quality by Shifting Fatty Acid Composition: A United States–Wide, 18-Month Study

Charles M. Benbrook[1]*, Gillian Butler[2], Maged A. Latif[3], Carlo Leifert[2], Donald R. Davis[1]

1 Center for Sustaining Agriculture and Natural Resources, Washington State University, Pullman, Washington, United States of America, 2 School of Agriculture, Food and Rural Development, Newcastle University, Northumberland NE, United Kingdom, 3 Organic Valley/CROPP Cooperative/Organic Prairie, Lafarge, Wisconsin, United States of America

Abstract

Over the last century, intakes of omega-6 (ω-6) fatty acids in Western diets have dramatically increased, while omega-3 (ω-3) intakes have fallen. Resulting ω-6/ω-3 intake ratios have risen to nutritionally undesirable levels, generally 10 to 15, compared to a possible optimal ratio near 2.3. We report results of the first large-scale, nationwide study of fatty acids in U.S. organic and conventional milk. Averaged over 12 months, organic milk contained 25% less ω-6 fatty acids and 62% more ω-3 fatty acids than conventional milk, yielding a 2.5-fold higher ω-6/ω-3 ratio in conventional compared to organic milk (5.77 vs. 2.28). All individual ω-3 fatty acid concentrations were higher in organic milk—α-linolenic acid (by 60%), eicosapentaenoic acid (32%), and docosapentaenoic acid (19%)—as was the concentration of conjugated linoleic acid (18%). We report mostly moderate regional and seasonal variability in milk fatty acid profiles. Hypothetical diets of adult women were modeled to assess milk fatty-acid-driven differences in overall dietary ω-6/ω-3 ratios. Diets varied according to three choices: high instead of moderate dairy consumption; organic vs. conventional dairy products; and reduced vs. typical consumption of ω-6 fatty acids. The three choices together would decrease the ω-6/ω-3 ratio among adult women by ~80% of the total decrease needed to reach a target ratio of 2.3, with relative impact "switch to low ω-6 foods" > "switch to organic dairy products" ~ "increase consumption of conventional dairy products." Based on recommended servings of dairy products and seafoods, dairy products supply far more α-linolenic acid than seafoods, about one-third as much eicosapentaenoic acid, and slightly more docosapentaenoic acid, but negligible docosahexaenoic acid. We conclude that consumers have viable options to reduce average ω-6/ω-3 intake ratios, thereby reducing or eliminating probable risk factors for a wide range of developmental and chronic health problems.

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Competing Interests: CROPP Cooperative is among the core funders of the "Measure to Manage Program" at Washington State University. MAL is the Director of Research & Development and Quality Assurance at CROPP Cooperative. This does not alter the authors' adherence to all the PLOS ONE policies on sharing data and materials.

* E-mail: cbenbrook@wsu.edu

Available at:

https://hygeia-analytics.com/nutrition/organic-vs-conventional-foods/#plos-one

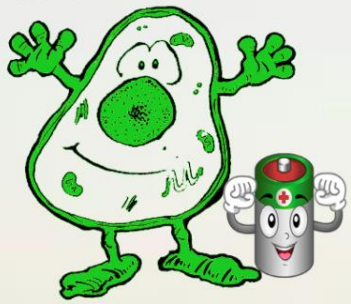
Not All Fats are Created Equal

SOME FATS ARE GOOD FOR YOU -- especially the fatty acids Omega-6s, Omega-3s, Conjugated Linoleic Acid (CLA) and even *some* saturated fats

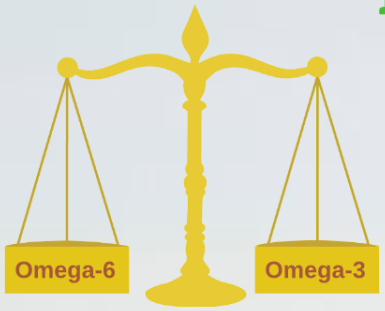
Fatty acids are a key **ENERGY SOURCE** for our cells

QUALITY VS. QUANTITY

Fat quality is as important as quantity

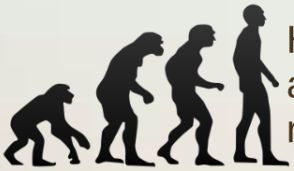


Balance is Key



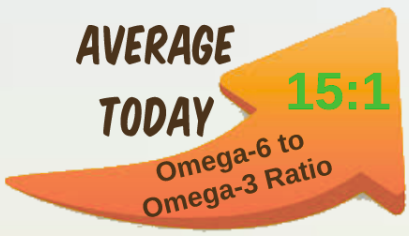
BALANCED intake of Omega-6 and Omega-3 fats promotes heart health and can help prevent obesity and diabetes

EVOLUTIONARY RATIO



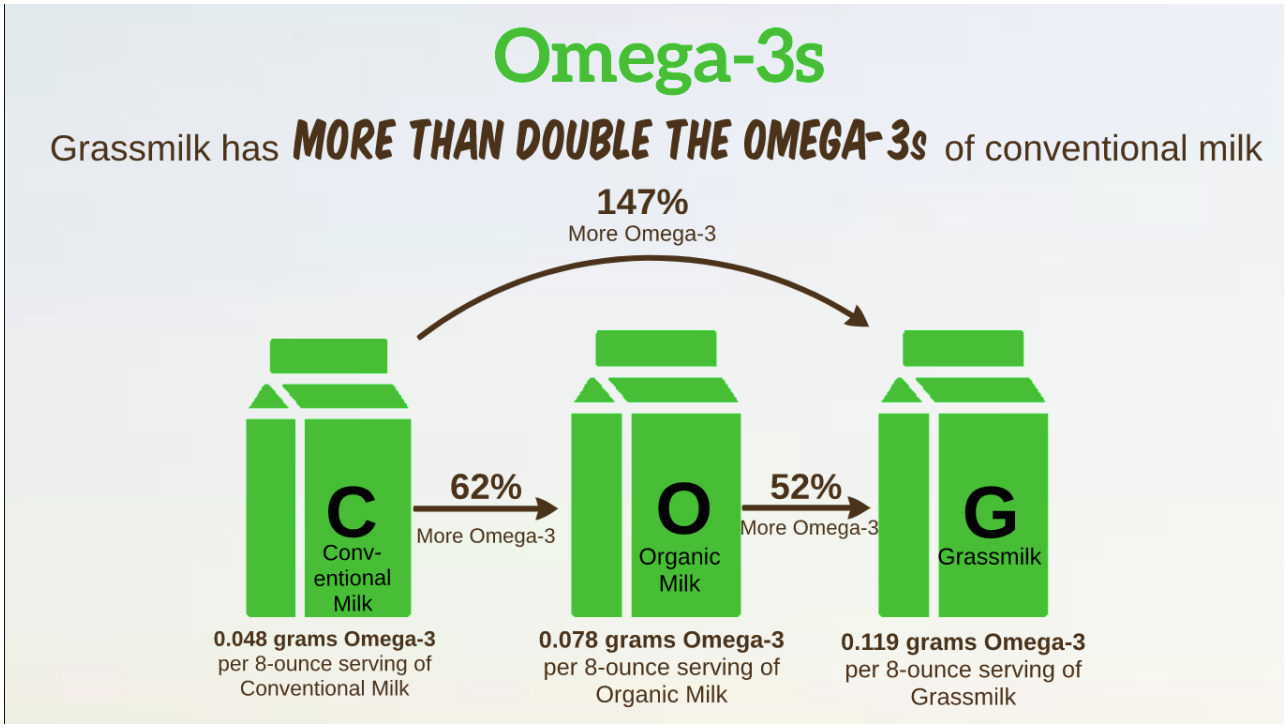
Human's evolved with an Omega-6:Omega-3 ratio of about 1 to 1

AVERAGE TODAY



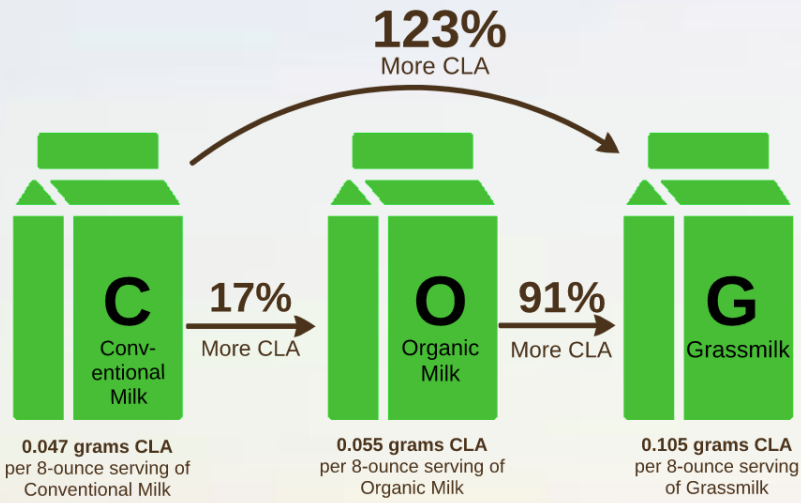
WAY TOO HIGH FOR OPTIMAL HEALTH!


Imbalanced Intakes
Omega-6 Foods
Grain fed meat, fried foods
WE NEED TO EAT MORE HEALTHY FATS!
Omega-3 Foods
Grass-fed meat and dairy, nuts and veggies, some fish
Modern American Diet

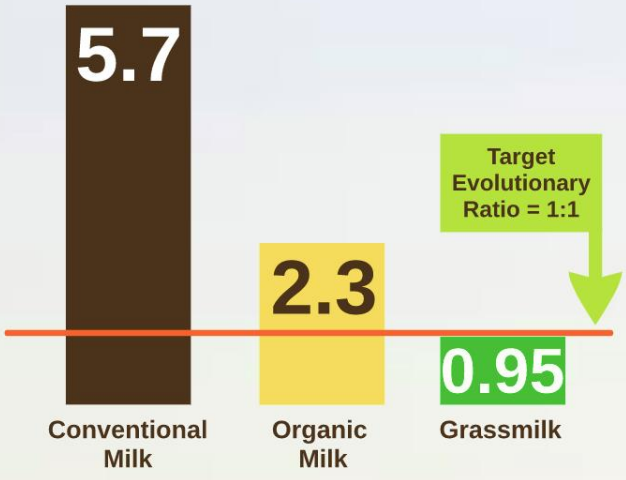

Omega-3s
Grassmilk has MORE THAN DOUBLE THE OMEGA-3s of conventional milk
147%
More Omega-3
C
Conv-entional Milk
62%
More Omega-3
O
Organic Milk
52%
More Omega-3
G
Grassmilk
0.048 grams Omega-3 per 8-ounce serving of Conventional Milk
0.078 grams Omega-3 per 8-ounce serving of Organic Milk
0.119 grams Omega-3 per 8-ounce serving of Grassmilk

Conugated Linoleic Acid (CLA)

And, grassmilk has **123% MORE CONJUGATED LINOLEIC ACID** than conventional milk



Omega-6 : Omega-3 Ratio



The Omega-6 to Omega-3 **RATIO OF GRASSMILK IS A REMARKABLY LOW 0.95,** compared to the still healthy 2.3 in organic milk and 5.7 in conventional milk. Plus grassmilk has **123% MORE CLA THAN CONVENTIONAL MILK!**

Big Improvements Needed

Average Omega-3 intakes are only about 10-30% of the recommended daily level

HOW MUCH CAN GRASSMILK CONSUMPTION INCREASE DIETARY OMEGA-3?

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Average Omega-3 intakes are only about 10-30% of the recommended daily level

HOW MUCH CAN GRASSMILK CONSUMPTION INCREASE DIETARY OMEGA-3?

Omega-6 or Omega-3 amounts in food are not well known, so the team used corresponding fatty acids:

LA → OMEGA-6

Linoleic Acid

ALA → OMEGA-3

Alpha Linolenic Acid

The research team looked at the impact of simple dietary changes on the ALA to LA ratio, like switching to grassmilk dairy products and avoiding three high-LA foods.

Small Changes Make a Big Impact

For
ab
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-2

grassmilk or
ces the LA:ALA

Small Changes Make a Big Impact

For the average American consuming about 1/3 of their calories from fat:

-24%

Three daily servings of grassmilk or grassmilk products reduces the LA:ALA ratio by 24%

-47%

Increasing to 4.5 grassmilk dairy servings reduces the ratio by 47%!!

GRASSMILK PRODUCTS MAKE A BIG DIFFERENCE!

Even More Progress Toward Health

Replacing just three key foods with low Linoleic Acid (LA) options reduces the LA:ALA ratio even more

Low LA Diet

LA:ALA Ratio

-72%

With 3 lower-LA foods a day along with 4.5 servings of grassmilk dairy products, the LA:ALA ratio falls from 11.3 to 3.2 --

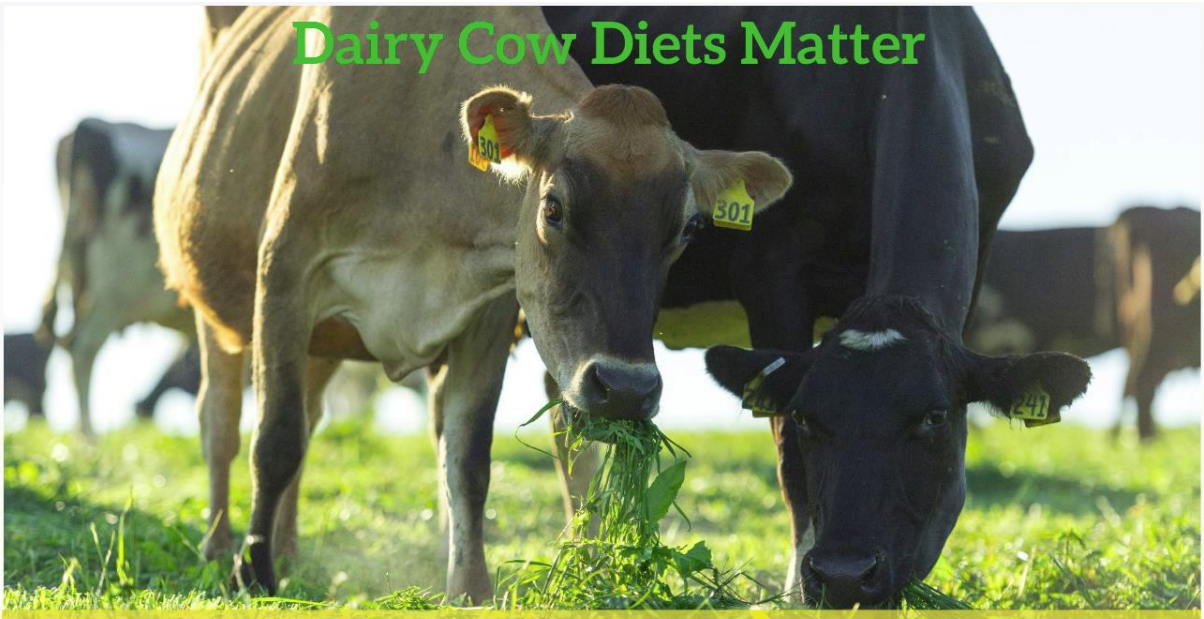
HUGE PROGRESS TOWARDS THE OPTIMAL, HEART-HEALTHY GOAL

So, you can greatly improve your Omega-6:Omega-3 ratio without major changes in the foods you eat

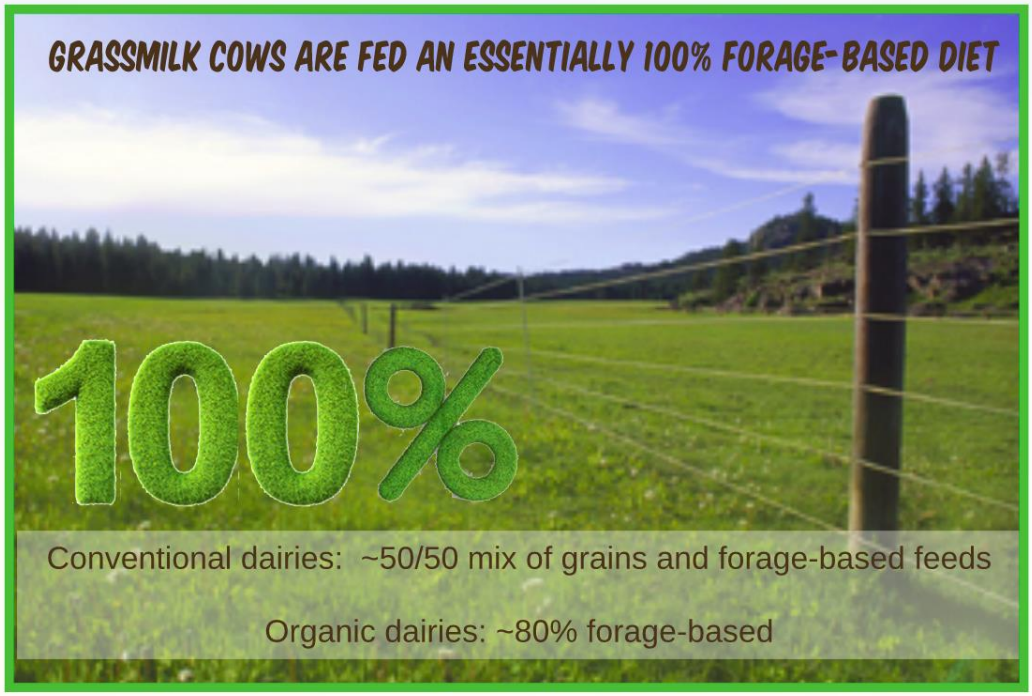
Fatty Acids in Fish

Often nutritionists consider fish to be the best dietary source of healthy fatty acids - but **70% OF AMERICANS CONSUME LITTLE OR NO FISH**

Many types of fish and shellfish contain low levels of the major Omega-6 (LA) and Omega-3 (ALA), so **EATING FISH DOES NOT USUALLY HAVE A SIGNIFICANT IMPACT ON A PERSON'S OVERALL OMEGA-6 TO OMEGA-3 RATIO**

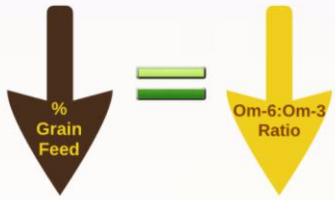


When a cow eats grass and legume forages, her milk is high in Omega-3 fatty acids and CLA, while consuming grains boosts Omega-6 content.



Impact of Dairy Cow Diet on Omega Ratio

AS THE PERCENT OF GRAIN FEED IN A COW'S DIET GOES DOWN, SO DOES THE OMEGA-6:OMEGA-3 RATIO OF HER MILK



BECAUSE:

BECAUSE:

Important forage feeds have a very low LA:ALA ratio of **between 0.26 and 0.54**

ALFALFA RYEGRASS RED CLOVER

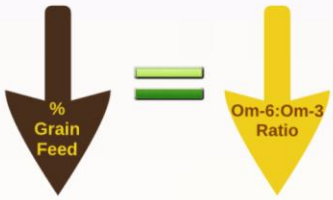
By contrast, grains are much higher.

LA:ALA Ratio:
Oats, grain= 27
Corn, grain = 49!

CORN OATS

Impact of Dairy Cow Diet on Omega Ratio

AS THE PERCENT OF GRAIN FEED IN A COW'S DIET GOES DOWN, SO DOES THE OMEGA-6:OMEGA-3 RATIO OF HER MILK



BECAUSE:

But -- young, vegetative stage grains are allowed in grassmilk feed as their LA:ALA ratio remains low (around 0.3) until plants mature to the soft-dough stage.

Want more?

Hygeia Analytics
hygeia-analytics.com

Email: charlesbenbrook@gmail.com

See Hygeia-Analytics for many more resources, including a pdf of the paper, full-length dynamic presentation, and background information on fatty acids.

https://hygeia-analytics.com/nutrition/organic-vs-conventional-foods/2017-grassmilk-paper

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