

# Ruminant Reality: Diet, Human Health and the Environment

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*Forage Ambassador*

North Dakota Grazing Lands Coalition  
Winter Meeting  
Bismarck, ND  
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The opinions expressed in this presentation are based upon Dr. Peter J. Ballerstedt's understanding of the relevant published scientific literature. They are not necessarily the opinions of Barenbrug Holding, Barenbrug USA, or the other Barenbrug companies.



**But I'm workin' on 'em!**

We can't feed TODAY'S world without ruminant animal agriculture,  
let alone the world of 2050.

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We must improve efficiency & productivity of ruminant animal agriculture.



“What’s a forage agronomist and what are you doing here?”

# Personal



YouTube – Peter Ballerstedt  
blog & facebook - Grass Based Health  
Twitter & Instagram – @GrassBased  
peter.ballerstedt@gmail.com

Twitter @GrassBased  
Facebook - Grass Based Health



# Ruminants Rule!

We eat plants

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so you don't *HAVE* to!

# Ruminants Rule!

We eat plants

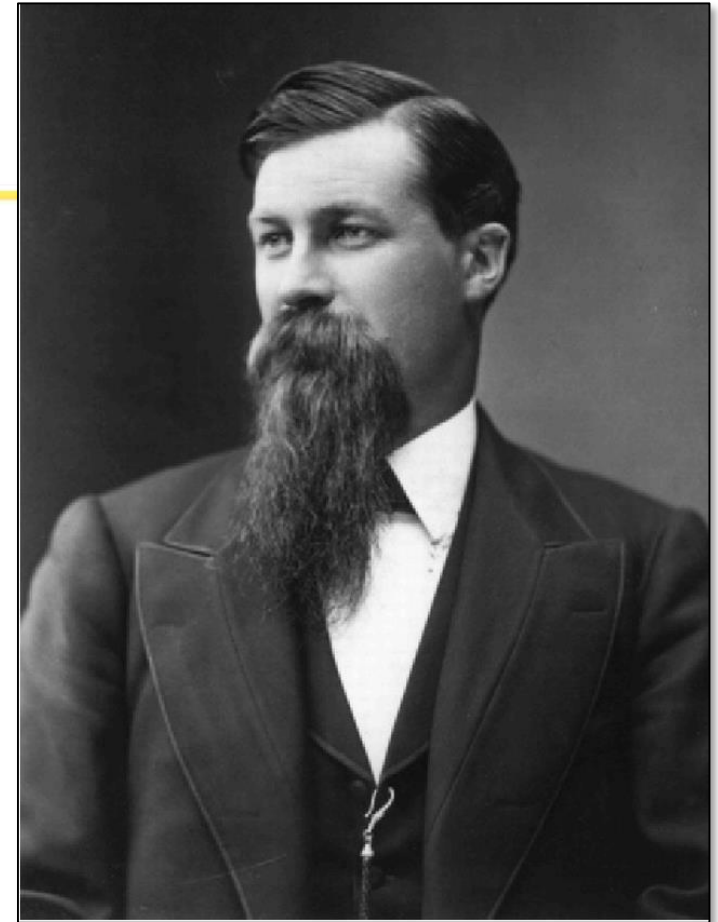


so you don't *HAVE* to!

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"When our soils are gone, we too, must go unless we find some way to feed on raw rock."

Thomas C. Chamberlain, 1908



Thomas C. Chamberlain, ca 1870s

Bailey, R. W. 1964. Mountain Water. Dept. of Agriculture, Forest Service, Intermountain Forest. Available from: <https://goo.gl/KK9H9v>

Image source - <https://goo.gl/DqGhfn>



# “The greatest wealth is health.”

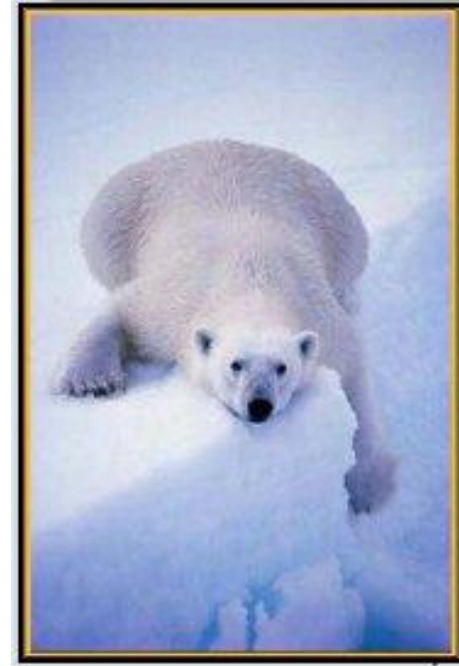
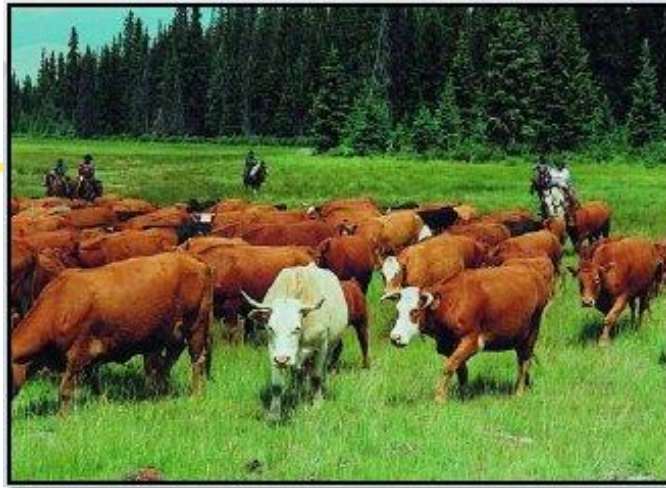
- Virgil



“Cattle grazing pastures when prairie sandreed and sand bluestem are at the elongation stage in late June and July. (Walter Schacht, 2005)”

## Healthy soil & healthy people, thanks to ruminants!

# Which mammals are designed to digest a low fat diet?



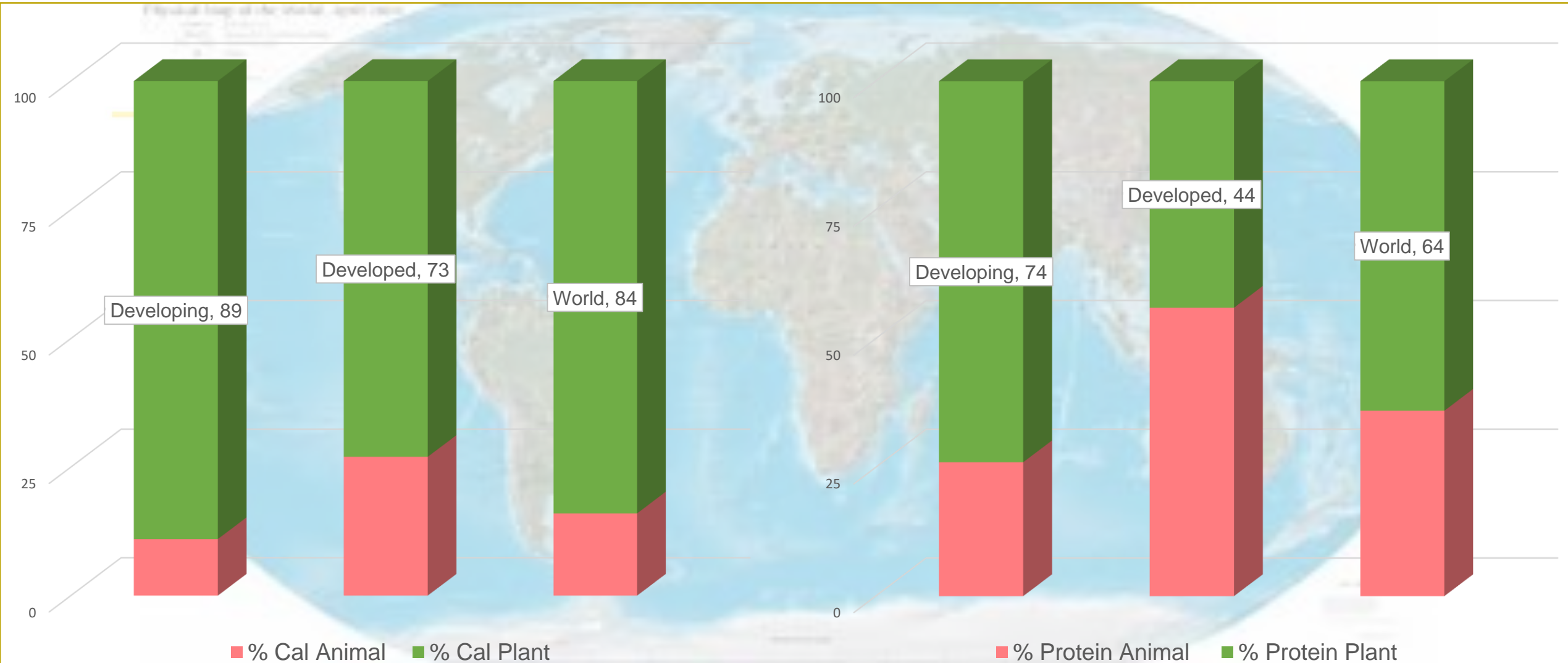
# The challenge ahead

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- UN projects world population will reach 9+ billion by mid-century
- UN has called for a 100 percent increase in world food production by 2050
- FAO predicts a 66% increase in demand for animal protein by 2050
- Must come from virtually the same land area as today.

# Percent of food calories and protein from plant products

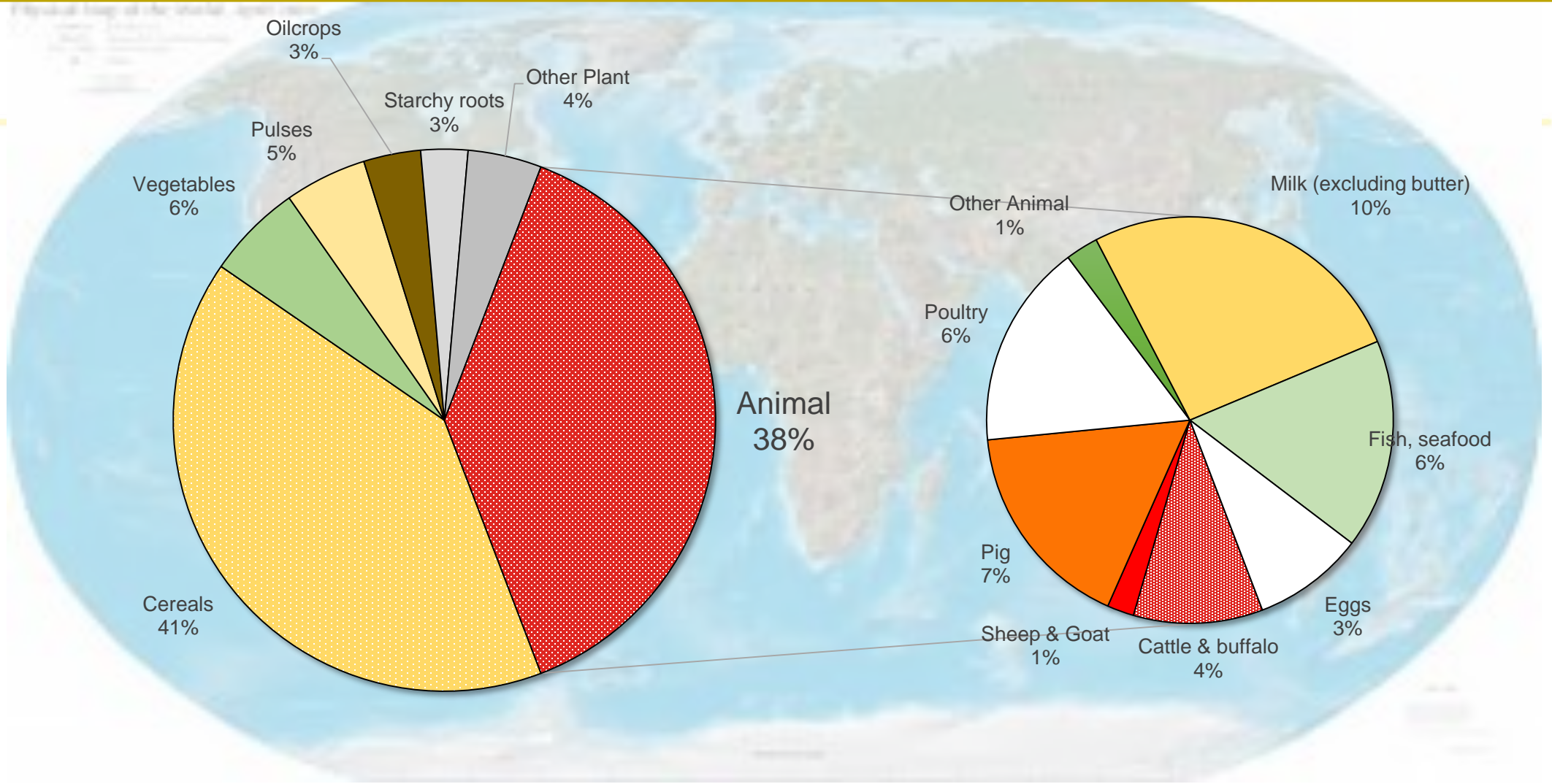


FAOSTAT (Food and Agriculture Organization of the United Nations, FAOSTAT database). 1997. <https://goo.gl/mkinwQ>

Cited In: Delgado, C. L., C. C. B. Courbois, and M. L. Rosegrant. 1998. Global food demand and the contribution of livestock as we enter the new millennium.

<https://goo.gl/CbjDKQ>

# Global Protein Supply



Data from Riddet <https://goo.gl/cKzRAi> and FAO <https://goo.gl/JVVEWu>

# Animal- vs plant-source foods

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Energy – Isocaloric quantities are NOT isometabolic

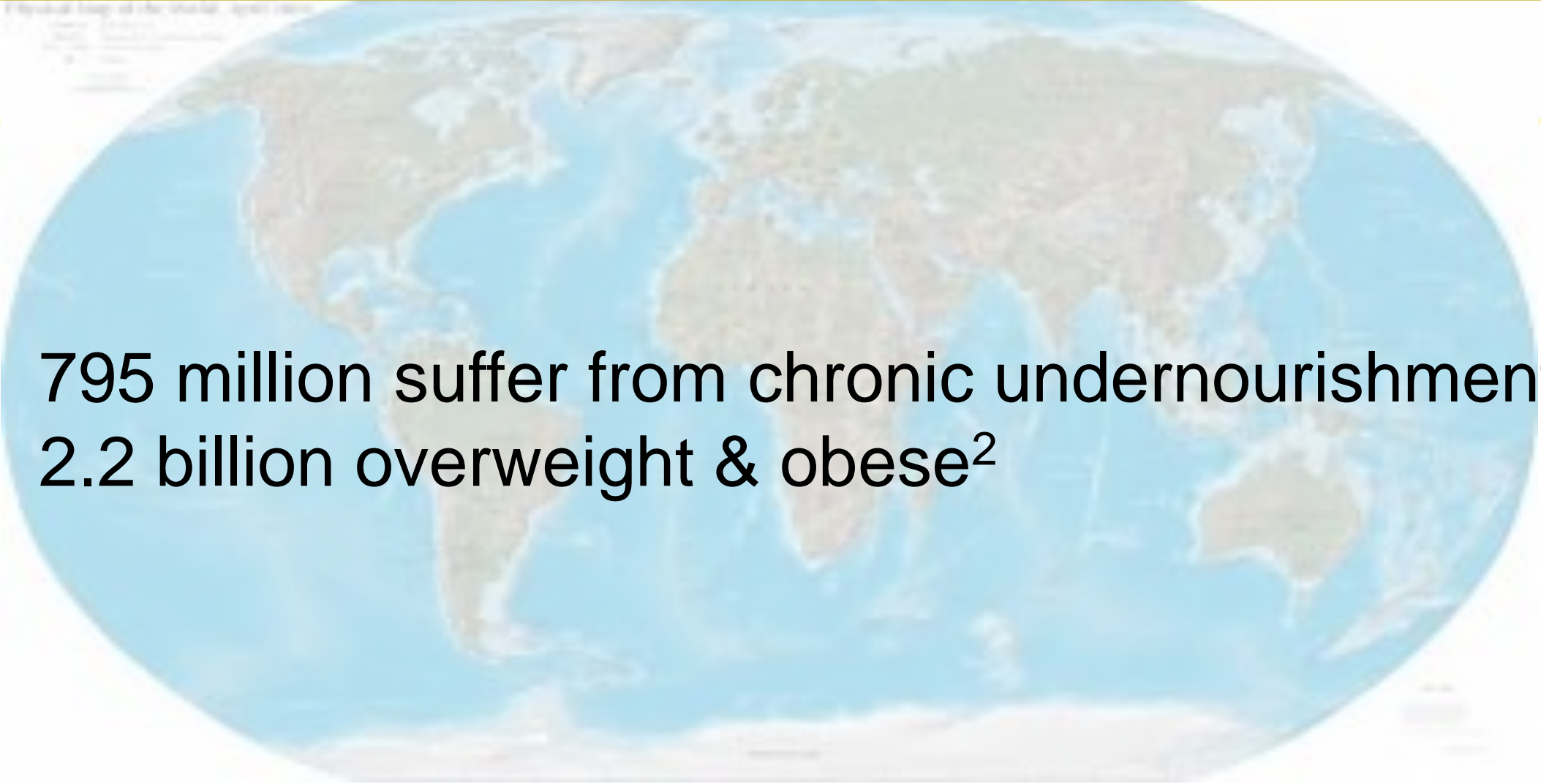
Protein & minerals – Isometric quantities are NOT isometabolic.

Vitamins – “Requirement” is dependent upon source.

Plant-sourced foods are NOT *required*.



# Malnourishment in today's world



795 million suffer from chronic undernourishment<sup>1</sup>  
2.2 billion overweight & obese<sup>2</sup>

FAO <https://goo.gl/Ta47sg>

Lancet <https://goo.gl/bThgFx>

This should be among our top priorities:  
Making sure that all children have a healthy start.  
Putting them on restrictive diets (either because of ideology or because of economic limitations) limits their potential.

### Brain food: Clever eating

*Nature* 531, S12–S13 (03 March 2016)

Sujata Gupta

There is a clear, but underappreciated link between meat and the mind, says Charlotte Neumann, a paediatrician at [UCLA], who has studied **meat eating in Africa and India** for the past three decades. Deficiencies in the micronutrients found in meat have been linked with brain-related disorders, including low IQ, autism, depression and dementia. [...] In the 1980s, researchers began to suspect that a lack of meat in some poor rural villages was contributing to a spectrum of **childhood problems**, including short stature, weakened immunity, social difficulties and poor school performance.

*Br. J. Nutr.* 2014 Mar 14;111(5):875–88. doi: 10.1017/S0007114513003310. Epub 2013 Oct 30.

#### **Animal source foods have a positive impact on the primary school test scores of Kenyan schoolchildren in a cluster-randomised, controlled feeding intervention trial.**

Huete JL<sup>1</sup>, Weiss RE<sup>2</sup>, Bwibo NQ<sup>3</sup>, Galal OM<sup>1</sup>, Drotbaugh N<sup>1</sup>, Neumann CG<sup>1</sup>.

Micronutrient deficiencies and suboptimal energy intake are widespread in **rural Kenya**, with detrimental effects on child growth and development [...] Folate, Fe, available Fe, energy per body weight, vitamin B<sub>12</sub>, Zn and riboflavin intake were significant contributors to the change in test scores. The greater improvements in test scores of children receiving [animal source foods] indicate improved academic performance, which can result in greater academic achievement.

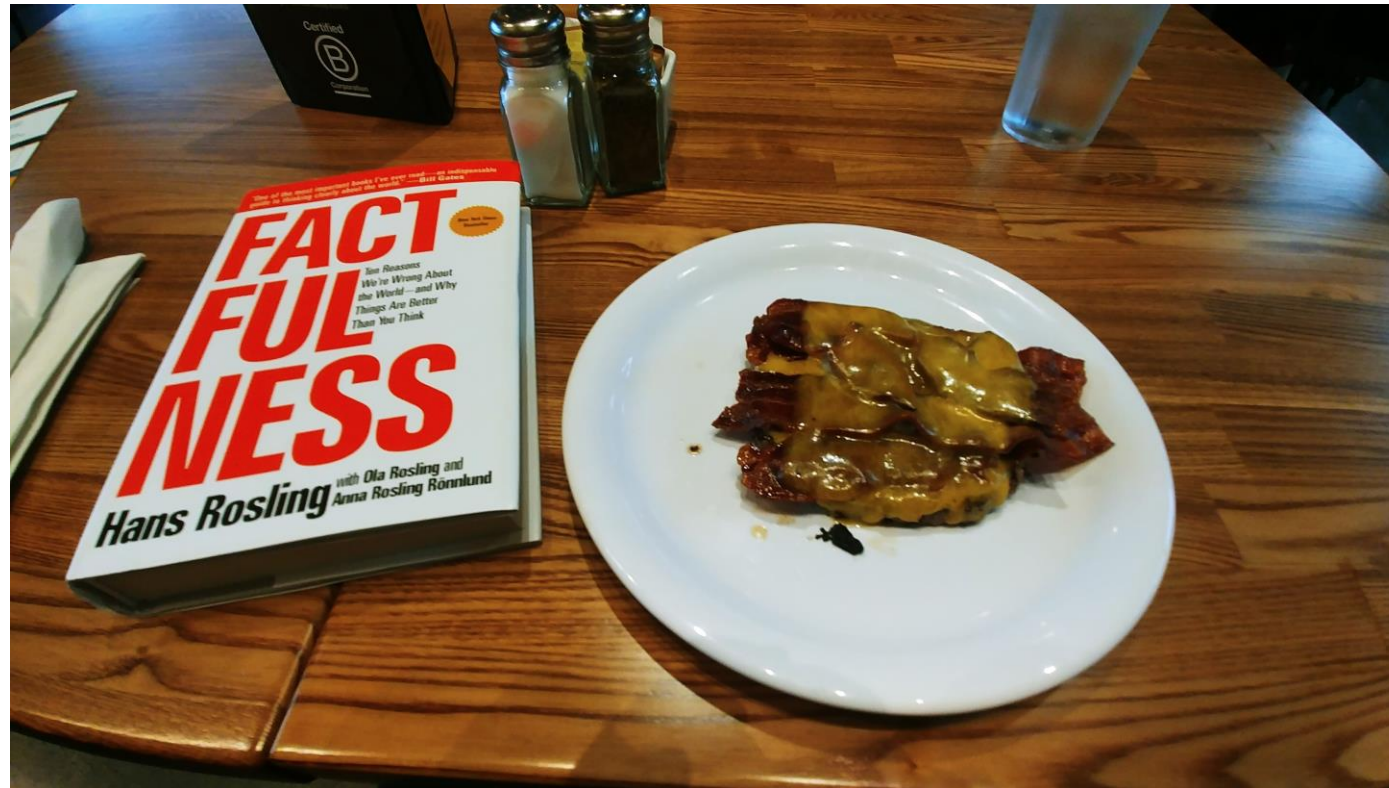




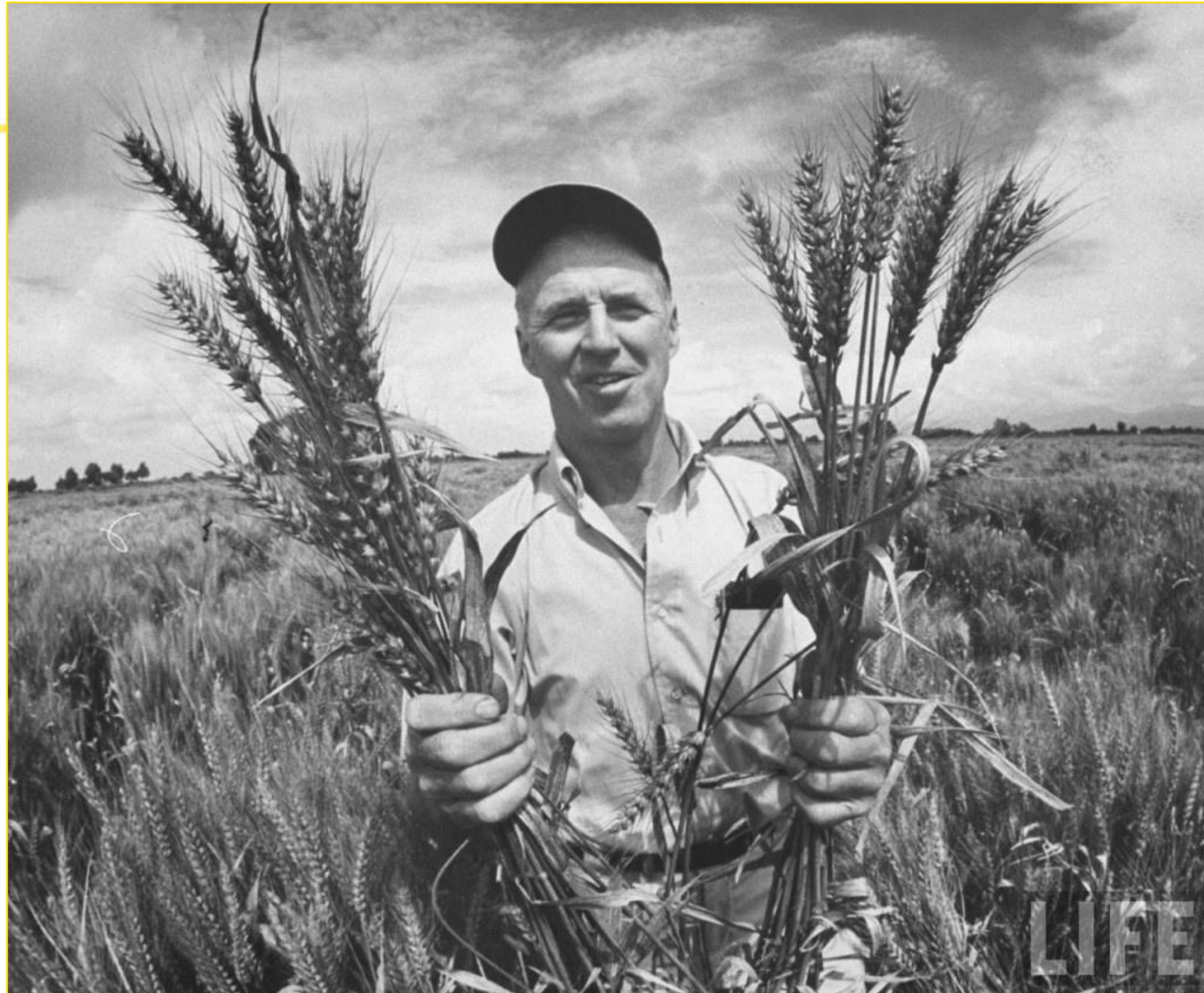
# Hans Rosling

## *Factfulness: Ten Reasons We're Wrong About the World- -and Why Things Are Better Than You Think*

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# The Green Revolution



# Ruminant Revolution



Che Cowvara

# Headlines are largely negative regarding beef and sustainability

- Increased scrutiny of beef's environmental impacts, animal welfare concerns, merging with health/nutrition
  - All fall under the umbrella of **sustainability**

REVIEW

## Meat consumption, health, and the environment

H. Charles J. Godfray<sup>1,2\*</sup>, Paul Aveyard<sup>1,3</sup>, Tara Garnett<sup>1,4,5</sup>, Jim W. Hall<sup>1,4</sup>, Timothy J. Key<sup>1,6</sup>, Jamie Lorimer<sup>1,7</sup>, Ray T. Pierre...

• See all authors and affiliations

Science 20 Jul 2018;  
Vol. 361, Issue 6399, eam5324  
DOI: 10.1126/science.125324

Food

## Rising global meat consumption 'will devastate environment'

Analysis suggests eating of meat will climb steeply and play significant role in increasing carbon emissions and reducing biodiversity



▲ Steaks and other meat products displayed for sale at a grocery store in Midvale, Utah. (AP Photo/John A. Crook)

Rising global meat consumption is likely to have a devastating environmental impact, scientists have warned.

ENVIRONMENTAL FOOTPRINT

## The world's biggest farms pollute more than any oil company

by Jeff Green

The world's biggest meat and dairy operations combined pump more greenhouse gas into Earth's warming atmosphere than any one of the largest fossil-fuel giants.

A report published this week by the nonprofit Institute for Agriculture and Trade Policy (IATP) shows the top five animal agriculture companies emit more greenhouse gases than...

FOOD

MISSION

IMPOSSIBLE™

ASK US

LATEST

## TO SAVE MEAT. AND EARTH.

We've been eating meat since we lived in caves. And today, some of our most magical moments together happen around meat: Weekend barbecues. Midnight fast-food runs. Taco Tuesdays. Hot dogs at the ballpark. Those moments are special, and we never want them to end. But using animals to make meat is a prehistoric and destructive technology. Animal agriculture occupies almost half the land on earth, consumes a quarter of our freshwater and destroys our ecosystems. So we're doing something about it: We found a way to make meat using plants, so that we never have to use animals again. That way, we can eat all the meat we want, for as long as we want. And save the best planet in the known universe.

CNN tech

BUSINESS

CULTURE

GADGETS

FUTURE

STARTUPS

## WeWork is banning meat

by Sara Ashley O'Brien @saraashleyo

🕒 July 13, 2018 5:25 PM ET

“Hell hath no fury like a vested interest masquerading as a moral principle.”



Twitter @GrassBased  
Facebook - Grass Based Health



The zealots are coming!  
The zealots are coming!!

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Extended (yet incomplete) overview of the academic, industrial, and political web around the **EAT-Lancet** initiative and what seems to be its broader think tank driven by various vested interests: the **Food and Land Use Coalition**

Its aim: a systematic change towards more plant-based diets and a depiction of livestock as harmful for health, animals, and the planet

Its strategy: pushing for rapid change on different levels, now that a critical tipping point has been reached, so that change can become permanent (rather than a passing “lifestyle” trend)

Its tools: lobbying for a “meat tax” by connecting with decision makers, organizing a flow of reports that incriminate livestock, developing a profitable market for vegan foods, creating associations with academics and NGOs for credibility



# EAT-Lancet will claim

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- Worldwide reduction in consumption
  - Beef – 75% (90% in US)
  - Pork – 90%
  - Eggs – 50%
- Worldwide increase in consumption
  - Beans – 300%
  - Nuts & Seeds – 400%
- Diseases related to meat consumption kill 2.4 million/year
- Taxing meat to reduce consumption would save 222,000 lives/year.



The zealots want a 34% meat tax!



The zealots want a 163% bacon tax!



When each strand of the narrative is tested,



it is shown to be weak, based upon flawed beliefs.

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"There's no interventional evidence in support of plant-based diets that isn't confounded by numerous other variables, and there is plenty of strong science supporting health risks of plant-based diets as well as strong science supporting the requirement for animal foods in the human diet."

– Georgia Ede, MD

<http://www.diagnosisdiet.com>



# Both professions wear white coats. Which is better for your health?

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h/t Shawn Baker MD @SBakerMD

“If an honest man is wrong, after demonstrating that he is wrong, he either stops being wrong or he stops being honest.” Anonymous



# True or False?

- Dietary cholesterol has no meaningful effect on total cholesterol (TC) levels.

Rittenberg, D., and R. Schoenheimer. 1937. "Deuterium as an Indicator in the study of Intermediary Metabolism. XI. Further Studies on the Biological Uptake of Deuterium into Organic Substances, with Special Reference to Fat and Cholesterol Formation." *Journal of Biological Chemistry*. 121:235-53.



# True or False?

- Total cholesterol is unrelated to risk of Coronary Heart Disease (CHD).
- Low Density Lipoprotein (LDL) cholesterol is a marginal risk factor for CHD.

Castelli, W. P., J. T. Doyle, T. Gordon, et al. 1977. "HDL Cholesterol and Other Lipids in Coronary Heart Disease: The Cooperative Lipoprotein Phenotyping Study." *Circulation*. May; 55(5)767-72.

Gordon, T., W. P. Castelli, M. C. Hjortland, W. B. Kannel, and T. R. Dawber. 1977. "High Density Lipoprotein as a Protective Factor Against Coronary Heart Disease." *American Journal of Medicine*. May; 62(5)707-14.



# True or False?

- Total cholesterol is unrelated to risk of Coronary Heart Disease (CHD).
- Low Density Lipoprotein (LDL) cholesterol is a marginal risk factor for CHD.
- Higher TC is associated with greater longevity for women and seniors.

Hulley, S. B., J. M. Walsh, and T. B. Newman. 1992. "Health Policy on Blood Cholesterol: Time to Change Directions." *Circulation*. Sept.; 86(3):1026-29.



# True or False?

- Total cholesterol is unrelated to risk of Coronary Heart Disease (CHD).
- Low Density Lipoprotein (LDL) cholesterol is a marginal risk factor for CHD.
- Higher TC is associated with greater longevity for women and seniors.
- Lower TC is associated with greater cancer mortality.

Dayton, S. D., M. L. Pearce, S. Hashimoto, W. J. Dixon, and U. Tomiyasu. 1969. "A Controlled Clinical Trial of a Diet High in Unsaturated Fat in Preventing Complications of Atherosclerosis." *Circulation*. July; 40(1):11-1-62

# True or False?

- Saturated fat does not cause heart disease.

Hoenselaar, R. 2012. "Saturated Fat and Cardiovascular Disease: The Discrepancy Between the Scientific Literature and Dietary Advice." *Nutrition*. 28: 118-123.

Skeaff, C. M., J. Miller, 2009. "Dietary Fat and Coronary Heart Disease: Summary of Evidence from Prospective Cohort and Randomised Controlled Trials." *Annals of Nutrition and Metabolism*. Sept. 15: 173-201.

Siri-Tarino, P.W., Q Sun, F. B. Hu, R. M. Krauss. 2010. "Saturated fat, carbohydrate, and cardiovascular disease." *Am J Clin Nutr*. 2010; 91: 502-9.

# True or False?

- Saturated fat does not cause heart disease.
- Saturated and total fat positively associated with longevity.

Gordon, T., W. P. Castelli, M. C. Hjortland, W. B. Kannel, and T. R. Dawber. 1977. "High Density Lipoprotein as a Protective Factor Against Coronary Heart Disease." *American Journal of Medicine*. May; 62(5)707-14.

Feinleib, M. 1981. "On a Possible Inverse Relationship Between Serum Cholesterol and Cancer Mortality." *American Journal of Epidemiology*. Jul; 114(1)5-10.

# True or False?

- Saturated fat does not cause heart disease.
- Saturated and total fat positively associated with longevity.
- A low fat diet will increase your risk of Cardio-Vascular Disease (CVD).

Krauss, R. M. 2005. "Dietary and Genetic Probes of Atherogenic Dyslipidemia." *Arteriosclerosis, Thrombosis, and Vascular Biology*. Nov.: 25(11):2265-72.

# True or False?

- High fat diets produces greater weight loss, better blood glucose control, and reduced CVD risks.

Gardner, C. D., A. Kiazand, S. Alhassan, et al. 2007. "Comparison of the Atkins, Zone, Ornish, and LEARN Diets for Change in Weight and Related Risk Factors Among Overweight Premenopausal Women: The A TO Z Weight Loss Study, a Randomized Trial." *Journal of the American Medical Association*. Mar 7;297(9):969-77.



## A study published in 2003 asked physicians several general nutrition questions:

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- 93% did not know that a low-fat diet, in general, would increase blood triglycerides.
- 75% did not know a low-fat diet would decrease HDL; 50% thought that a low-fat diet would not change HDL.
- 50% did not know carbohydrate was the diet component most likely to raise triglycerides.



Flynn, M., C. Sciamanna, and K. Vigilante. 2003. "Inadequate Physician Knowledge of the Effects of Diet on Blood Lipids and Lipoproteins." *Nutrition Journal*. 2:19

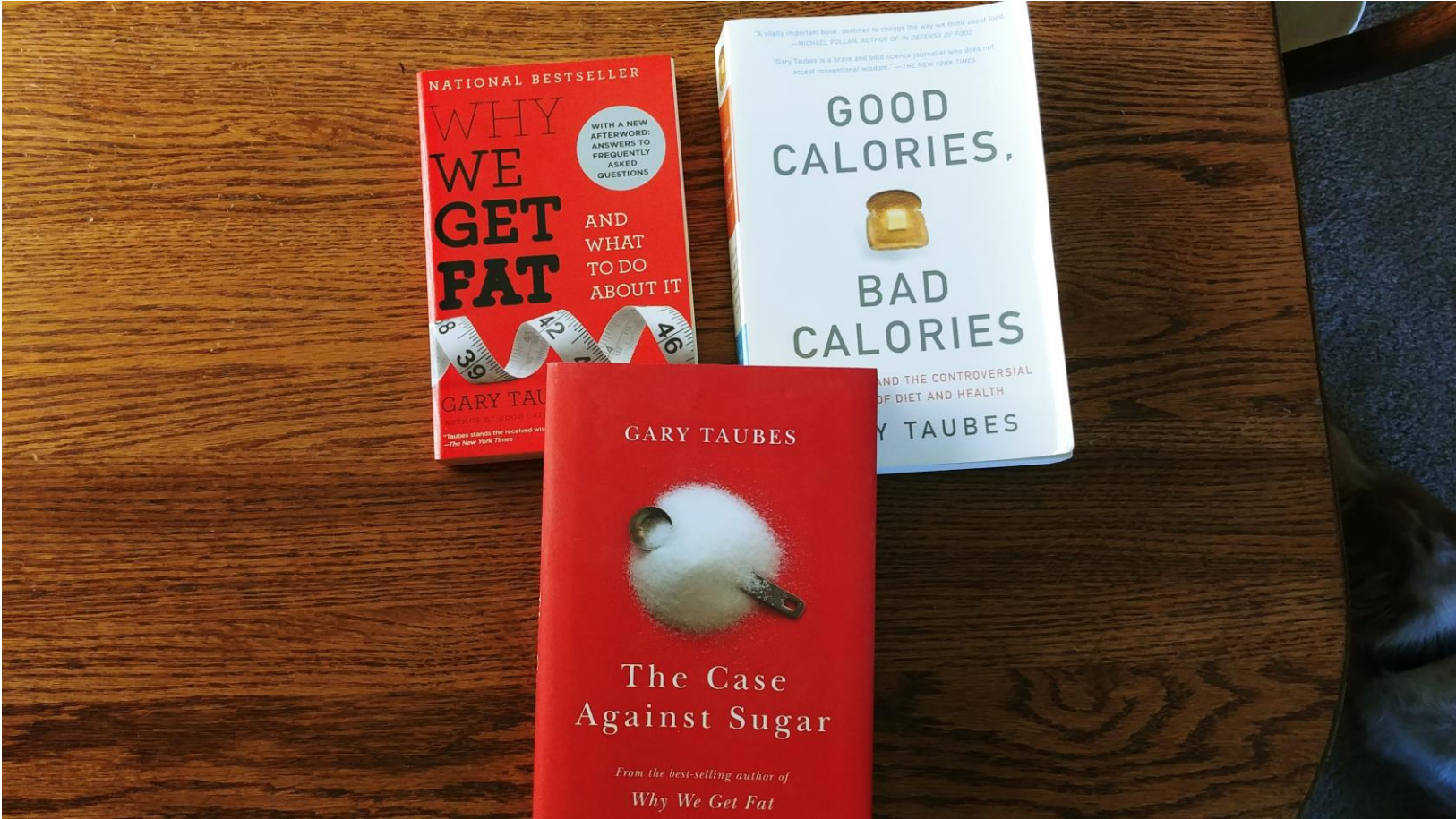
Why are you learning this from a



Forage Agronomist?

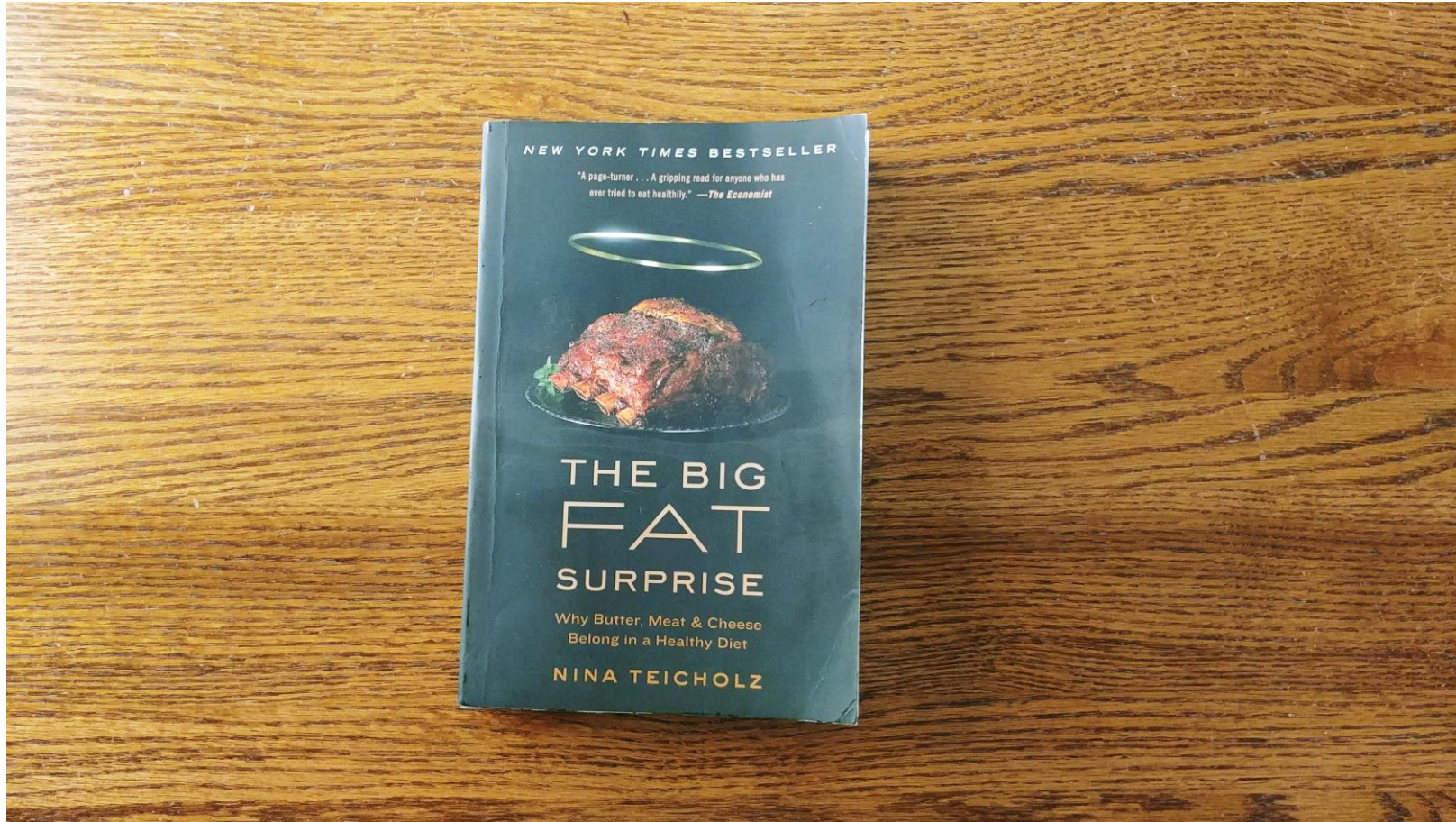


# Gary Taubes



# Nina Teicholz

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“Consumers and producers alike care about animal welfare, environmental stewardship, food safety, nutrition and taste.”

- Amanda Radke



# And wouldn't it be *really* amazing if...

...there were a way to convert inedible (by humans) materials into high-quality food for humans...

... utilizing that portion of the Earth's surface that cannot produce human-utilizable feedstuffs...

...while improving the environment,...

... improving human health,...

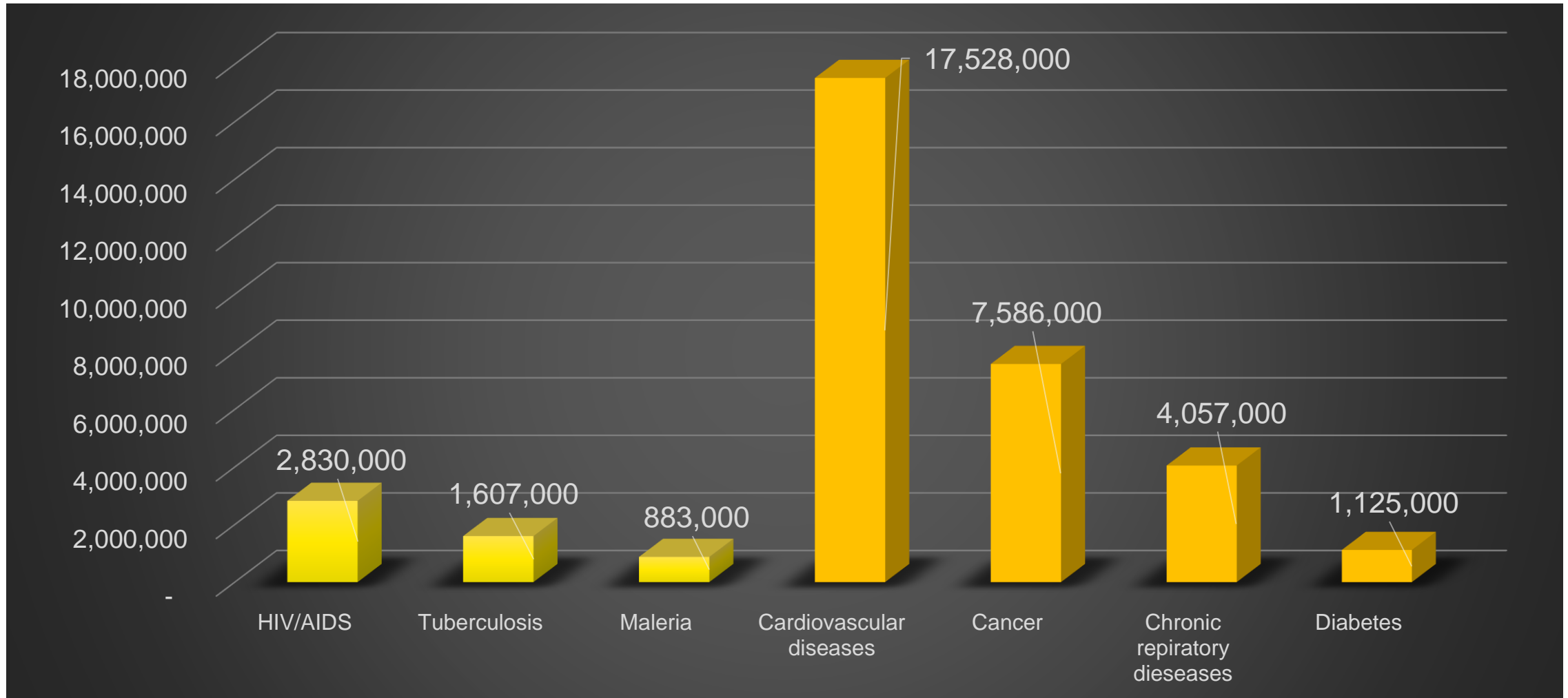
...and increasing human flourishing?

Oh, wait...

## Ruminants RULE!



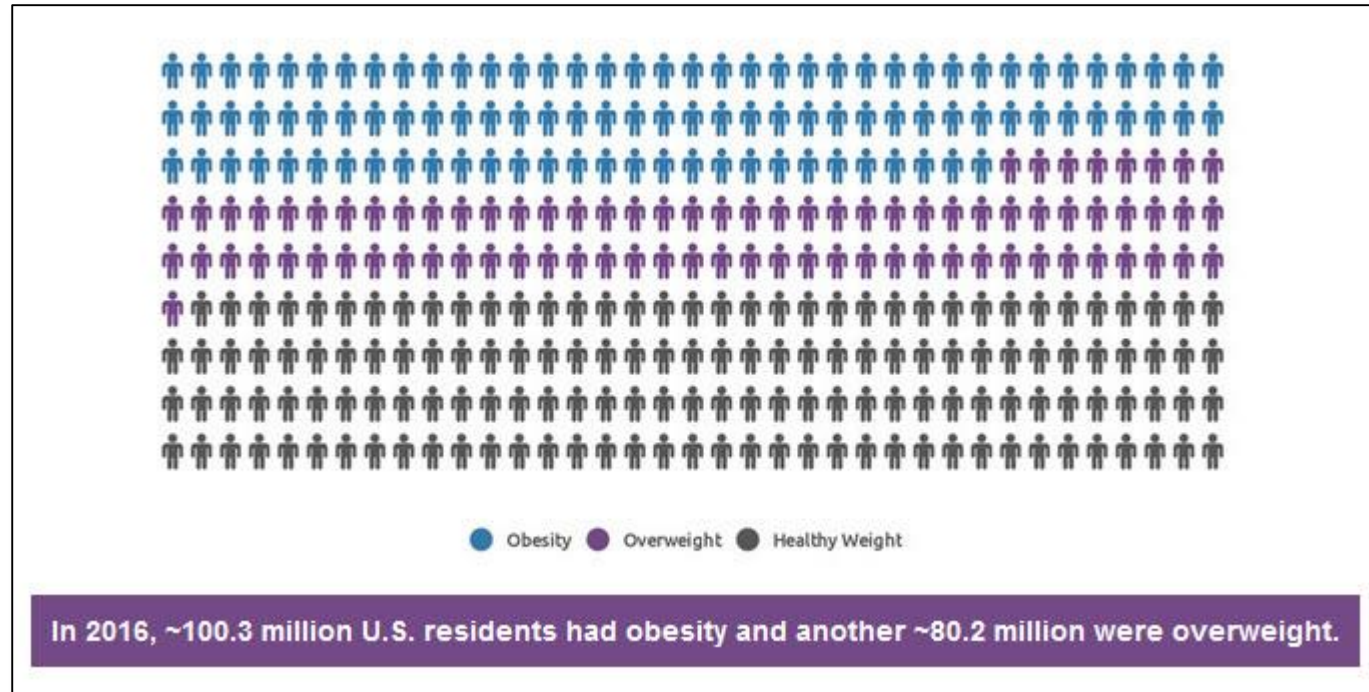
# Deaths from leading infectious and non-infectious diseases worldwide 2005



Source - "Preventing Chronic Diseases: A Vital Investment" WHO <https://goo.gl/YQM2xP>

# Let's talk about sustainability...

"The total cost of chronic diseases due to obesity and overweight was \$1.72 trillion—equivalent to 9.3 percent of the U.S. gross domestic product (GDP)."<sup>1</sup>

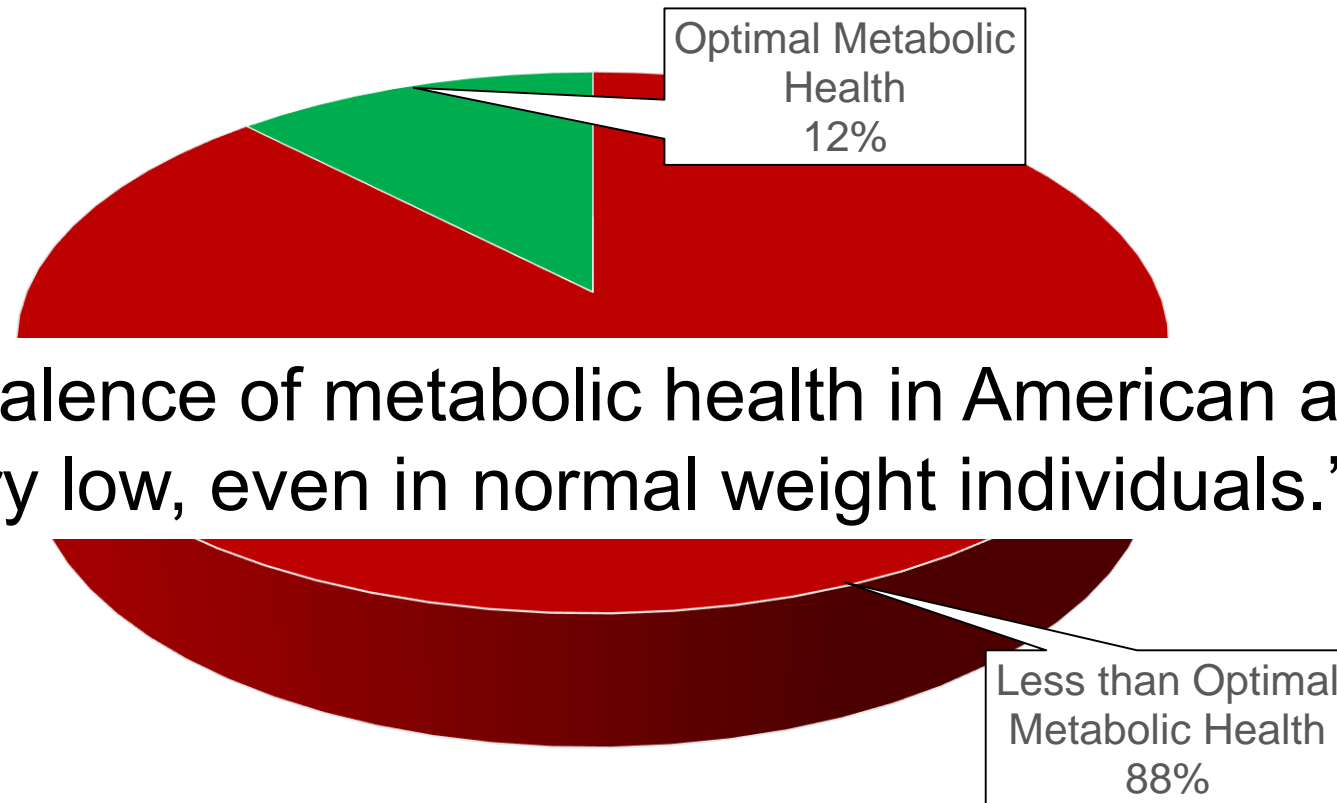


"Agriculture, food, and related industries contributed \$992 billion to U.S. gross domestic product (GDP) in 2015, a 5.5-percent share. The output of America's farms contributed \$136.7 billion of this sum—about 1 percent of GDP."<sup>2</sup>

1. H. Waters and Graf, M. 2018. America's Obesity Crisis: The Health and Economic Costs of Excess Weight. <https://t.co/1OAdG5rdaU>
2. USDA ERS 2018 <https://goo.gl/X9Xwg7>

# The prevalence of metabolic health in American adults

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“The prevalence of metabolic health in American adults is very low, even in normal weight individuals.”

# Symptoms of Metabolic Syndrome

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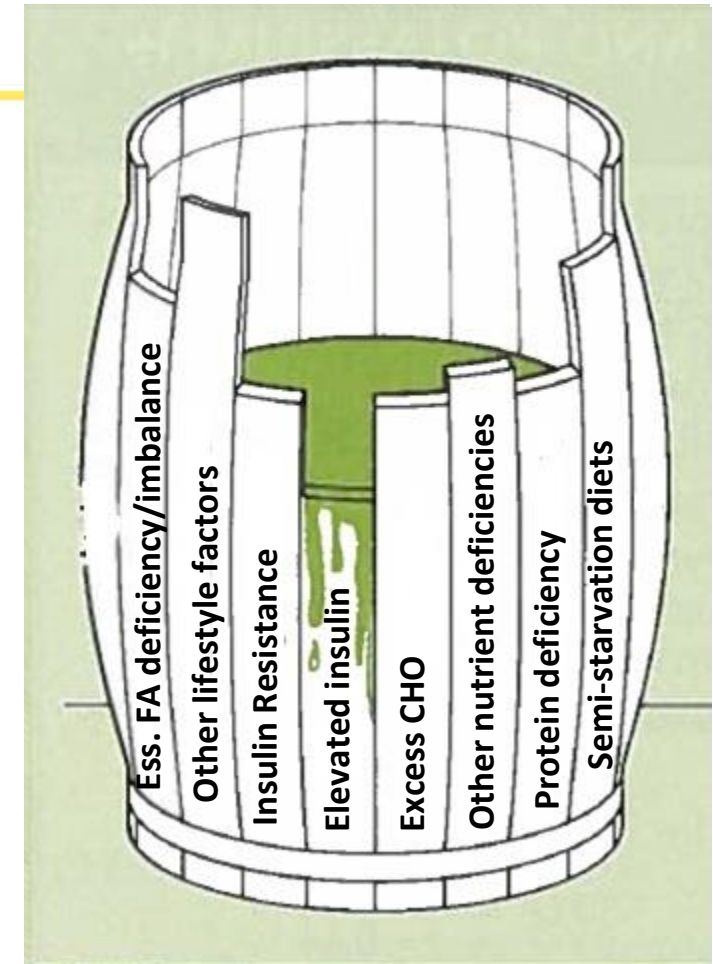
- Abdominal obesity: a waist circumference over 40 inches in men and over 35 inches in women.
- Serum triglycerides  $\geq 150$  mg/dL.
- HDL cholesterol 40mg/dL in men, 50mg/dL in women.
- Blood pressure of 130/85 or more.
- Fasting blood glucose 100 mg/dL (HbA1c  $< 5.7$ ).



# Hyperinsulinemia: The “Short Stave” of Public Health

Biological systems and disease states affected by hyperinsulinemia

System	Disease
Cancer	Cancer (Breast, ovarian, colon, bladder, pancreas & liver)
Circulatory	Atherosclerosis Cardiomyopathy Endothelial dysfunction Thrombosis
Gastrointestinal	Diabetes: Gestational Diabetes: Type 2 Hyper-triglyceridemia Non-alcoholic fatty liver disease
Endocrine	Chronic inflammation Obesity
Nervous	Alzheimer's disease and vascular dementia Peripheral neuropathy Retinopathy
Skeletal	Osteoporosis
Urinary	Nephropathy



The Law of the Minimum: Liebeg’s Barrel

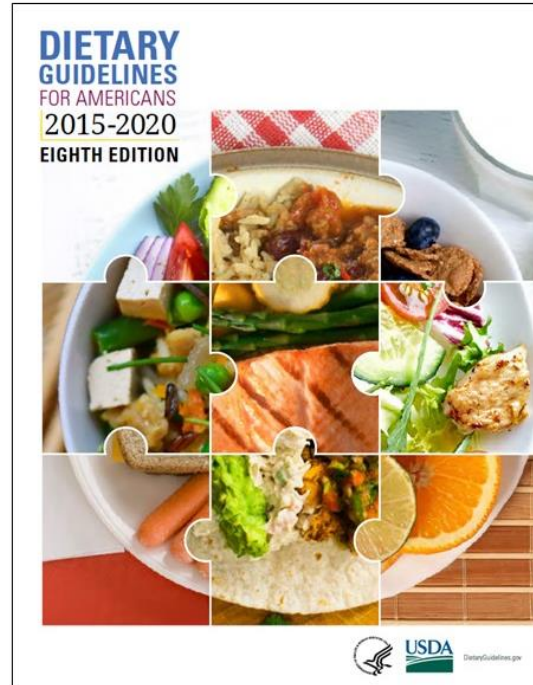
Crofts, C. A. P. 2015. Hyperinsulinemia: A unifying theory of chronic disease? *Diabetes*. 1:34. doi:10.15562/diabetes.2015.19. Available from: <http://diabetes.ejournals.ca/index.php/diabetes/article/view/19>

Remember, the DGA's "healthy eating pattern" is NOT intended for disease treatment, only avoidance. Compare with data testing DGA's recommended diet, published **TEN YEARS AGO!**

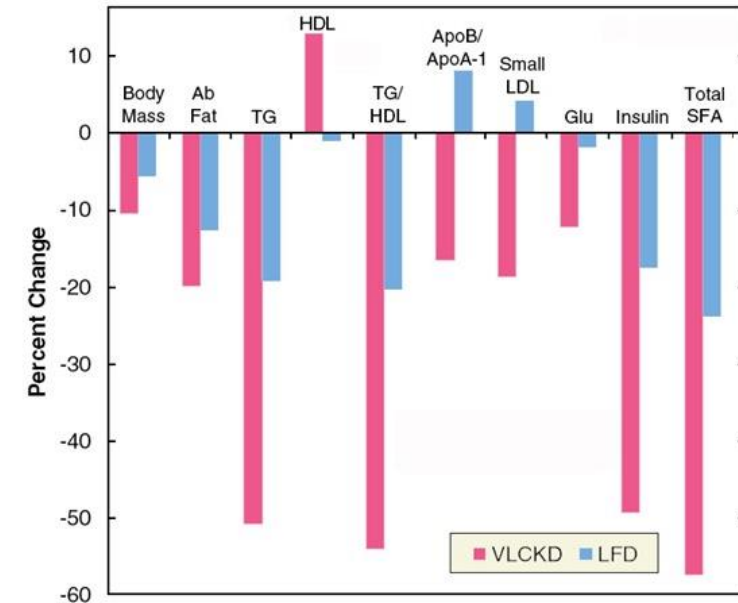
So the *Dietary Guidelines for Americans* is NOT intended for most adults in US...

"... intended to help individuals improve and maintain overall health and reduce the risk of chronic disease—its focus is disease prevention. The Dietary Guidelines is not intended to be used to treat disease."

2015-2020 Dietary Guidelines for Americans — Page 6



## Testing DGA's Diet



Feinman RD, Volek JS, Westman E: *Dietary Carbohydrate Restriction in the Treatment of Diabetes and Metabolic Syndrome*. Clinical Nutrition Insight 2008, 34(12).

Kind of awkward that the diet promoted to lower the risk of contracting disease is neither intended for treatment nor the most effective, no?

I dream of the day when the public understands that their consumption of the products in the background ...

... lessens their need for the products in the foreground.



Happily, THAT day is fast approaching!

# True health food comes from ruminants!



Beef (cattle)



Chevon or cabrito (goats)



Lamb (sheep)



Venison (deer)

## Different kinds of fermented plant products

You can tell when idols are being worshiped,  
human beings are being sacrificed.

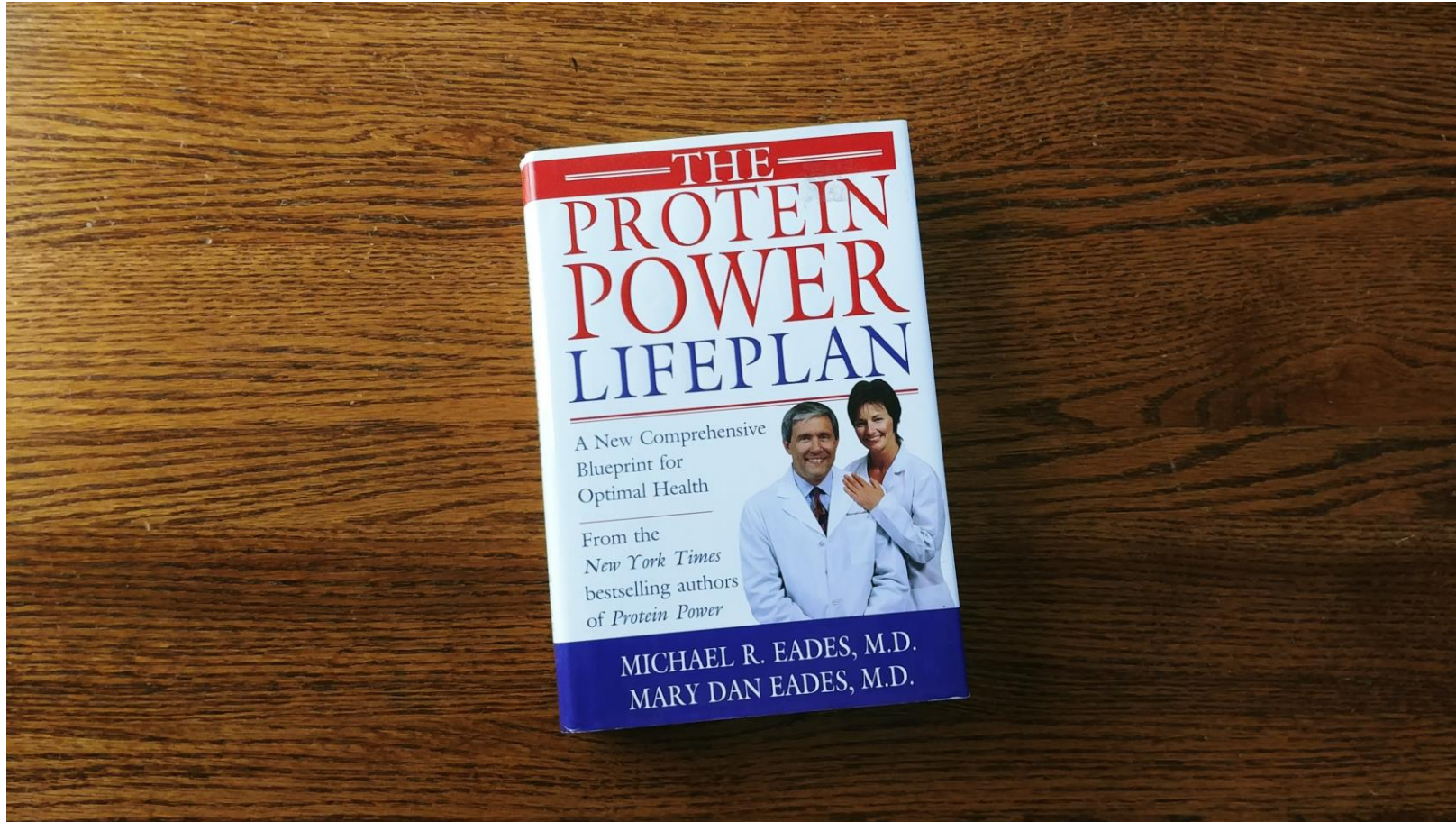


“Is there anything more pitiful than a life  
lost in the service of some unsound belief?”

Thomas Gilovich, 1991. *How We Know What Isn't So: The Fallibility of Human Reason in Everyday Life*. Free Press. New York, NY

# Drs. Michael & Mary Dan Eades

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“A steak a day keeps the doctor away!”

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# Questions?



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