

- APRIL 6, 2021 -

Let Food be Our Medicine: Plant Diversity + Health



- PRESENTED BY -
Dr. Fred Provenza

- HOSTED BY -

FACT

Food Animal Concerns Trust

View slides and recordings at foodanimalconcernstrust.org/fred-provenza

Introductions



Food Animal Concerns Trust (FACT) is a national nonprofit organization that works to ensure that all food-producing animals are raised in a humane & healthy manner, and that everyone will have access to safe & humanely-produced food.



Larissa McKenna

Humane Farming Program Director

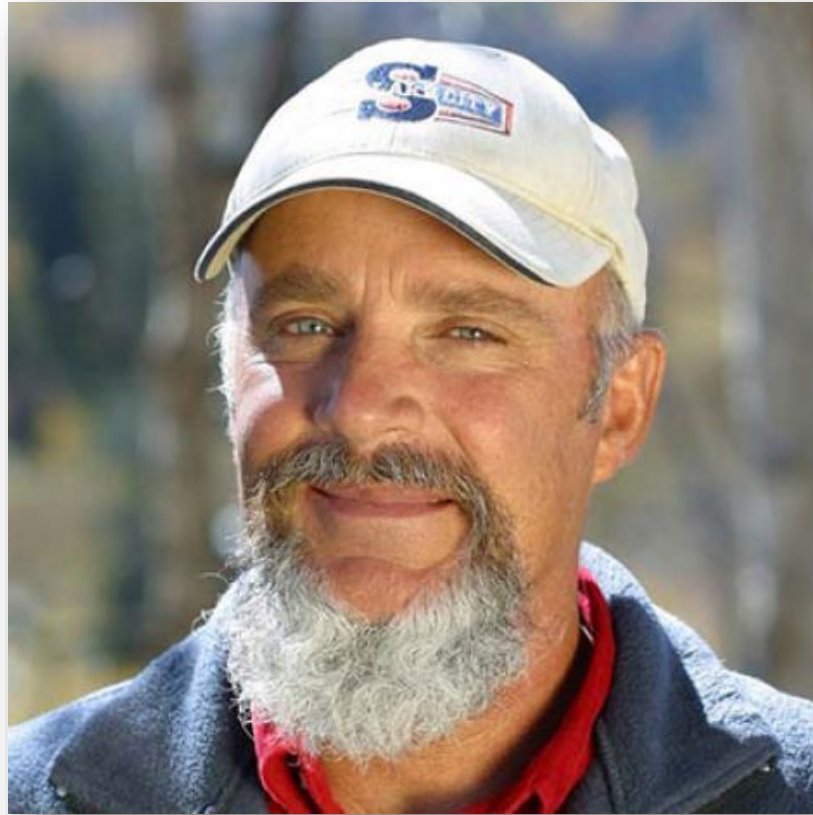
Email: lmckenna@foodanimalconcerns.org

Website: foodanimalconcernstrust.org/farmer

FACT's services for livestock and poultry farmers include:

- **Conference scholarships – ongoing**
- **Customized handouts – ongoing**
- **Free webinars – ongoing**
- **Fund-a-Farmer Grants (applications available in fall 2021)**
- **Humane Farming Mentorship Program (*apply in fall 2021*)**

Our Presenter



Dr. Fred Provenza



Wisdom of the Body
Let Food be Our Medicine

Let Feed
Be Thy
Medicine



Wisdom of
the Body

Herbivore
Culture

Let Food
Be Our
Medicine



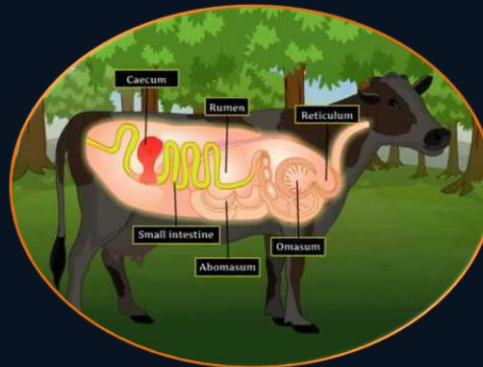


**Plant
Diversity**

**Wisdom
of the Body**

**Flavor
Feedback**

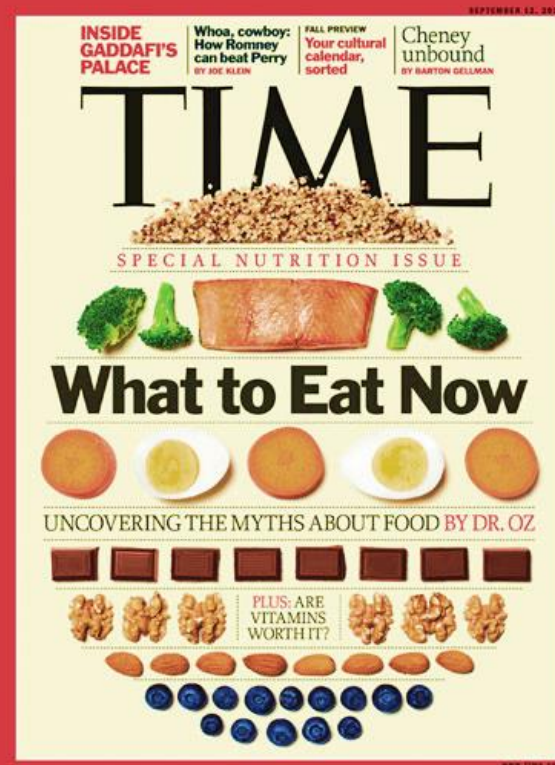
**Social
Cultural**



Nobody has to tell a bacteria, or a wild insect, fish, bird, or mammal how to eat, develop, and replicate.



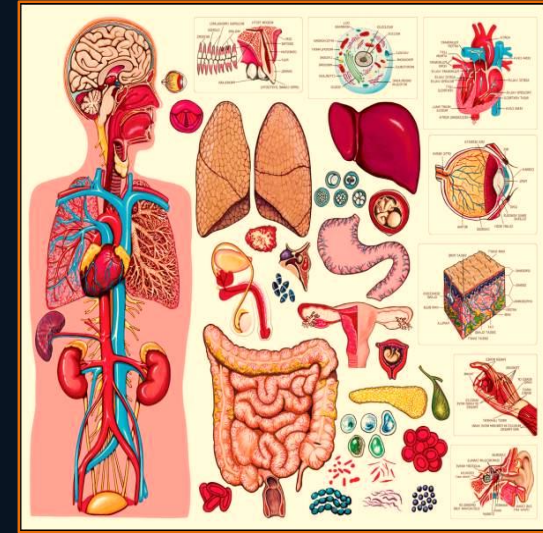
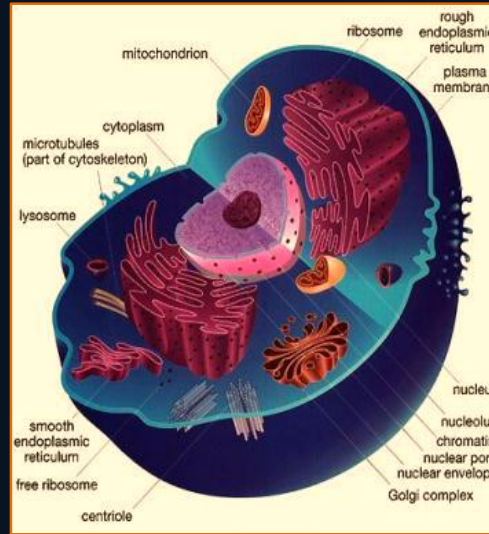
Consider the irony: people must be told by authority figures what and what not to eat.



Have we lost the ability to identify and select nourishing diets? Or has that ability been hijacked?

Feedback Traps

Flavor-feedback associations involve primary and secondary compounds interacting in a dynamic network of communication that unites cells and organ systems with environments.



- Integrates flavor with feedback from nutrients and medicines to alter liking as a function of need
- Involves thousands of compounds
- Non-cognitive, intuitive, integrative

Why do humans eat “poisonous plants”?

Business
Credit Cards
Climate Change



Ultra-Processed
Foods

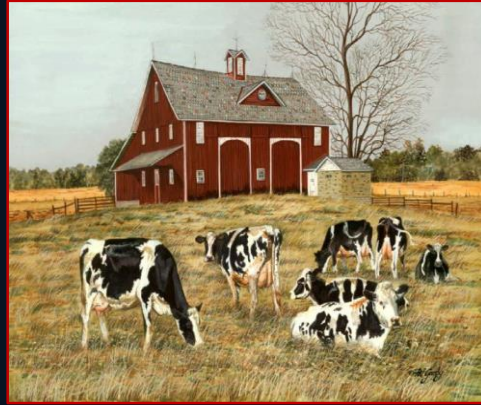
Nutritional
Status



Link familiar flavors
with refined carbs
to lure people to the
novel food by dressing
it in a known and liked
flavor and reinforcing
the flavor with a
blast of energy.



Nutritional
state affects
choices animals
make while
foraging.



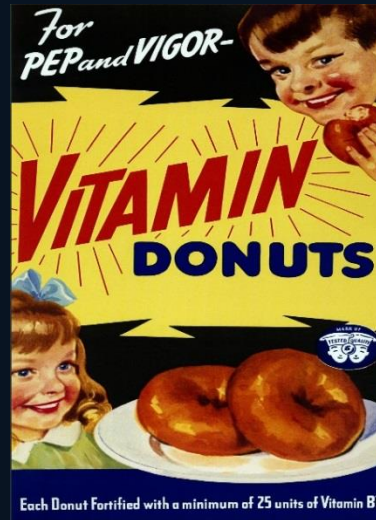
High protein in
the barn, avoid
clover on pasture

Trefoil (tannins),
Alfalfa (saponins),
Fescue (alkaloids)



De-worming
Medicinal Plants

Does fortifying and enriching foods decrease preferences for wholesome foods?



Eighteenth-century sailors with scurvy craved fruits and vegetables.



Today, those
sailors could
drink vitamin
C-fortified
'fruit' drinks.

Their scurvy would disappear,
along with their cravings for
fruits and vegetables.

Rather than eat a rich array
of phytochemicals, each sailor
would consume a large quantity
of sugar-sweetened calories.

Two Kinds of Cravings

Wholesome Foods
Refined Carbs



Eating processed foods
causes rapid weight gain.

Broken Linkages with Foodscapes

We're all connected...

Resource
Availability

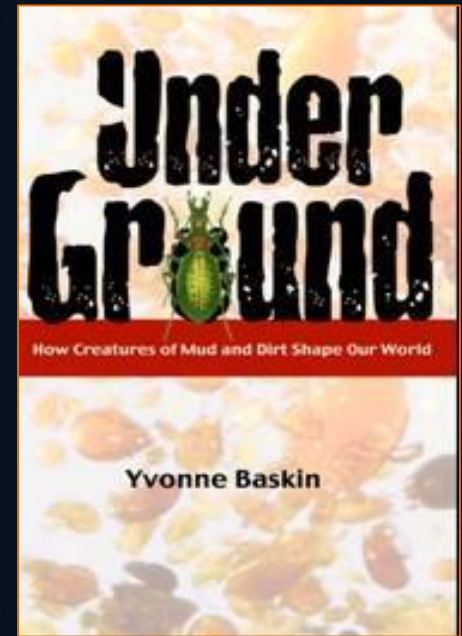
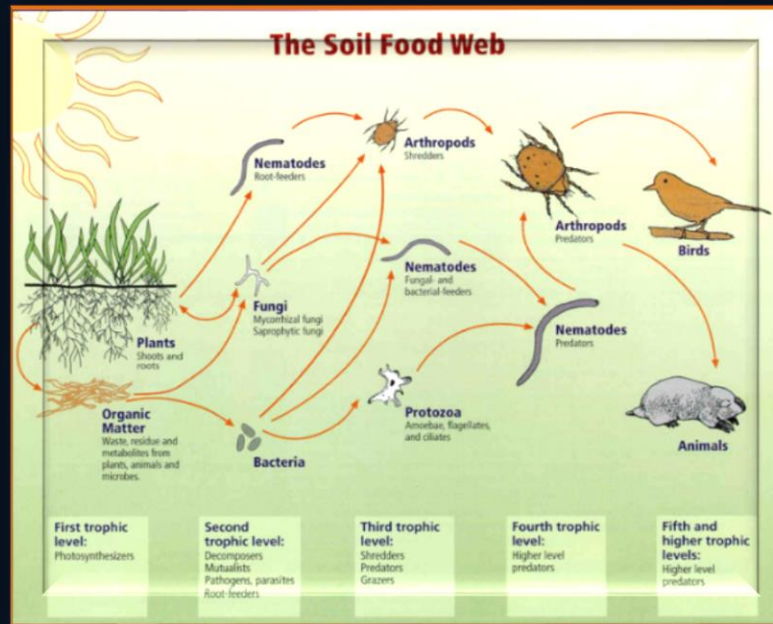


Soil
Formation

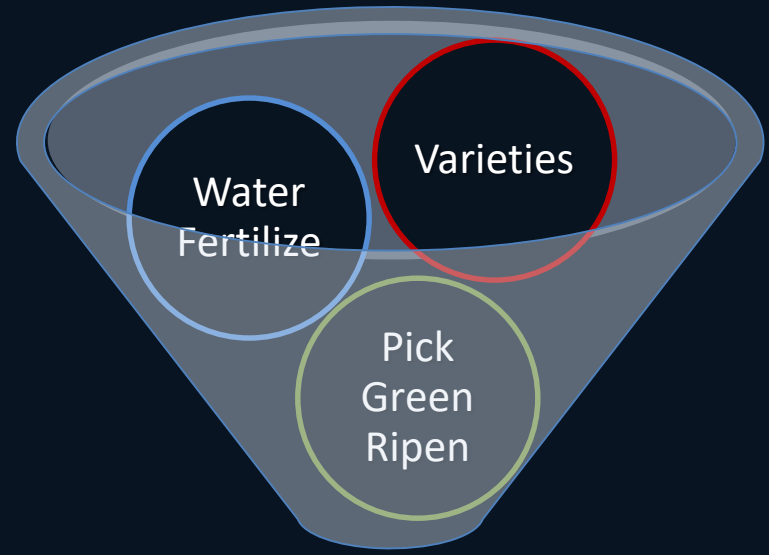


Plant Diversity
and Chemistry

Abiotic and
biotic factors
influence soil
formation.



Phytochemical richness declined from 10% to 50% in 43 fruits, vegetables, and grains from 1950 to 1999.



Enhance growth at the expense of phytochemical richness



Phenolics in fruits and vegetables



Phenolics are higher in plants growing on dry sites than on wet sites and higher in plants growing on infertile sites than on fertile sites.

Wild fruits
contain higher
concentrations of
phytochemicals
that nourish
and satiate.



Phytochemicals protect against
cancer, heart disease, diabetes,
and metabolic syndrome.

During the past 50 years, researchers have learned of the many primary roles for secondary compounds.



Sun Screen
Antioxidants
Adaptive Coloration
Attract Pollinators
Fruit Eaters

Allelopathy
Drought Resistance
Persistence



Defense Grazing
Regrowth Grazing
Recovery Injury

While some
were learning
of the values
of secondary
compounds,
others were
reducing their
concentrations...

...increase yields of
crops and forages...



...maximize
energy/protein
as opposed to total
phytochemical
richness...

...make plants
more susceptible
to environmental
hardships...



In their stead,
we've come to
rely on fossil-fuel
based pesticides
herbicides, and
fertilizers, to grow
and protect plants
in monocultures.

Pesticides
Control Insects



Herbicides
Control Weeds

Fertilizers
Enhance Growth



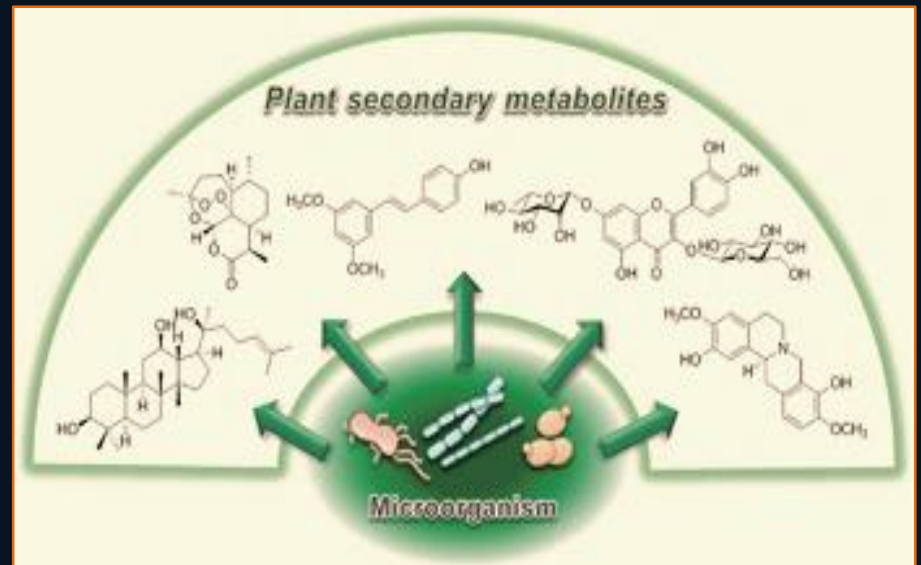
Most
agricultural
soils are not
deficient in
nutrients.



Rather, farming practices
(tillage, fertilizers, herbicides, pesticides)
that adversely affect the soil's
“gut” have compromised the
soil microbiome in ways that
inhibit nutrient uptake.

Each plant species harbors a unique rhizosphere community.

Diverse mixes of species interact in ways that enhance the soil microbiome, nutrient availability, and plant chemistry.



Certain species of soil bacteria inhibit the growth of cheatgrass, medusahead, and jointed goat grass, but they don't inhibit any economically important cultivated or native plants.



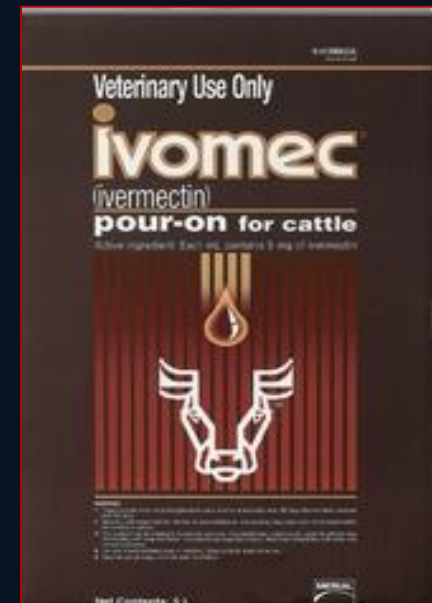
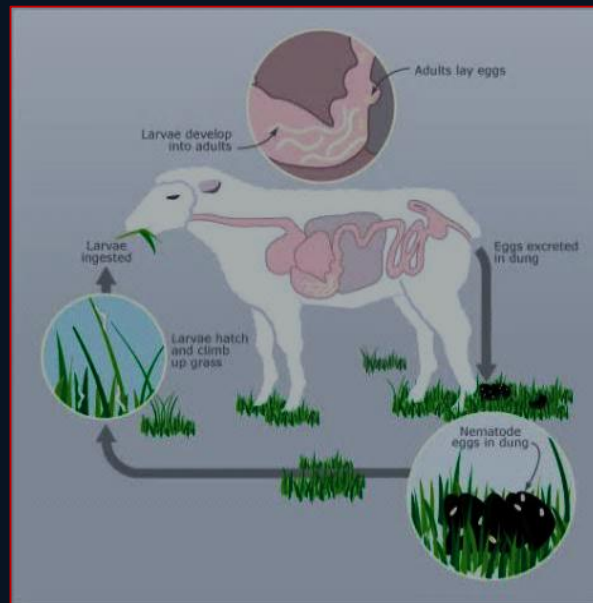
- ✓ Apply bacteria in the fall: they grow well in fall and spring during early root growth of annual weeds.
- ✓ Grow along roots, delivering the compounds that inhibit radicle formation, root growth, and tiller initiation of these weeds.

Nutrient inputs from *living roots* are 2-13 times more efficient than *litter* inputs at forming both slow-cycling, mineral associated soil organic carbon (SOC) and fast-cycling particulate organic carbon.

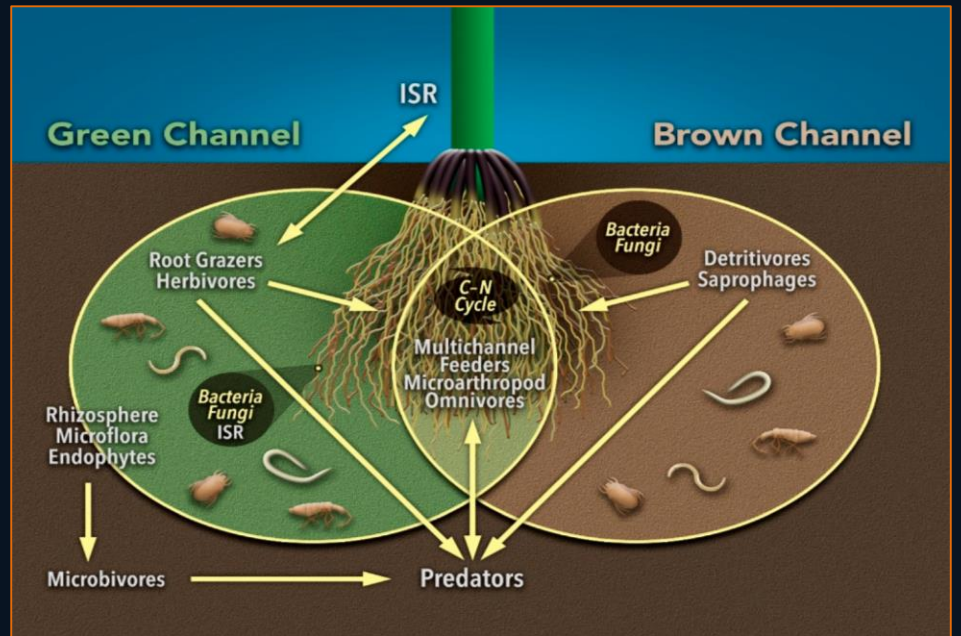


Nutrients from roots stimulate growth of microbial populations. Dead microbes can make up over 50% of all SOC, adhering to mineral surfaces and forming soil aggregates.

We've also
come to rely
on antibiotics
and anthelmintics
to treat diseases
and parasites.



Plants turn dirt
into soil and diverse
mixtures of plants turn
soil into homes, grocery
stores, and pharmacies
for herbivores,
carnivores, and
omnivores below
and above ground.



When they have access to diverse mixtures of plants, animals from insects to primates use phytochemicals to self-medicate therapeutically prophylactically.



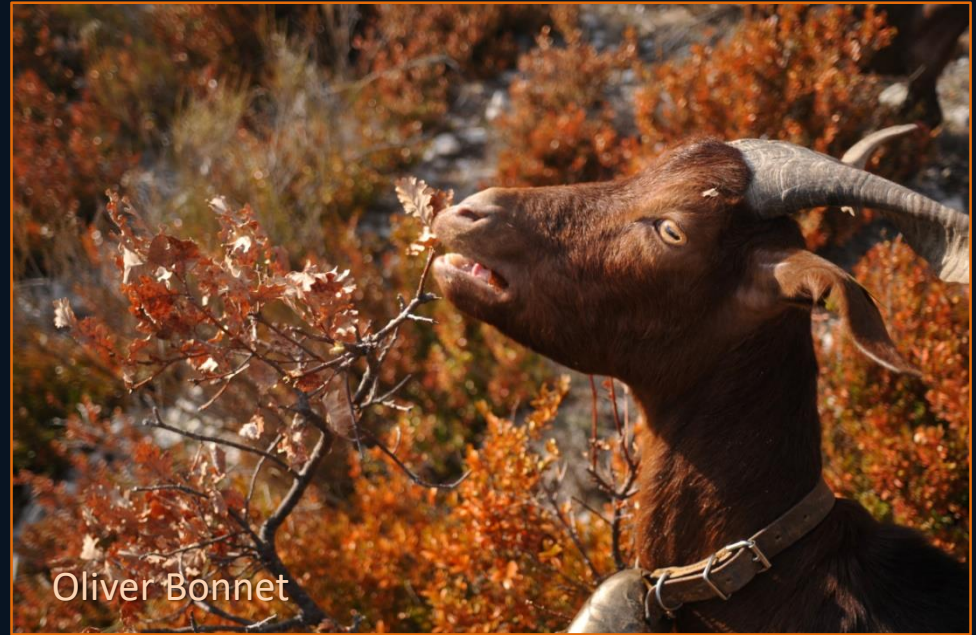
Phytochemically rich diets enhance nutrition, reduce loads of parasites, and enhance detoxification of pesticides by bees.



In response to fungal infections, honey bees immunize their hives by foraging for plant resins (phenolics and terpenes), a behavior called *social immunity*.

Livestock Learn to Self-Medicate:

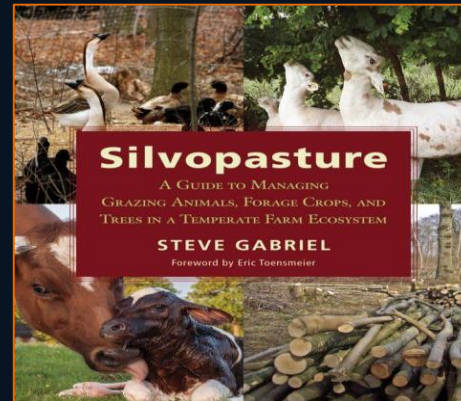
- ✓ Acidosis
- ✓ Bloat
- ✓ Toxins
- ✓ Parasites



When goats are treated with Ivomec, they no longer use tannin-containing medicinal shrubs.

Values of Plant and Animal Diversity

Plant Mixes
(NRCS,
Extension)



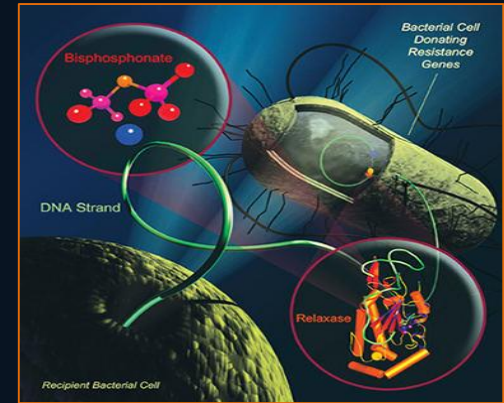
Silvopasture

Parasite
Control



We've isolated and purified compounds to amplify their effects, but that has simply made resistance easier for bacteria, insects, plants.

Antibiotic-resistant bacteria

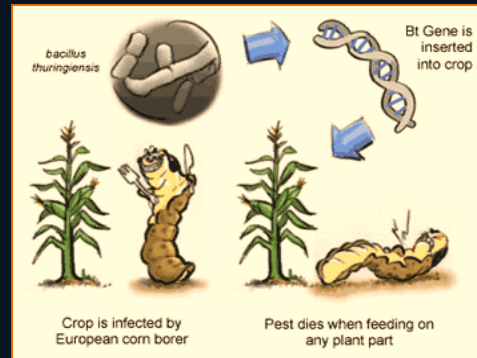


Pesticide-resistant insects

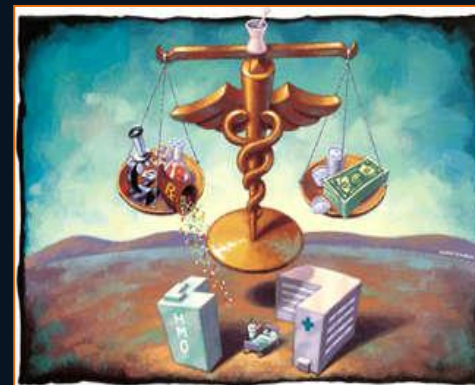
Herbicide-resistant plants



People are now trying to genetically engineer back into crop plants resistance they had originally.



Plants have been playing these games for millions of years.



Pharm-Ecology
Pharmacological
Aspects of Ecology

Sunlight
Driven
Economies

Plant
Diversity

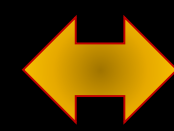
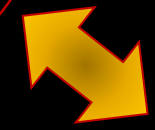
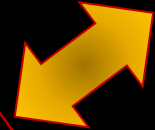
Fossil Fuel
Driven
Economies

Climate

Soil
Health

Human
Health

Animal
Health



To produce 1 calorie of food requires 2 calories of fossil fuels for:

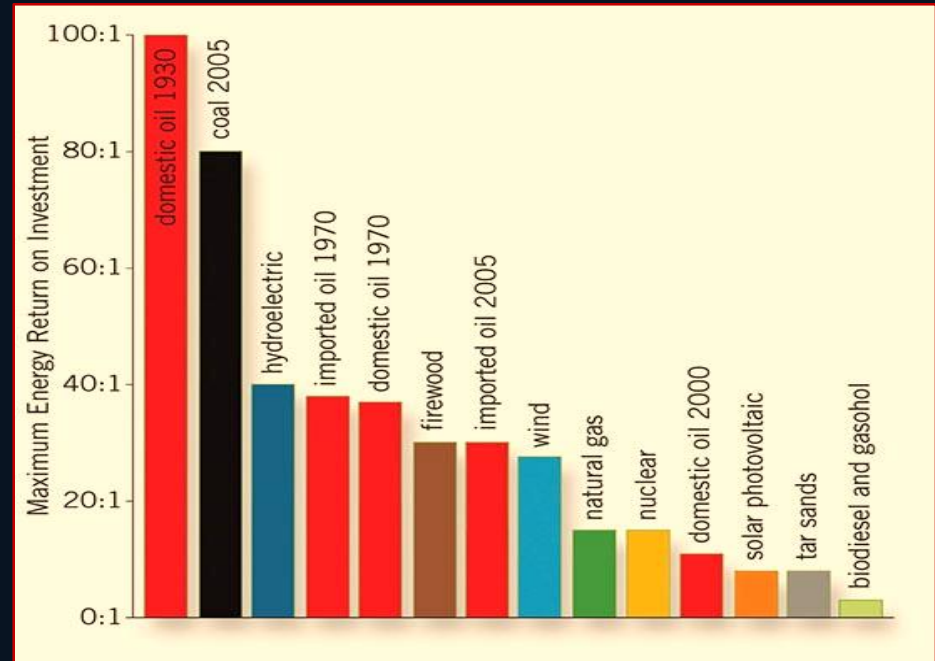
- machinery to plant, irrigate, and harvest crops;
- fertilizers, herbicides, and insecticides to grow and protect plants;
- antibiotics and anthelmintics to maintain the health of livestock.



We use another 8-12 calories to process, package, deliver, store, and cook modern food.

No species can survive expending 10-14 calories to gain 1 calorie of energy.

Hagens, N.J. 2020.
Economics for the
Future—Beyond
the Superorganism.
Ecological Economics. 169.
Land, Labor, Capital



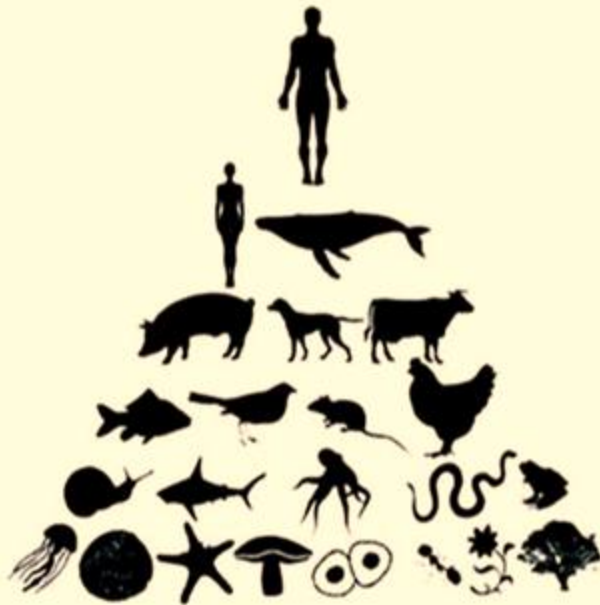
We are utterly
dependent on
fossil fuels, and their
EROI is plummeting.

This seeming catastrophe is creating opportunities to produce foods locally in ways that nurture relationships among soil, water, plants, herbivores, farmers, ranchers, and consumers.



Agriculture can once again be at the heart of communities, but from soils and plants to livestock and humans, we will need to learn what it means to be locally co-evolving with nature's communities.

Ego-Logical



Authoritarian ~ Dualistic ~ Unsustainable
Delusional ~ Mechanistic ~ Self-destructive
Unwise ~ Imbalanced ~ Power Seeking

Eco-Logical



Democratic ~ Holistic ~ Sustainable
Compassionate ~ Natural ~ Regenerative
Wise ~ Balanced ~ Interdependent

We're all connected...

Plant Diversity
and Chemistry



Biochemical
Richness Diet



Quality Milk,
Cheese, Meat



When dairy cows graze botanically diverse swards, as opposed to eating a total-mixed ration of cultivated forages and grains...

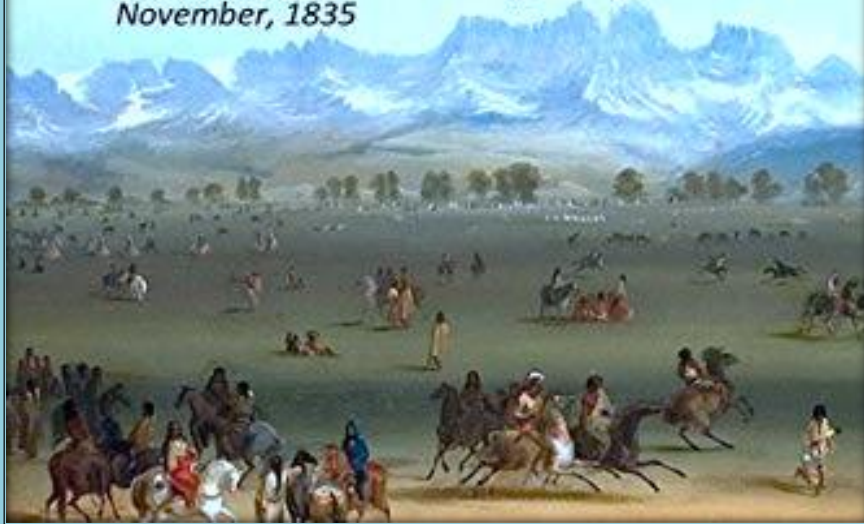


...the flavor and biochemical richness of their milk and cheese are enhanced. Local peoples prefer the flavors of milk and cheese from dairy cows grazing on the botanically diverse swards.

Warren Angus Ferris

Life in the
**Rocky
Mountains**

*From 1830-1835: A Diary of Wanderings on
the sources of the Rivers Missouri, Columbia,
and Colorado from February, 1830, to
November, 1835*



Bison in poor flesh were the worst diet imaginable, but as they became fat, “we grew strong and hearty, and now not one of us but is ready to insist that no other kind of meat can compare with that of the female bison, in good condition.”

“With it we require no seasoning; we boil, roast, or fry it, as we please, and live upon it solely, without bread or vegetables of any kind...



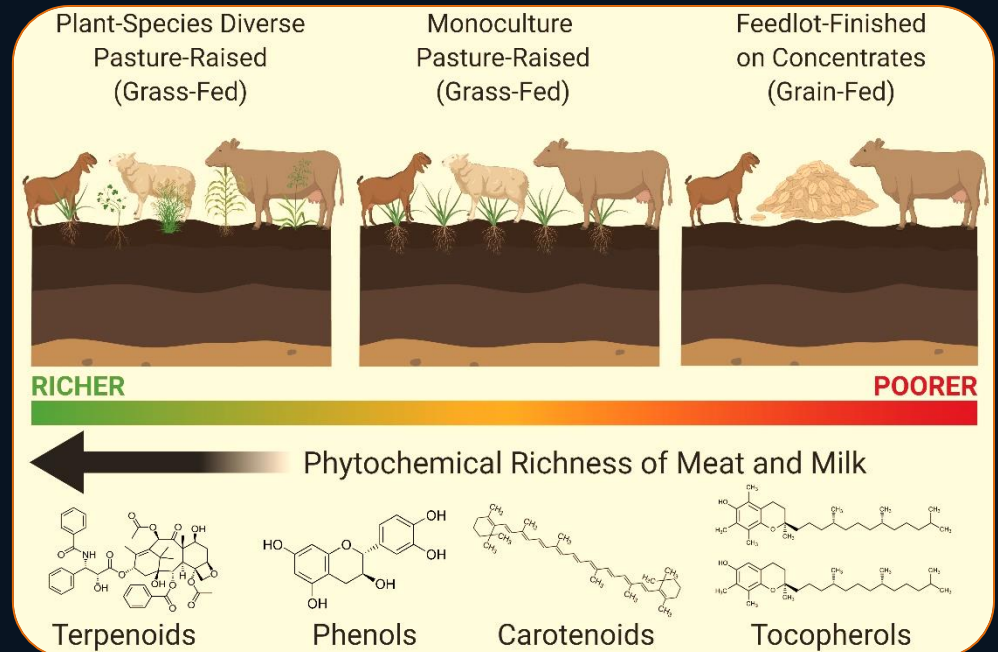
...and what seems most singular, we never tire of or disrelish it, which would be the case with almost any other meat, after living upon it exclusively for a few days.”

The flavor
of meat is
influenced by
phytochemical
richness of
the diet.

Yet, we know
little about how
phytochemical
richness of the
diet affects meat
flavor, quality,
satiety, and
human health.



We are comparing faux meat, meat from feedlots, and meat from animals eating phytochemically rich diets.



- Metabolomic analyses for biochemical richness of meat
- Feeding trials for inflammation
- Clinical trials for satiety, inflammation, and health



Ground Beef

Nutrition Facts	
Serving size	(113g)
Amount Per Serving	
Calories	220
% Daily Value*	
Total Fat 14g	18%
Saturated Fat 5g	25%
Trans Fat 0g	
Cholesterol 60mg	20%
Sodium 70mg	3%
Total Carbohydrate 0g	0%
Dietary Fiber 0g	0%
Total Sugars 0g	
Includes 0g Added Sugars	0%
Protein 23g	46%
Vitamin D 0.1mcg	0%
Calcium 12mg	0%
Iron 2mg	10%
Potassium 289mg	6%
Thiamin 0.05mg	4%
Riboflavin 0.2mg	15%
Niacin 4.8mg	30%
Vitamin B6 0.4mg	25%
Folate 6mcg	2%
Vitamin B12 2mcg	80%
Phosphorus 175mg	15%
Zinc 4.6mg	40%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

≠



Soy-Based Alternative

Nutrition Facts	
Serving size	(113g)
Amount Per Serving	
Calories	250
% Daily Value*	
Total Fat 14g	18%
Saturated Fat 8g	40%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 370mg	16%
Total Carbohydrate 9g	3%
Dietary Fiber 3g	11%
Total Sugars 0g	
Includes 0g Added Sugars	0%
Protein 19g	38%
Vitamin D 0mcg	0%
Calcium 180mg	15%
Iron 4.2mg	25%
Potassium 610mg	15%
Thiamin 28.2mg	2350%
Riboflavin 0.4mg	30%
Niacin 4.8mg	30%
Vitamin B6 0.4mg	25%
Folate 115mcg	30%
Vitamin B12 3mcg	120%
Phosphorus 180mg	15%
Zinc 5.5mg	50%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

≠



Pea-Based Alternative

Nutrition Facts	
Serving size	(113g)
Amount Per Serving	
Calories	260
% Daily Value*	
Total Fat 18g	23%
Saturated Fat 5g	25%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 350mg	15%
Total Carbohydrate 5g	2%
Dietary Fiber 2g	7%
Total Sugars 0g	
Includes 0g Added Sugars	0%
Protein 20g	40%
Vitamin D 0mcg	0%
Calcium 100mg	8%
Iron 4mg	20%
Potassium 280mg	6%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.



Champions of
faux meat purport
to address issues of
health and climate
(created in part by
industrial agriculture)
with more processed
foods and industrial
agriculture...



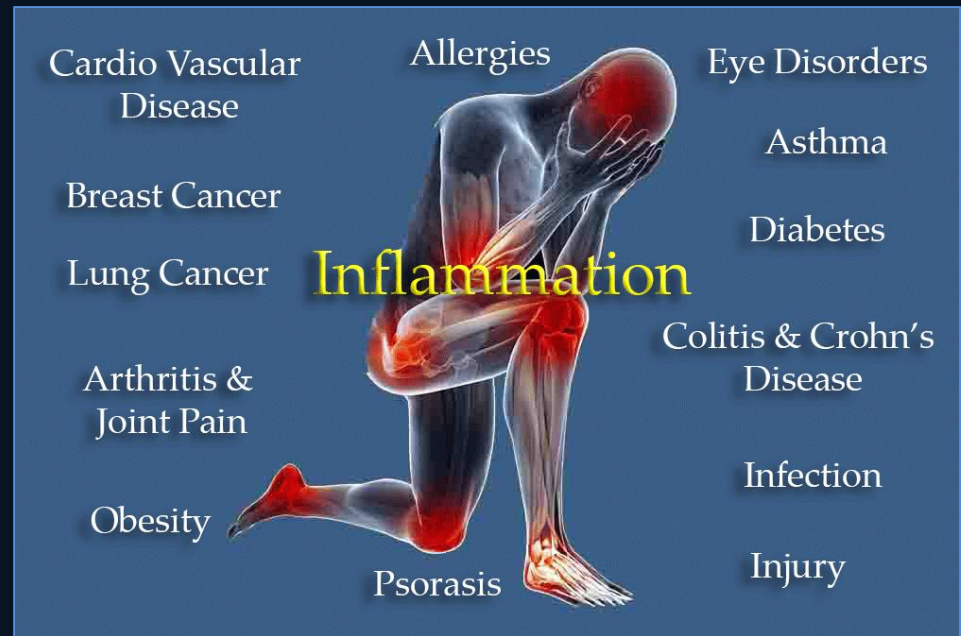
Faux Meat
Ingredients

...by convincing people that fake meat
is better than real meat and nature is a
feeble-minded nitwit compared to the
time-tested wisdom of Silicon Valley.

Real Meat
Ingredients



Low-grade systemic inflammation leads to diseases. Notably, inflammation occurs within a meal, with increasing likelihood of developing diseases when meals that elevate inflammation become dietary habits.



Moderating inflammation by eating wholesome diets can prevent or treat metabolic diseases.

In humans, postprandial inflammatory responses are much greater for meat from cattle (wagyu) fed high-grain diets than for meat from a wild herbivore (kangaroo) eating a phytochemically rich diet.



Herbs and spices added to foods enhance palatability, satiation, and satiety and they reduce alleged adverse effects of eating red meat.



Native Americans made pemmican from meat and wild berries that reduce alleged adverse effects of eating red meat.

Eating traditionally processed meats is not associated with increased risks of cancer in Morocco.



Kaddid is ribs of beef, lamb, or camel cut into thin slices mixed with olive oil, herbs and spices such as cumin, garlic, coriander, salt, vinegar.

Phytochemically
rich herbs and
spices are anti-
inflammatory.



Turmeric
Garlic
Cinnamon

Rosemarie
Ginger
Willow Bark



Cardamon
Cloves
Black Pepper

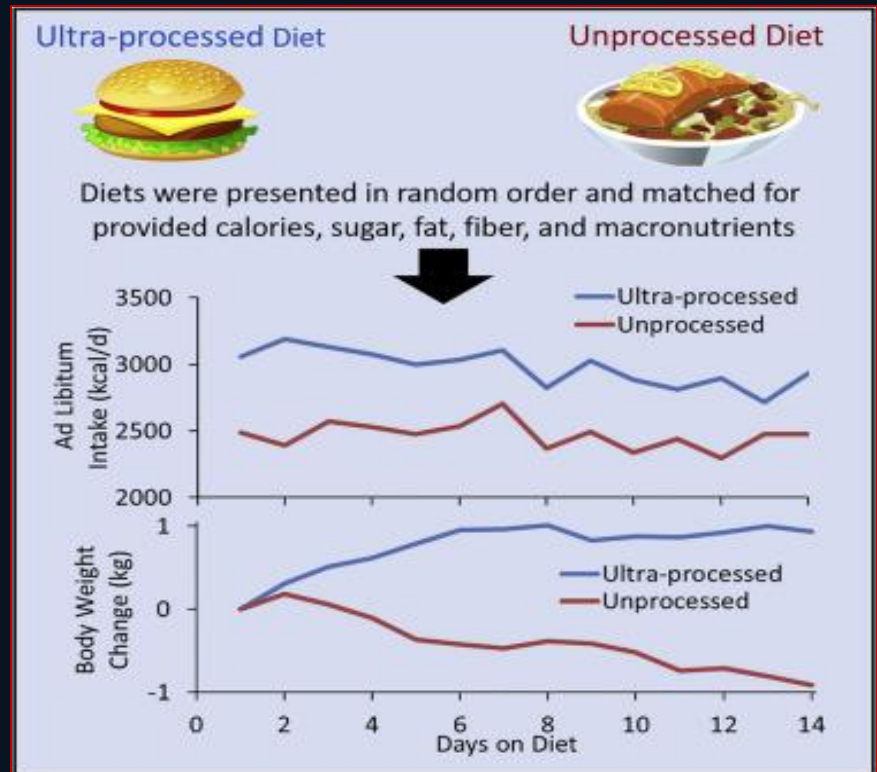
Projected by 2050

- ✓ Population 9.7 billion
- ✓ A 32% increase in GHG emissions from shifts to processed diet
- ✓ Net increase of 80% in GHG emissions from production and consumption of ultra-processed foods



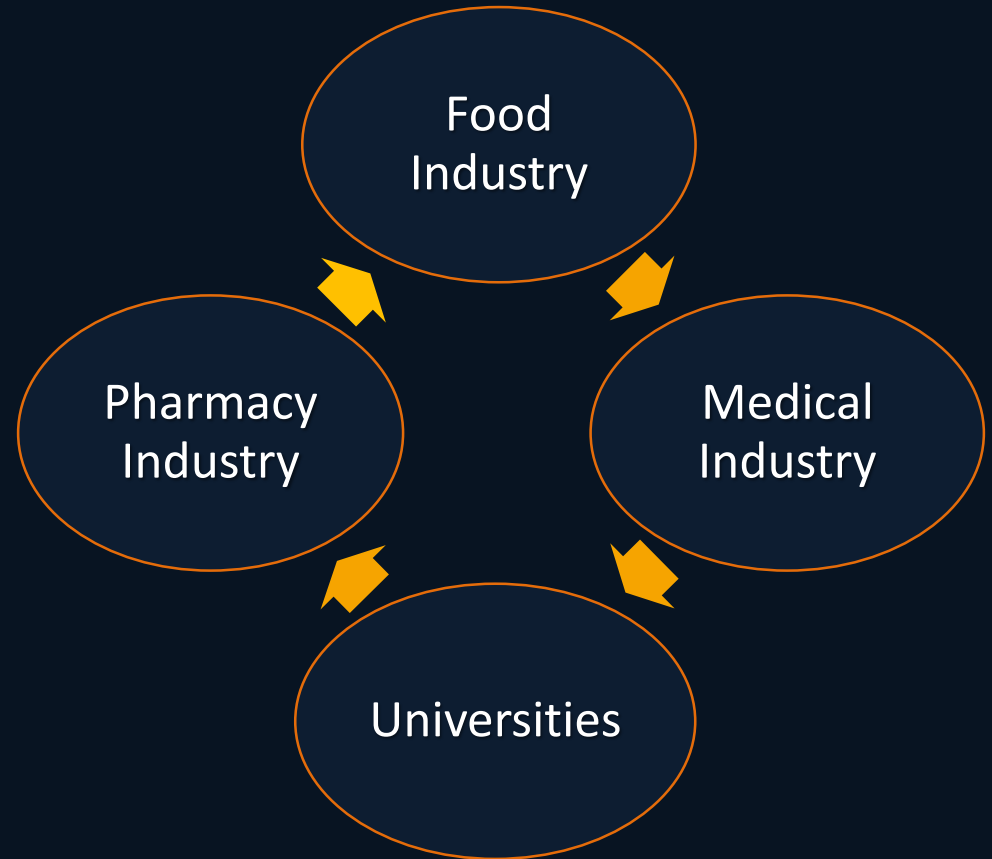
In contrast, no net increase in food production emissions if diets worldwide became any combination of vegetarian, pescatarian, Mediterranean diets.

The global shift away from eating phytochemically and biochemically wholesome diets to ultra-processed diets has encouraged 2.1 billion people to eat processed foods and become overweight or obese.



Processed foods do little to induce satiation or satiety, so people overeat and gain weight.

Ultra-processed foods created a pandemic of obesity and diet-related diseases, whose symptoms the medical and pharmaceutical industries treat at enormous expense.



Overweight or obese: 75%
Pre-diabetic or diabetic: 50%
Metabolically unhealthy: 88%
Can't serve in the military: 80%

We've extracted compounds from foods (to enrich and fortify ultra-processed foods), foods from diets, and diets from cultures...



...and we no longer know what it means to be locally adapted to the landscapes we inhabit...

Perceive, Believe, Behave

Palates once
linked people
with landscapes
they inhabited.
Why is human
nutrition so
confusing?



Ancestral
Diets

Meat, Milk,
Eggs, Fat



Plant vs
Meat Diets





Culture

Community

Family

Mother

Self

Cognitive
Rational
Analytical



can override



Noncognitive
Intuitive
Synthetic



The brain is one of many mutually interdependent organ systems in the body.

While vegetarians report a lower desire to eat meat compared with omnivores, their neural activity reveals an inherent craving for meat.

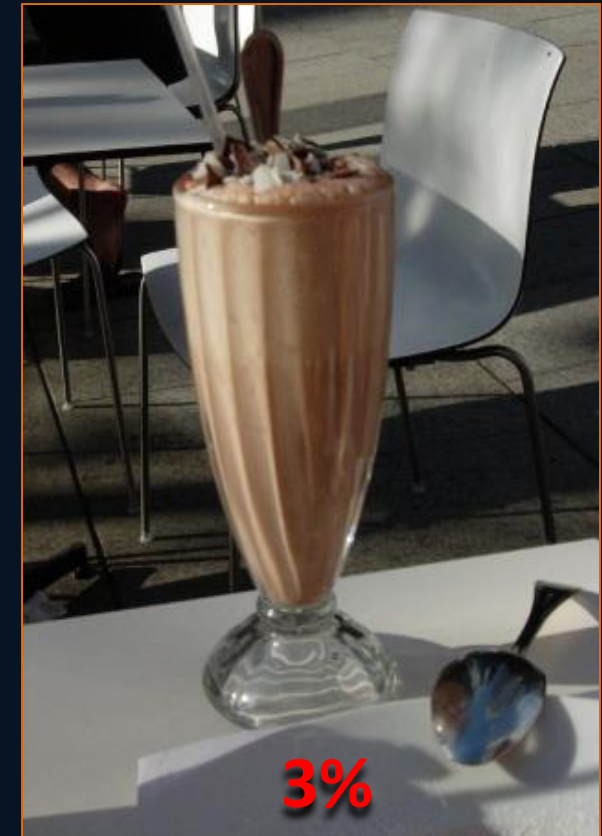
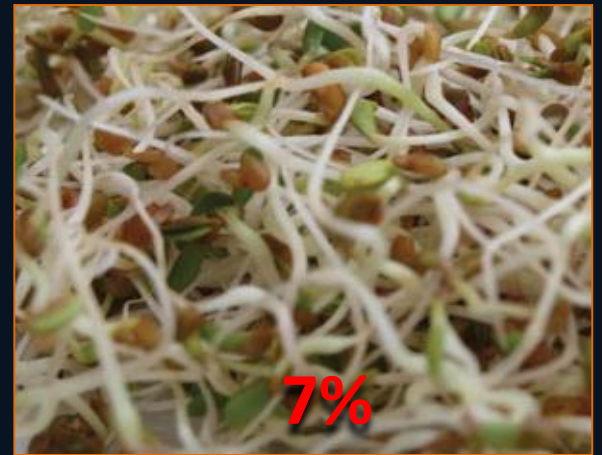
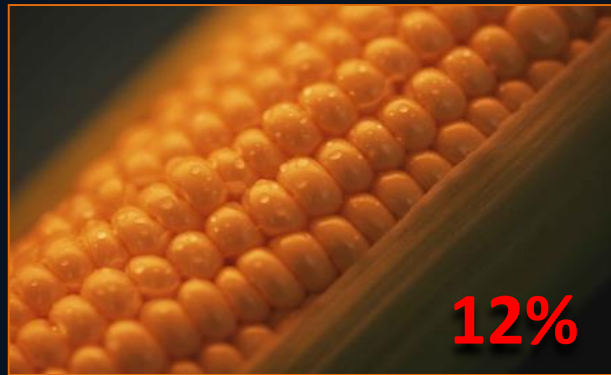


These findings highlight the dissonance between *acquired beliefs and attitudes* and *inherent needs* for nutrients contained in meat.

Which food
would you take if
you were going to
be stranded on a
desert island for
one year?



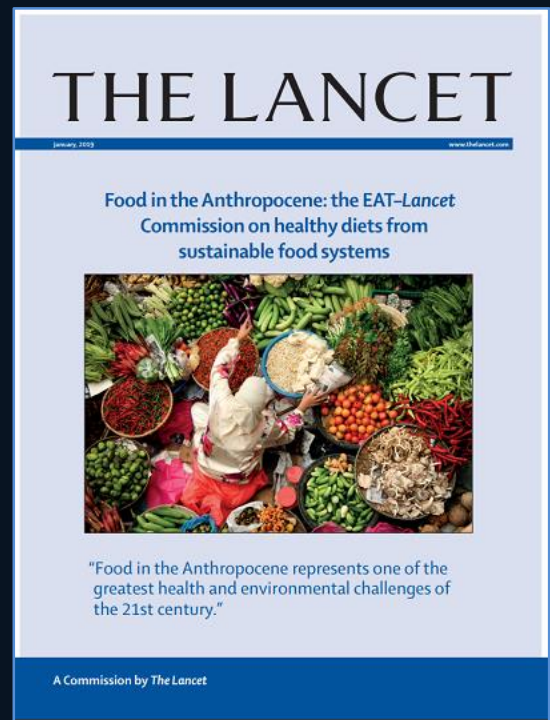
Bananas, Peaches
Corn, Alfalfa Sprouts, Spinach
Hot Dogs, Chocolate Milk



How Fat Became Toxic



How Fat Stays Toxic



"Food in the Anthropocene represents one of the greatest health and environmental challenges of the 21st century."

We stopped listening to the wisdom body, and yielded to advice from authorities.



Experiences influence what we perceive, how we believe, and how we behave.



Meat samples
were paired with
descriptions of animals
raised on 'factory' or
'humane' farms.

'Factory farm'
samples looked and
smelled less pleasant
and tasted saltier
and greasier.

Many people believe they have adverse reactions to wheat.

People fed high-gluten, low-gluten, and no-gluten food had pain, bloating, nausea, and gas to a similar degree, indicating strong nocebo effects.





Ghrelin, the hunger hormone, affects appetite and plays a key role in the rate of use and distribution of energy in the body.

Ghrelin decreases after an 80-calorie milkshake labeled 'indulgent, 620 calories' but not after an identical milkshake labeled 'sensible, 140-calories'.



John Whitley
had stage 4 pancreatic
cancer. Determined to beat
the odds, he entered a trial
where some participants got
an experimental drug and
others got a placebo.

Every afternoon, as he sat
in his apartment and took
the drug, he told himself:
"This is a miracle drug that
is going to save my life."

Foreword by Dr. Wayne W. Dyer

ANITA
MOORJANI

DYING TO BE ME

MY JOURNEY FROM CANCER,
TO NEAR DEATH,
TO TRUE HEALING

*"I had the choice to come back . . . or not.
I chose to return when I realised
that 'heaven' is a state, not a place. . . ."*

Hindu Family
Buddhist Maid
Christian School

After losing two friends to cancer, and a diagnosis of lymphoma, she began to study everything she could about holistic health in Western and Eastern healing systems.



When none of these worked, she traveled to India to follow the healing system of ayurveda.

She returned to Hong Kong where friends told her how good she looked. When she told them about her ayurvedic regimen, she received fear-based, negative responses.



She began experimenting with other ways of healing, including Traditional Chinese Medicine (TCM), common in Hong Kong, but because of its conflict with ayurveda, she felt quite confused.

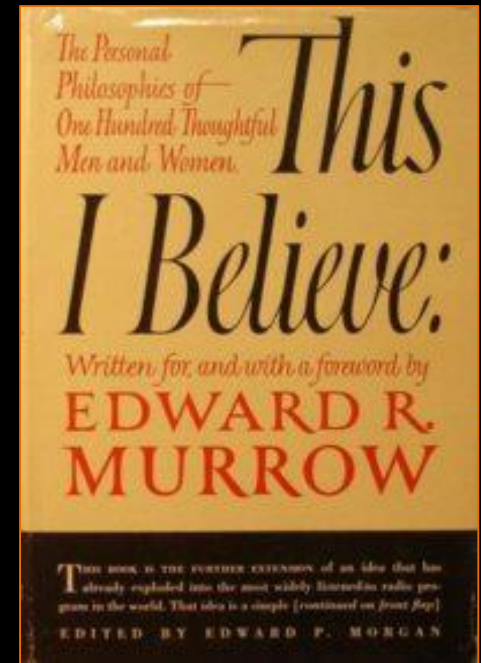
In TCM, you are encouraged to eat meat, especially pork. In ayurveda, you are encouraged to be vegetarian; meat is the worst thing you can eat.



In the end, her organ systems failed and she slipped into a coma, death imminent. Then, she experienced the near death experience that changed her life.

After years of trying to meet everyone else's expectations, she realized, as a result of her near-death experience (NDE), she alone held the power to heal herself physically and spiritually.

From 1951 to 1955, Edwin R. Murrow was the host of a radio talk show titled **This I Believe**.



I can tell you what I've been taught to believe by my family, church, community, country, and so on. But I do not, in all honesty, know what I believe in the absence of all that I've been taught.

We identify
with our family,
community, culture,
religion, profession,
politics, country...
all of the “I am’s”.
But that’s a trap
momentarily
inflected.



When we transcend
all of the “I am’s”
we come to I am.

THE POWER OF NOW

A GUIDE TO SPIRITUAL ENLIGHTENMENT

Eckhart Tolle



“One of the best books to come along in years.
Every sentence rings with truth and power.”

— Deepak Chopra, author of *The Seven Spiritual Laws of Success*

The word *enlightenment* conjures up the idea of some super-human accomplishment, but it is simply your natural state of *felt* oneness with Being.

It is a state of connectedness with something immeasurable and indestructible, something that, almost paradoxically, is essentially you and yet it is much greater than you. It is finding your true nature beyond name and form.

The inability to feel this connectedness gives rise to the illusion of separation from yourself and the world around you. You then perceive yourself, consciously and unconsciously, as an isolated fragment. Fear arises, and conflict within and without becomes the norm.





Our separateness is an illusion.
The awareness that *I am*
resides within each of us.

Two Spiritual Dangers

“There are
two spiritual
dangers in not
owning a farm.”
Aldo Leopold
*A Sand County
Almanac*



“One is the danger
of supposing that
breakfast comes from
the grocery, and the
other that heat comes
from the furnace.”

“To avoid
the first
danger,
one should
plant a garden,
preferably where
there is no grocer
to confuse
the issue.”



“To avoid the second,
he should lay a split of
good oak on the andirons,
preferable where there is no
furnace, and let it warm his
shins while a February
blizzard tosses the
trees outside.”



Before



After



Most people don't own farms or ranches,
but they have yards that can become...

Resources Used to Grow Lawns Annually

Over 30 thousand tons of synthetic pesticides at a cost of well over \$2 billion, not to mention all the herbicides and fertilizer to “weed and feed” our lawns.

Over 800 million gallons of gasoline. The gas spilled refilling lawn mowers is 17 million gallons -- 1.57 times the amount spilled by the Exxon Valdez off the shores of Alaska.

Residential water use outside the home is 30% to 60% of total water use. Depending on the estimate, 7 billion to 9 billion gallons of water are used each day for suburban irrigation.

We've
made an
art form of
dining...



...but tabled the
larger questions...



Eating is participating in endless transformation as plants and animals are killed and eaten.

If we consider consciousness and sentience to be part of awareness and perception, then animals and plants are conscious and sentient.



In pondering
this mystery
we may come
to realize that
all life is sacred.



We are members of nature's
communities: what we do to
them, we do to ourselves.
Only by nourishing them,
can we nurture ourselves.

And we
do that by
declaring love
-- not war --
on one
another
and the
landscapes
we inhabit.



Questions

Please type into the chat bar



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View slides & recordings at foodanimalconcernstrust.org/fred-provenza

🐔 April 13: **Part 3 – Creating Locally Adapted Animals**

Grants, Scholarships, Mentorship & More!

🐔 **Scholarships – ongoing**

🐔 **Handouts on nutritional benefits of pasture-raised animals**

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