

- APRIL 13, 2021 -

Wisdom of the Body: Herbivore Culture



- 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

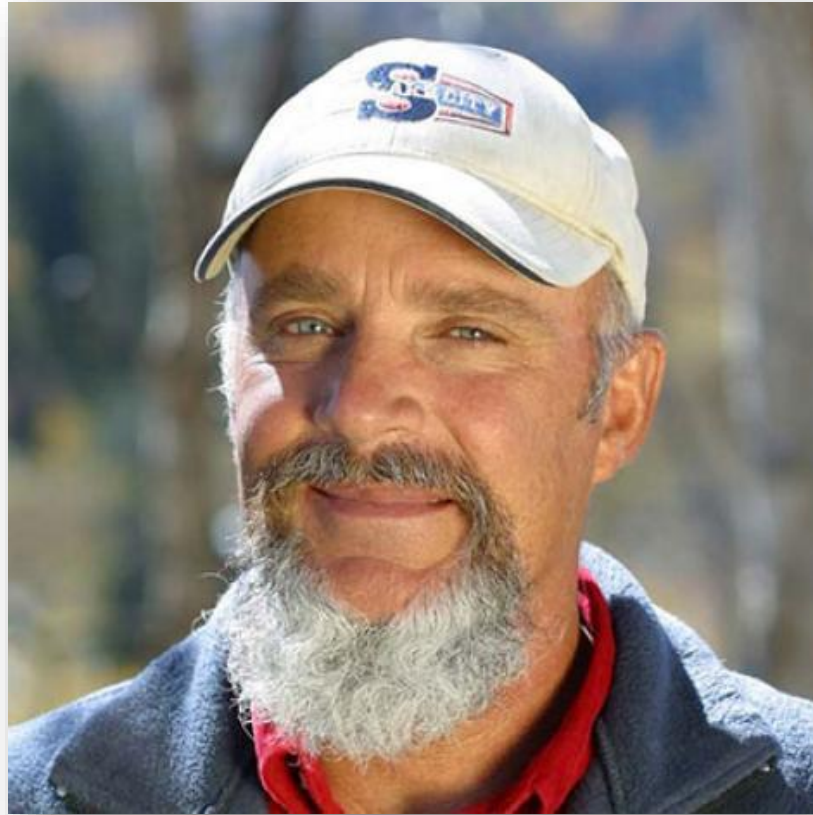
Email: lmckenna@foodanimalconcerns.org

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
Herbivore Culture

Let Feed
Be Thy
Medicine



Wisdom of
the Body

Let Food
Be Our
Medicine

Herbivore
Culture



**What does
it mean...**



**...to know
the range?**

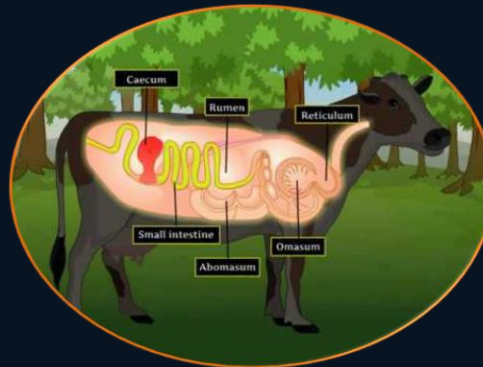


**Plant
Diversity**

**Wisdom
of the Body**

**Flavor
Feedback**

**Social
Cultural**



Cows and Straw

- ✓ Age: 5 years
- ✓ Diet: Ammoniated Straw
- ✓ Fed: December to May
- ✓ Study: 3 years



Outcome

Half of the cows performed well, the other half didn't. Why?

Why do moose
in Norway
winter at high
elevations?



*THE BUFFALO
HARVEST*



FRANK H. MAYER AND
CHARLES B. ROTH



What was the
secret to bison
hunters' success?

Suppose one wishes to know as much as possible about the foods another person likes and eats and can ask only one question.



What should that question be?
Paul Rozin

There is no doubt about it, the question should be, ‘What is your culture or ethnic group?’



There is no other single question that would even approach the informativeness of the answer to this question.



Natal experiences affect food and habitat preferences in a broad range of animal taxa including insects, fish, birds, and mammals (Davis and Stamps, 2004).



A Mother's
Lifelong
Influence on
Diet and Habitat
Selection



In utero
Mother's Milk

Mother
as a Model



Family Dynamics



Mother adds stability



Offspring add creativity



Ewes, Lambs
and Douglas-fir

Young goats reared by their mothers on blackbrush, a shrub high in fiber and tannins...

Goats ate 2.5 times more blackbrush than did goats naive to blackbrush.



When allowed to choose, experienced goats ate 30% more blackbrush than did inexperienced goats at any level of alfalfa pellet availability, which ranged from 20% to 100% of ad libitum.

Cows and Straw

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Outcome

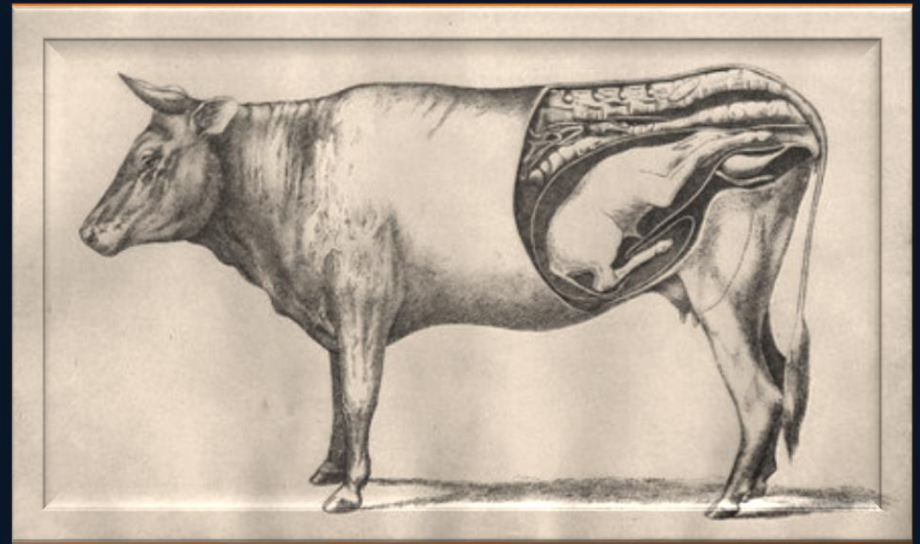
Half of the cows performed well, the other half didn't. Why?

Cows fed straw as calves 5 years before...

- ✓ higher body weight/condition
- ✓ produced more milk
- ✓ shorter post-partum intervals ...when fed straw as the bulk of the diet during pregnancies from 5 to 8 years of age.



Calves exposed to straw in utero eat more straw, digest straw better, and grow faster than calves not exposed to straw.



Lambs exposed
to saltbush *in utero*
grow faster and handle a
salt load better than lambs
from mothers on pasture...



...they excrete salt more
rapidly, drink less water
and maintain higher intake
when eating saltbush.

Learned patterns
of behavior enable
experienced animals
to better use forages
in a landscape.



bitterbrush (tannins)



sagebrush (terpenes)

Bitterbrush as an appetizer
helps the sagebrush go down.

Foraging behaviors develop as a function of history, necessity, and chance and then become part of a culture.

Goats eat woodrat houses to alleviate a protein deficiency.



Of 18 groups of goats during 3 winters, only 1 group learned to eat woodrat houses.

Why do moose
in Norway
winter at high
elevations?



Moose in
Norway winter at
high elevations due
to traditions passed
from generation
to generation.



Experiences
early in life
have life-long
influences on
habitat selection
by sheep.

Welsh Mountain

- 36 kg
- 90% lambing
- prefer native



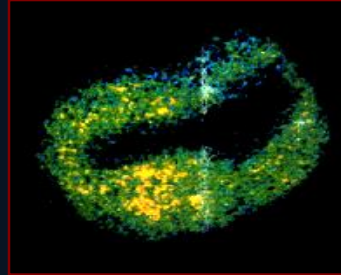
Clun Forest

- 54 kg
- 150% lambing
- prefer pastures

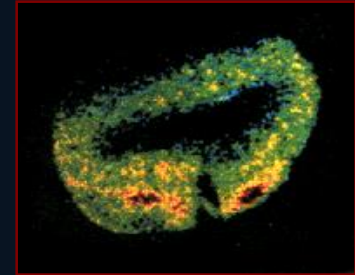
Experiences
early in life
influence habitat
selection by cattle
on a Forest Service
allotment during
summer.



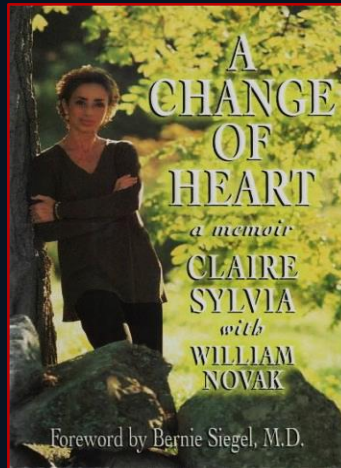
Environments influence gene expression, which influences form, function, and behavior.



Enhanced neural response to familiar olfactory cues



Enhanced rumen volume, kidney function



Taste receptors in organ systems explain changes in preferences of people who have organ transplants.



Origins of Human Food Preferences

- Mother's diet *in utero* (amniotic fluid)
- Experiences early in life (milk, foods)

Clara Davis' Self-selection of Diets by Young Children

- | | |
|--------------------|-----------------|
| 1. Water | 18. Potatoes |
| 2. Sweet milk | 19. Lettuce |
| 3. Sour milk | 20. Oatmeal |
| 4. Sea salt | 21. Wheat |
| 5. Apples | 22. Corn meal |
| 6. Bananas | 23. Barley |
| 7. Orange juice | 24. Ry-Krisp |
| 8. Fresh pineapple | 25. Beef |
| 9. Peaches | 26. Lamb |
| 10. Tomatoes | 27. Bone marrow |
| 11. Beets | 28. Bone jelly |
| 12. Carrots | 29. Chicken |
| 13. Peas | 30. Sweetbreads |
| 14. Turnips | 31. Brains |
| 15. Cauliflower | 32. Liver |
| 16. Cabbage | 33. Kidneys |
| 17. Spinach | 34. Haddock |



No two children ever
ate the same combinations
of foods and no child ever
selected the same mix
of foods each day.

For every diet differed from every other diet, fifteen different patterns of taste being presented, and not one diet was the predominately cereal and milk diet with smaller supplements of fruit, eggs and meat, that is commonly thought proper for this age.



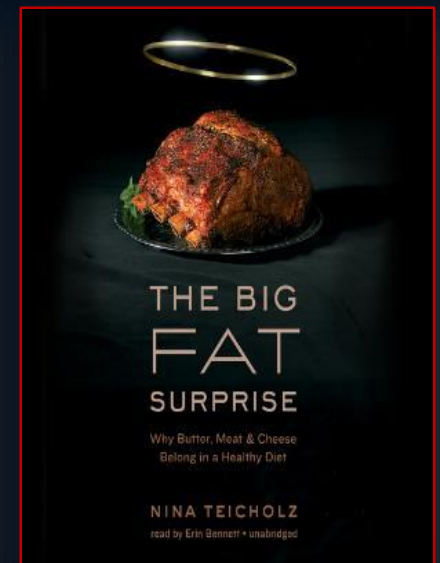
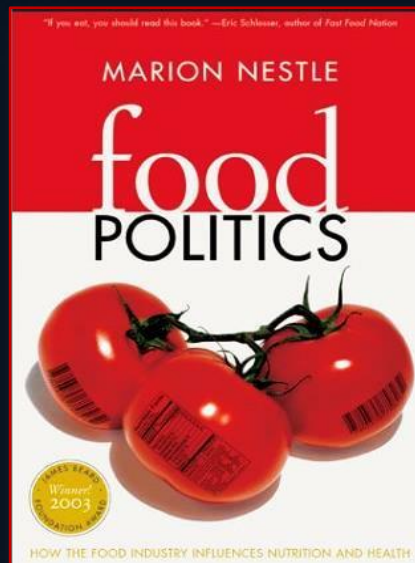
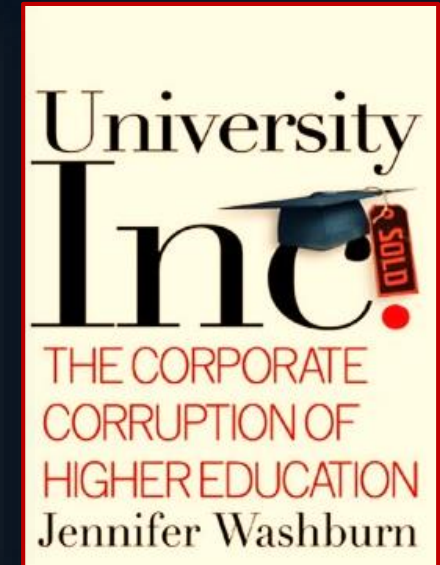
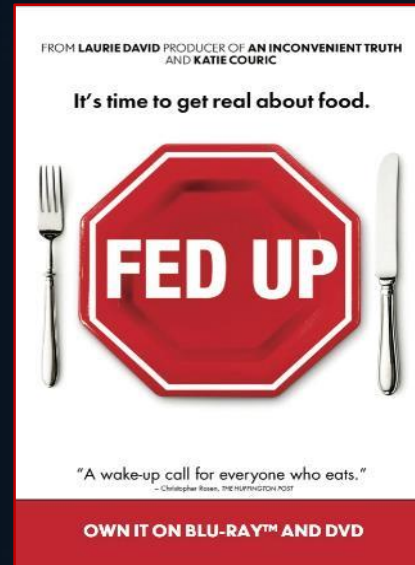
To add to the apparent confusion, tastes changed unpredictably from time to time, refusing as we say “to stay put,” while meals were often combinations of foods that were strange indeed to us, and would have been a dietitian’s nightmare—for example, a breakfast of a pint of orange juice and liver; a supper of several eggs, bananas and milk.

They achieved the goal, but by widely various means, as Heaven may presumably be reached by different roads.”

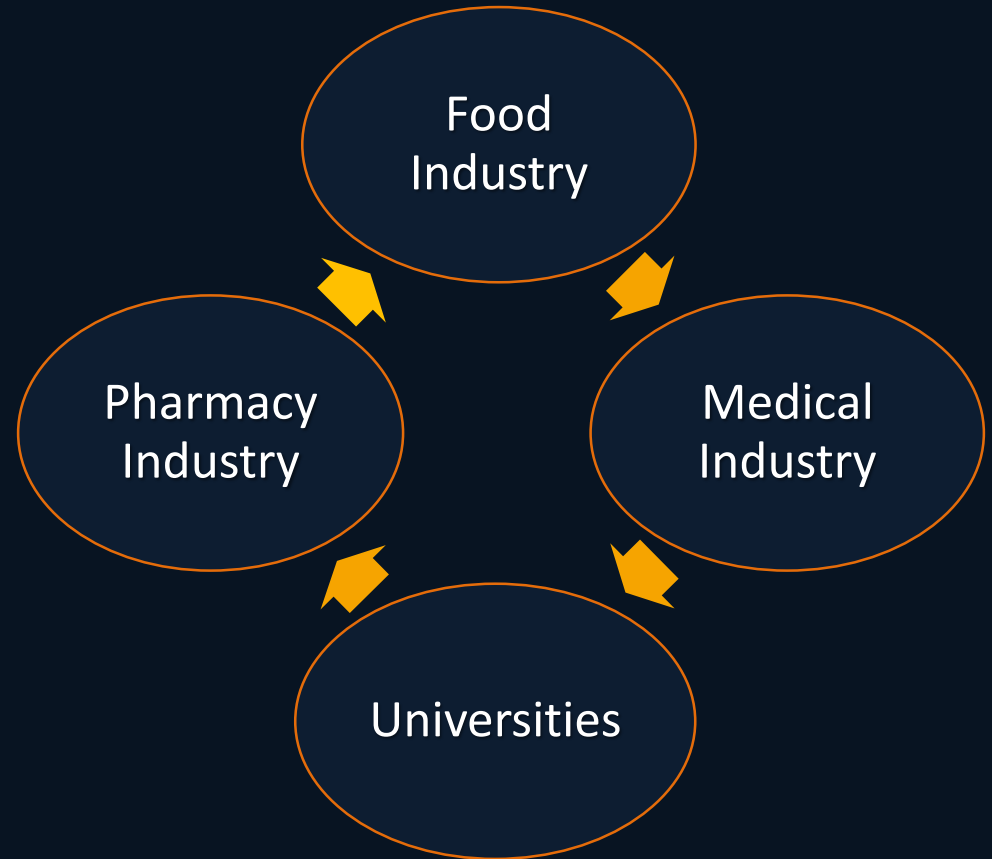


The results leave the selection of the foods to be made available to young children in the hands of their elders where everyone has always known it belongs.

But that hasn't been so during the past half century. The choices people learn to make now are influenced by corporate, political, and academic elders.



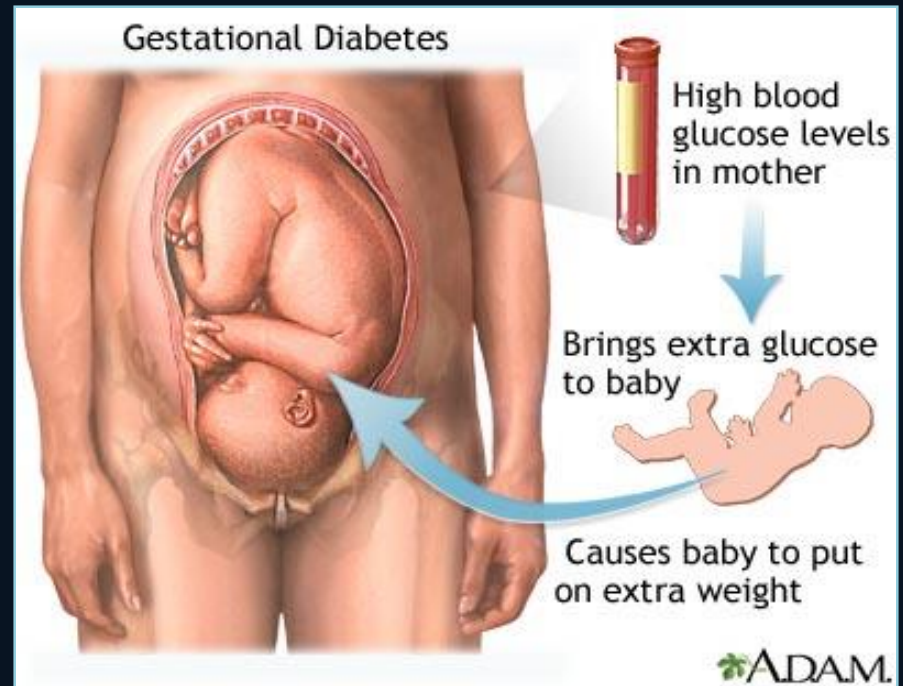
Ultra-processed foods created a pandemic of obesity and diet-related diseases, whose symptoms the medical and pharmaceutical industries treat at enormous expense.



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

Transgenerational Metabolic Syndrome

Mothers who gain excessive weight during pregnancy, mothers who are obese, and mothers who become diabetic during pregnancy are more likely to have fatter babies with higher incidence of diabetes, cardiovascular disease, cancer...



Pancreas develops more insulin-secreting cells.
Baby over-secretes insulin and with age becomes insulin-resistant.

"A thrilling survey of how the science of fetal origins is changing the way we think about the nine months before birth."

—Dr. Mehmet Oz, coauthor of *YOU: Having a Baby*

HOW THE NINE MONTHS
BEFORE BIRTH SHAPE THE
REST OF OUR LIVES



ORIGINS

ANNIE MURPHY PAUL

Author of The Cult of Personality

GHOST IN YOUR GENES

Experts investigate how a mysterious "second genome" helps determine our biological fates.

Experiences in utero
and early in life influence
gene expression.

Supplemental
genistein changes
coat color
and incidence of
obesity and diabetes.



Source: Randy Jirtle, Ph.D., Duke University Medical Center. Used with permission.

These inbred mice are genetically identical. They are each about a year old and both are female. Their different characteristics result from differences in the epigenome. The mother of the mouse on the left received a normal mouse diet. The mother of the mouse on the right received a diet supplemented with genistein, the phytoestrogen found in soy products. Genistein increases the incidence of brown offspring by altering the epigenome rather than mutating the genome — an example of nature via nurture.



Nurturing by mother

Licked vs Unlicked
Rat Pups



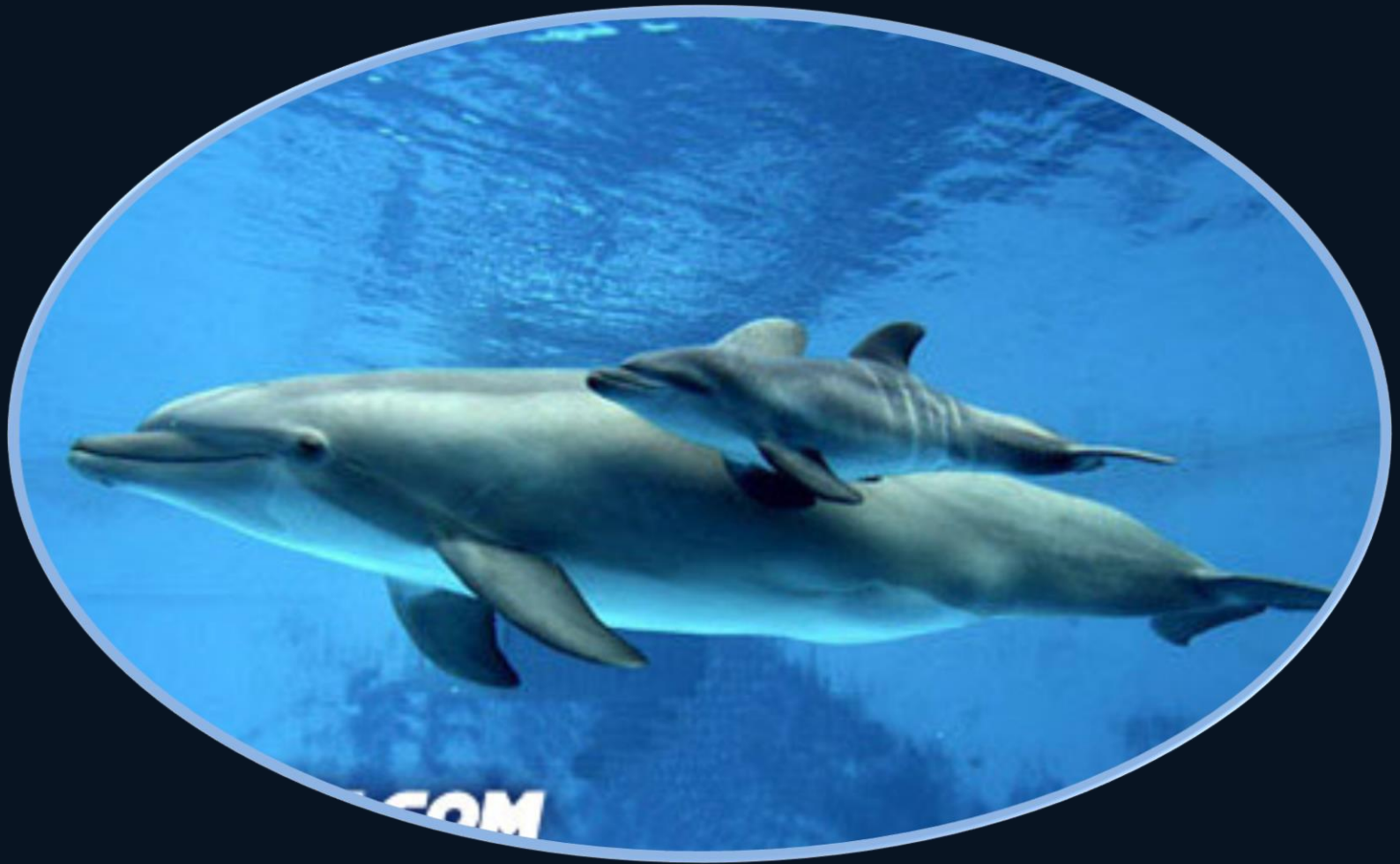
Nurturing early in life
increases calmness and reduces
stress-related diseases in adults.

Therefore, after a forty-year case study, it is my contention that couch potatoes actually begin to develop early in life as tater tots...





On the river bank...



In the ocean...



In the Arctic...



In India...



In Africa...



In Africa...



In Africa...



In Africa...



In Your House



Somewhere near Walmart

What price do we pay when we ignore transgenerational linkages to social and biophysical environments?



Creating Locally Adapted Herbivores

Green Revolution

Farm-, pasture-, and range-based livestock production systems emphasized low diversity of high-producing plants and animals, abandoning locally adapted species of plants and animals in favor of new strains and breeds.



Maximize Crop Diversity



Maintain Soil Cover



Integrate Livestock



Minimize Soil Disturbance

Maintain Living Roots



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

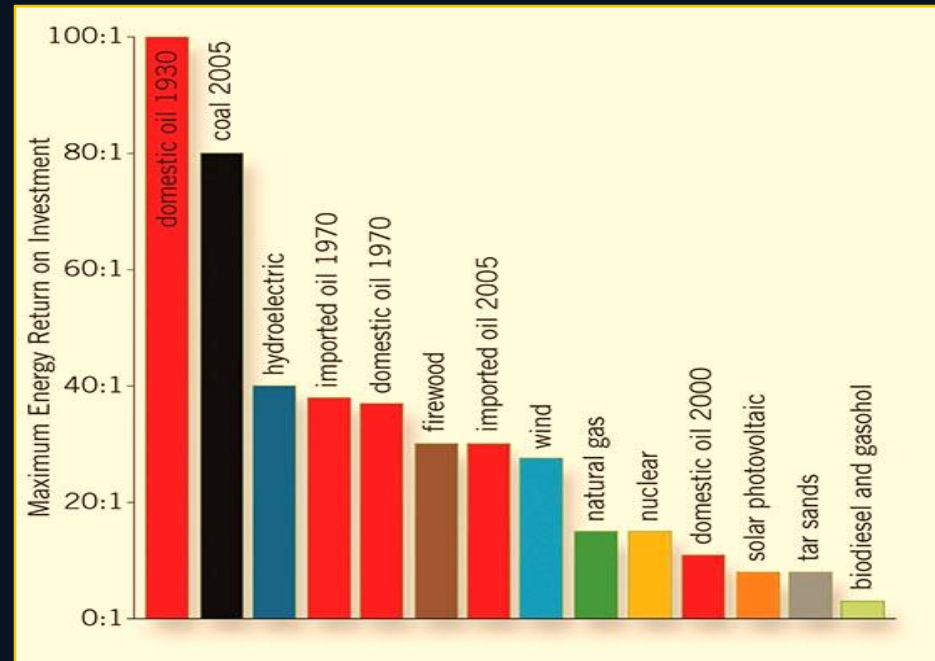
- machinery to plant, irrigate, and harvest crops;
- fertilizers, herbicides, and insecticides to grow and protect plants;
- antibiotics and anthelmintics to maintain the health of livestock.



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.



The EROI for fossil fuels at the finished fuel stage are much closer to those of renewable energy sources – roughly 6:1, and potentially as low as 3:1 for electricity. The increasing energy costs of extracting fossil fuels will cause the ratios to continue to decline, pushing energy resources towards a "net energy cliff."

The Last Ranch by Sam Bingham



1935

- 75-lb lambs
- culled ewes with twins

1985

- 90-lb lambs
- 150% lamb crop

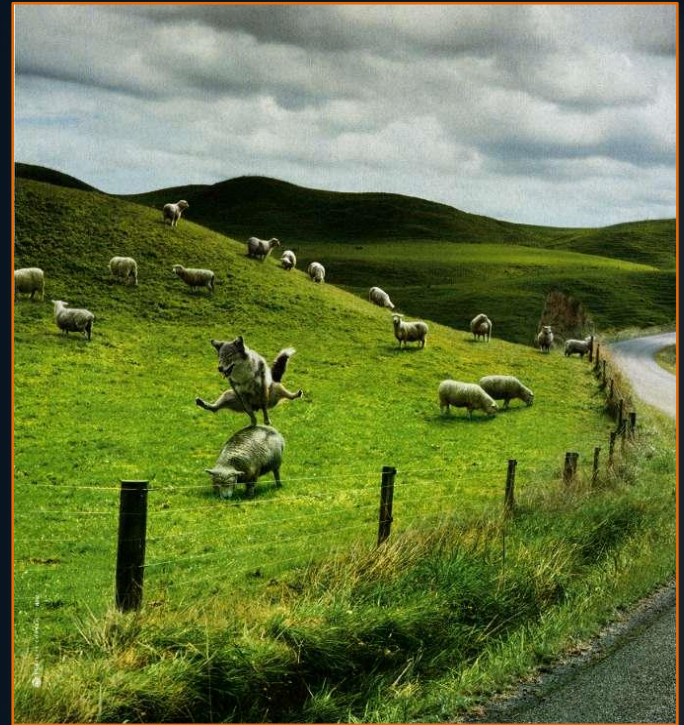
Our ewes [from 1935]
were strong and as well
muscled as deer, and yours
wouldn't last a day
where ours went.

George Whitten

"They were crazy.
Once the knowledge is
gone, you can't get it back
just like that. They didn't
even have a dog that knew
anything. When they went
through here you knew they
were looking for trouble.
And they found it."



Old dogs can learn new tricks, but young dogs learn them quicker.



Age and challenge influence how quickly animals can learn.

Learning Curves

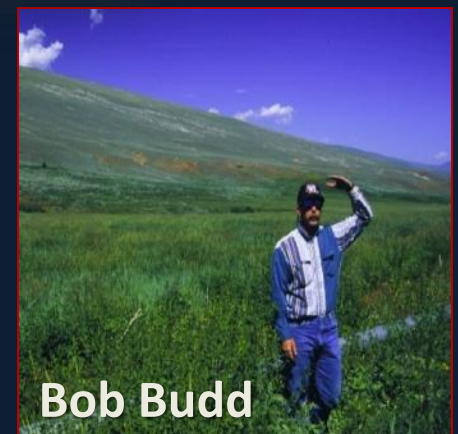
System Performance



Soils, Plants, Herbivores, People

Time

Changing Food and Habitat Selection Behaviors of Livestock



Fossil fuels enabled people to select for animals that lack the ability to thrive on foods and habitats available to them.



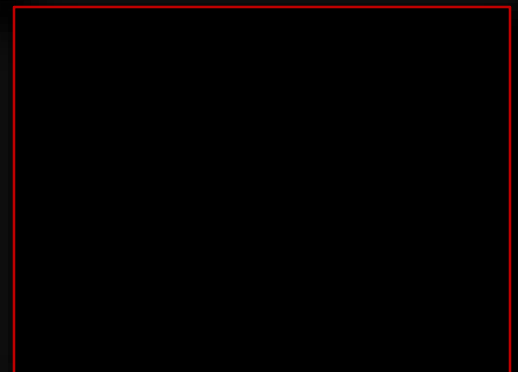
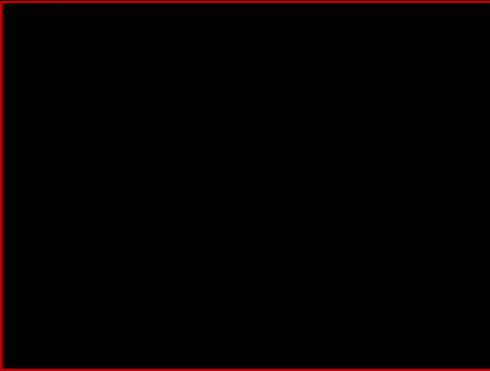
Much of the cost of ranching is due to feeding hay in winter.

Mat Carter Crown Cattle Company

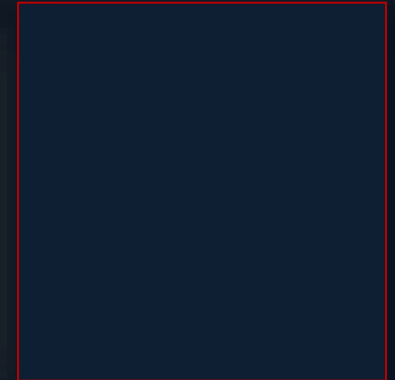
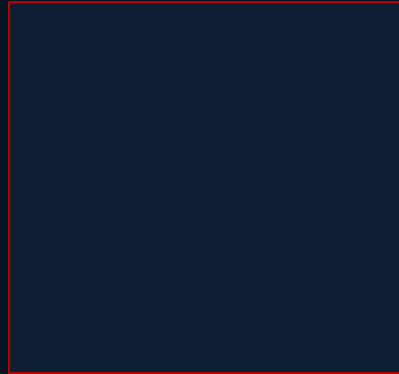


From sagebrush as a costly
nuisance to sagebrush as a
forage resource in winter

Like their
wild ancestors,
domestic livestock
can learn to be
locally adapted to
the environments
they inhabit.



Retain animals
that can survive
only on what nature
provides seasonally
in landscapes.



Match production
cycles to seasonal
availability of forage:

Fall-Winter

Maintenance

Spring-Summer

Reproduction



Calve in Spring
Winter on Forages

Rear offspring with their mothers where they will be expected to produce as adults. Create families based on epigenetic and learned abilities of matriline to use diets and habitats.



*THE BUFFALO
HARVEST*



FRANK H. MAYER AND
CHARLES B. ROTH



What was the
secret to bison
hunters' success?

Bison live
in extended
families



They decide when to
move **democratically** and
where to move **despotically**



Extended Families

Moving Families



Moving Bulls



Livestock live in extended families when calves, lambs, and kids aren't weaned...



Play ▶

Sony DVD Player/ Video Cassette Recorder

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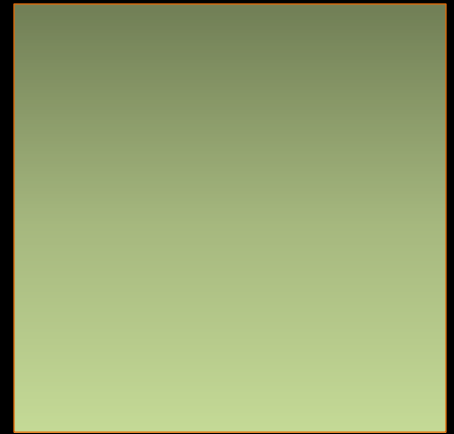
We stress
genetics as the
mechanism of
evolution...



...not appreciating that genes dialog continually with social & biophysical environments.



Animals aren't machines and genes aren't destiny. Animals are *involved* in the world which helps them to *evolve* with the world.



Questions

Please type into the chat bar



Connect with **FACT**

Food Animal Concerns Trust

Recordings of webinars with Dr. Fred Provenza

- 🐔 Available at foodanimalconcernstrust.org/fred-provenza
- 🐔 Webinars will resume in the fall!

Grants, Scholarships, Mentorship & More!

- 🐔 **Scholarships – *ongoing***
- 🐔 **Handouts on nutritional benefits of pasture-raised animals**
- 🐔 Sign up for emails @ foodanimalconcernstrust.org/farmer/

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