

- MARCH 30, 2021 -

Wisdom of the Body: Let Feed be Thy Medicine



- PRESENTED BY -
Dr. Fred Provenza

- HOSTED BY -

FACT

Food Animal Concerns Trust

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

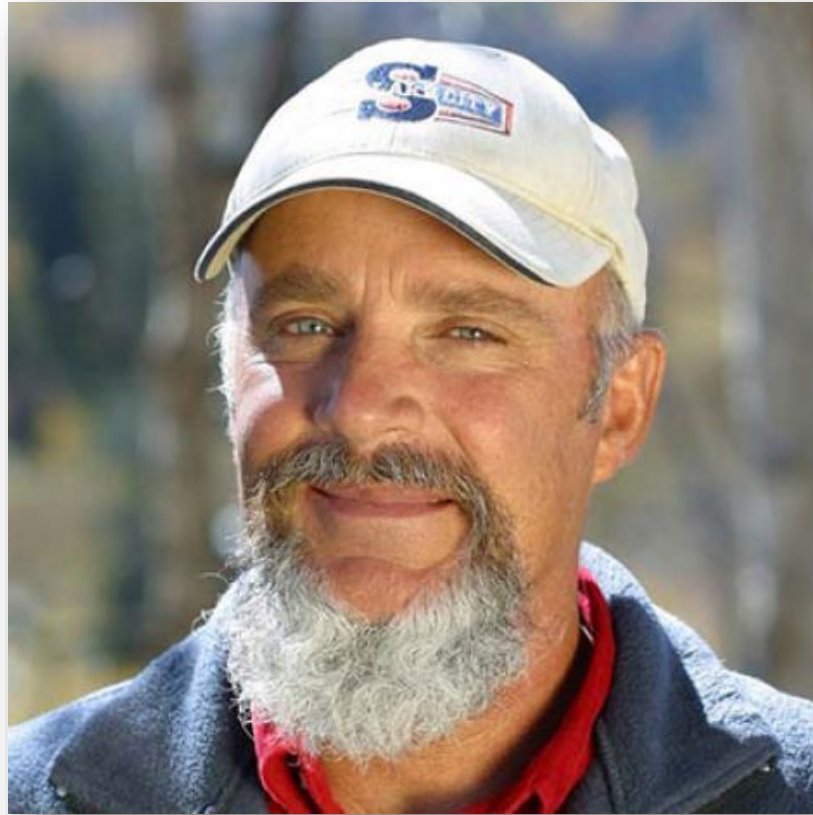
Email: lmckenna@foodanimalconcerns.org

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 Thy Medicine

Ecology



Agriculture

Let Feed
Be Thy
Medicine



Wisdom of
the Body

Let Food
Be Our
Medicine

Herbivore
Culture



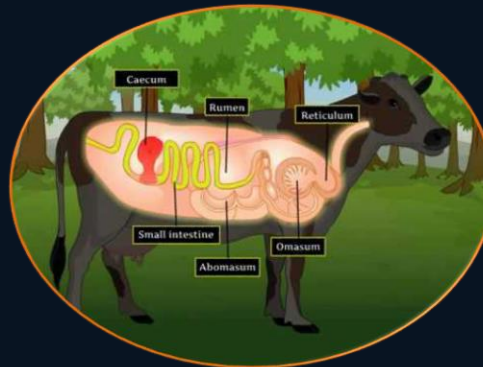


**Plant
Diversity**

**Wisdom
of the Body**

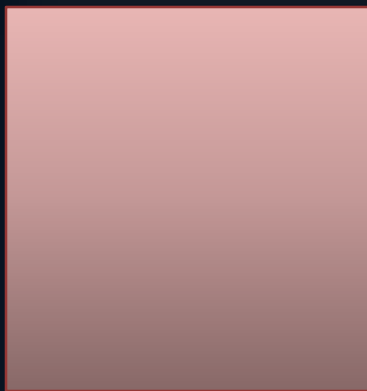
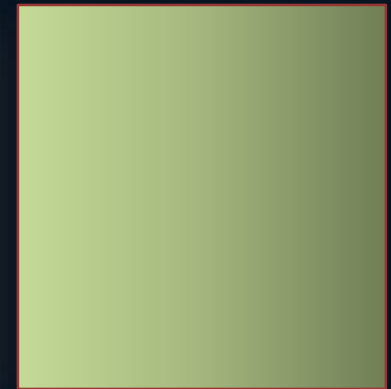
**Flavor
Feedback**

**Social
Cultural**



Flavor-Feedback

Why do goats
avoid eating the
more nutritious
new growth of
blackbrush?



Why does
polyethylene
glycol increase
preference for
new growth in
blackbrush?



New growth is higher in
energy, protein, and minerals
than old growth, but most
goats strongly prefer
old to new growth.

Why do
goats eat
woodrat
houses?



Why did cattle
in Apache county
die from eating
poisonous plants
while those in Gila
county did not?



Cattle were exposed
to the same poisonous
plants in both Apache
and Gila Counties.



“I guess that just goes to show domestic animals lack nutritional wisdom.”

Herbivores are challenged to select diets from grasses, forbs, shrubs, and trees, each unique biochemically.



Some species and plant parts are nutritious, others are toxic.

Individual plants can be nutritious or toxic depending on the time of the day, week, and season...



...and on the resources available in the environment where the plant is growing.

How do herbivores know how to meet needs for nutrients and medicines?

Nutritionists

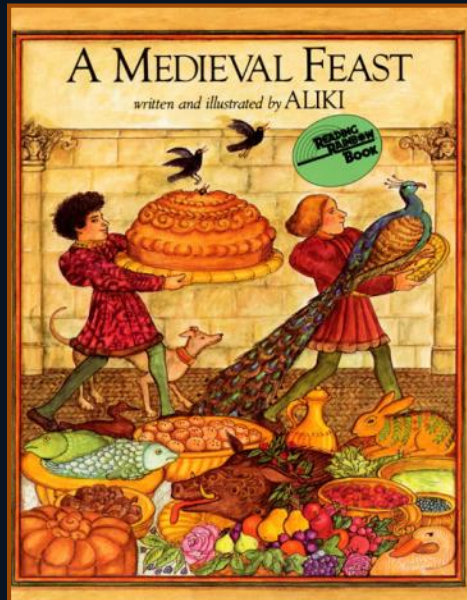


Pharmacists

Veterinarians



What is Palatability?



A/R

OPEN

Picante Sauce



Gerber

2ND
FOODS

NET WT. 4 OZ (113g)





Flavor

Palatability
is more...

...than a
matter of taste

Primary
Compounds

Secondary
Compounds



Primary Compounds

Energy, Protein, Minerals



Secondary Compounds

Phenolics, Terpenes, Alkaloids



Nutrients Increase Palatability

Conditioning

- Odd days
- Even days

Group 1

apple → water
maple → nutrient

Group 2

maple → water
apple → nutrient

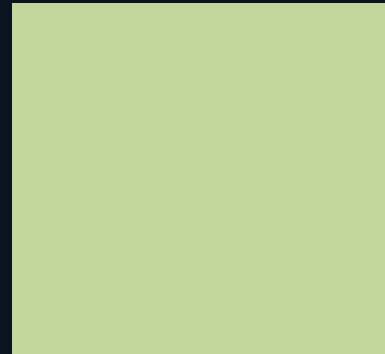
Testing

Choice between apple and maple

What are calories?

Calories are little units that measure how good a particular food tastes. Fudge, for example, has a great many calories, whereas celery, which is not really a food at all but a member of the plywood family, provided by mother nature so that we would have a way to get onion dip into our mouths at parties, has none.

Dave Barry



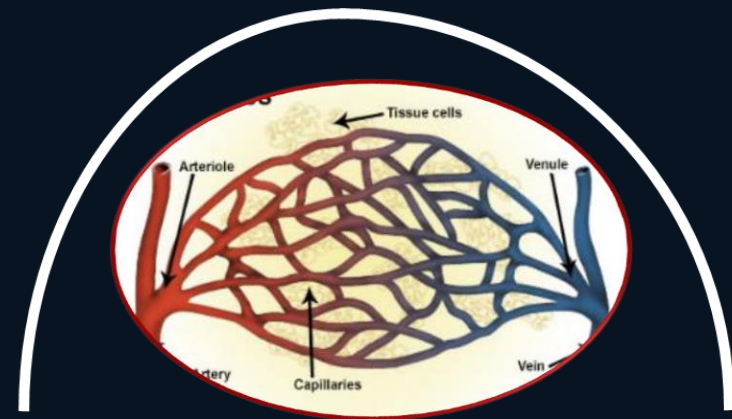
Link familiar flavors
with refined carbs
to lure people to the
novel food by dressing
it in a known and liked
flavor and reinforcing
the flavor with a
blast of energy.



Postingestive Feedback

Primary Compounds

- Energy (cellulose, starch, glucose, VFAs)
- Protein (NPN, rumen degradable, bypass)
- Minerals (Na, P, Ca, Se, S)
- Vitamins (E)

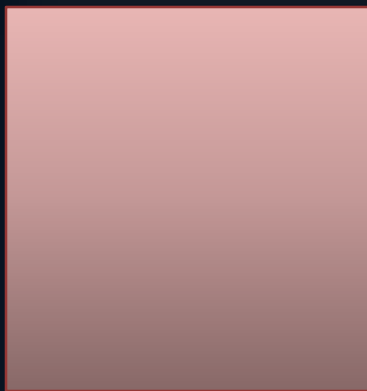
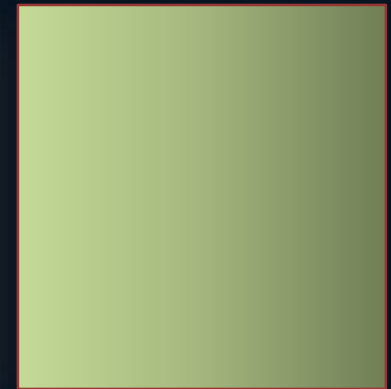


deficit adequate excess
Liking for Food

Secondary Compounds

- Phenolics
- Alkaloids
- Terpenes
- Nutrients
- Medicines

Why do goats avoid eating the more nutritious new growth of blackbrush?



Why does
polyethylene
glycol increase
preference
for new growth
in blackbrush?



Polyethylene glycol binds to tannins in new growth, alleviating their aversive effects in the body.

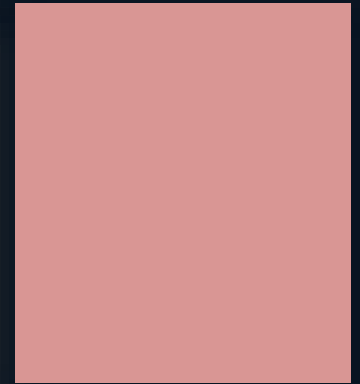
Cattle
supplemented
with polyethylene
glycol eat more
seresicia.



Why do
goats eat
woodrat
houses?



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



Why do animals eat unusual foods?



Alleviate deficiencies

- minerals: Na, P, Ca, Se, S
- vitamin: E

Free-Choice Cafeteria Mineral Supplements



- Choice: Na, P, Ca
- Minerals: Na, P, Ca, Se, S
 - Vitamins: E

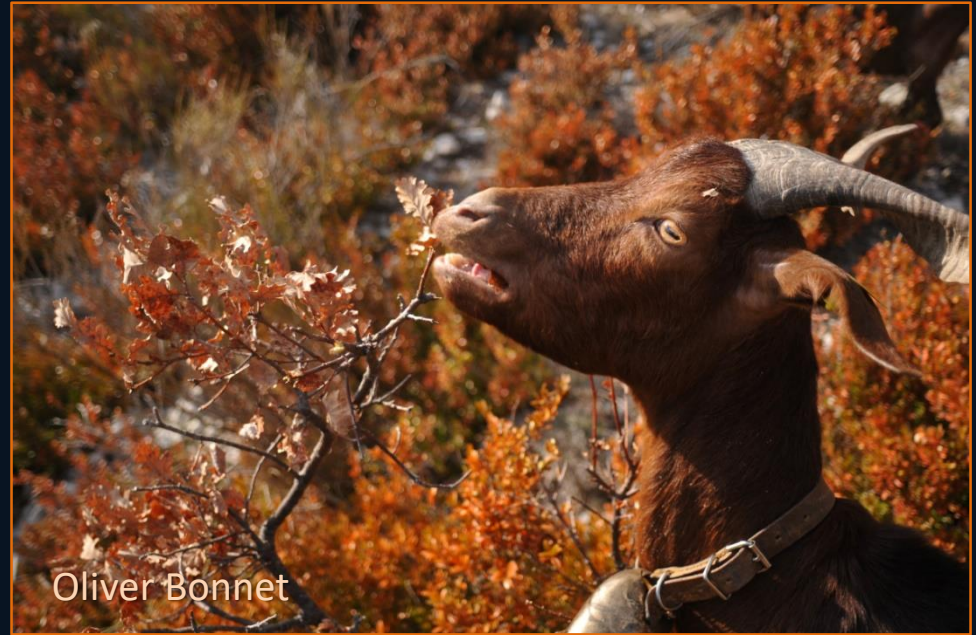
Two Ways to
Self-Medicate
Therapeutically
Prophylactically





Livestock Learn to Self-Medicate:

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



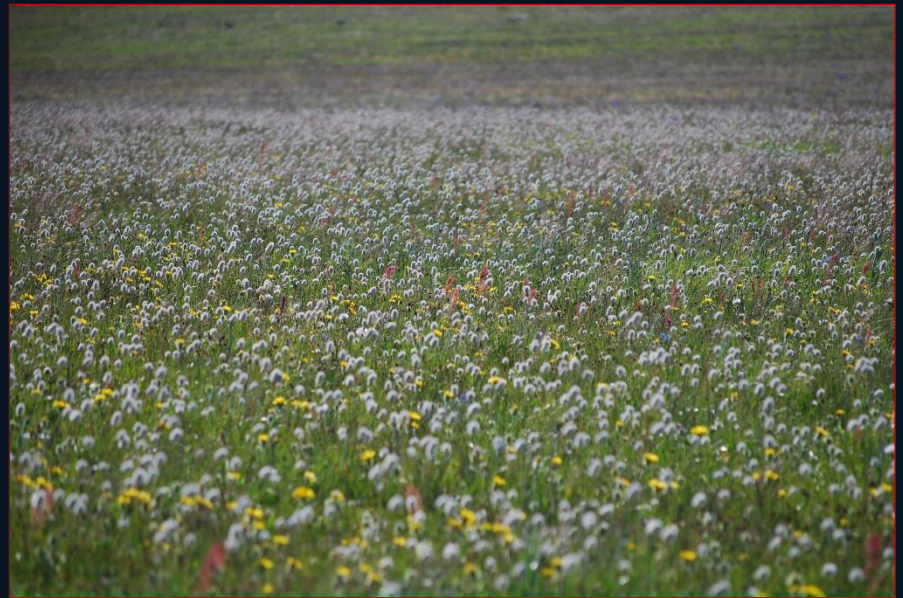
When goats are treated with Ivomec, they no longer use tannin-containing medicinal shrubs.

While 3 to 5 plants make up the bulk of the diet, herbivores often eat 50 to 75 plants in a meal.



Health is enhanced when livestock graze phytochemically rich mixes of grasses, forbs, shrubs, and trees.

Nothing is more important for health through nutrition than landscapes with a variety of plants for herbivores, omnivores, and carnivores above and below ground.



Health improves when livestock graze mixtures of plants, some of which contain tannins, compared with monocultures.



They gain weight more efficiently - with less emissions of CH_4 and NO_3 - and they can reach slaughter weight as quickly as animals in feedlots.

Biochemically
diverse diets
enable sequences
that compliment
one another.



trefoil (tannins)



tall fescue (alkaloids)

An appetizer of trefoil (sainfoin)
helps the fescue go down.

An appetizer of bitterbrush
helps the sagebrush go down.

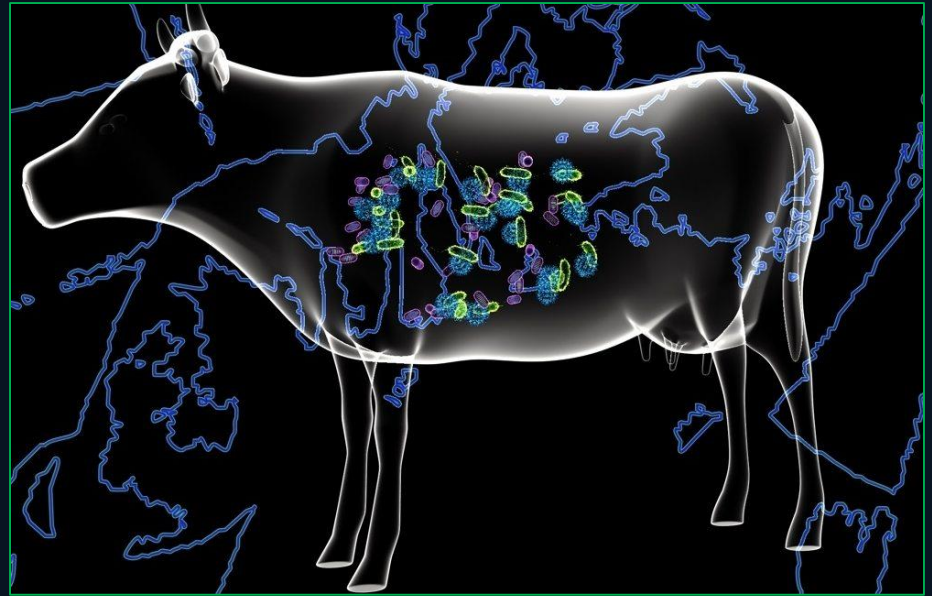


bitterbrush (tannins)



sagebrush (terpenes)

Photochemically
rich diets increase
diversity of species
in the microbiome
of the rumen
and in the soil.



The microbiome of
each individual is unique.



Why do cattle
perform so well
on the mix of
plants from hell?

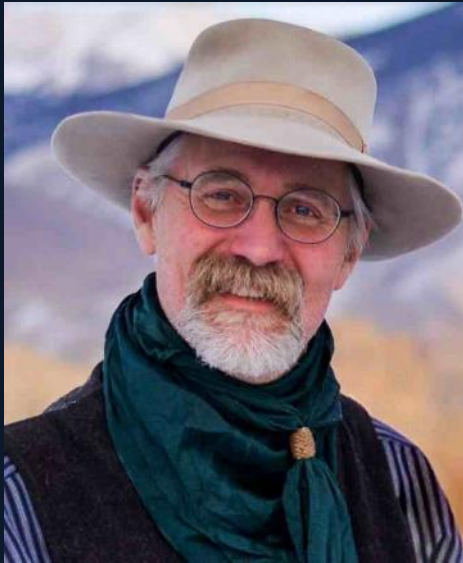


Livestock
producers are
finding morbidity
and mortality
decrease...



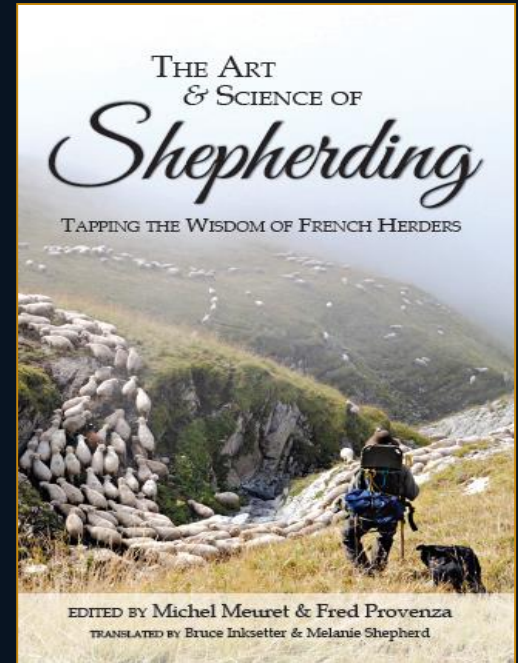
...when stocker cattle forage
on diverse mixtures of plants
rather than monoculture pastures.

Glenn Elzinga



Alderspring Ranch

Nurturing health from soil and plants to herbivores and humans.

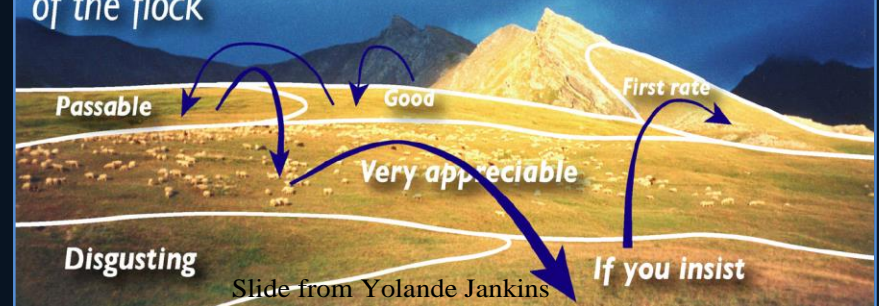


Grazing Circuits

- ✓ Enables individuals to regulate intake of primary and secondary compounds
- ✓ Stimulate appetite/intake
- ✓ Target grazing to enhance/maintain biodiversity

7. A few tricks to improve the flock's appetite

Alternation is a key concept in maximizing the appetite of the flock



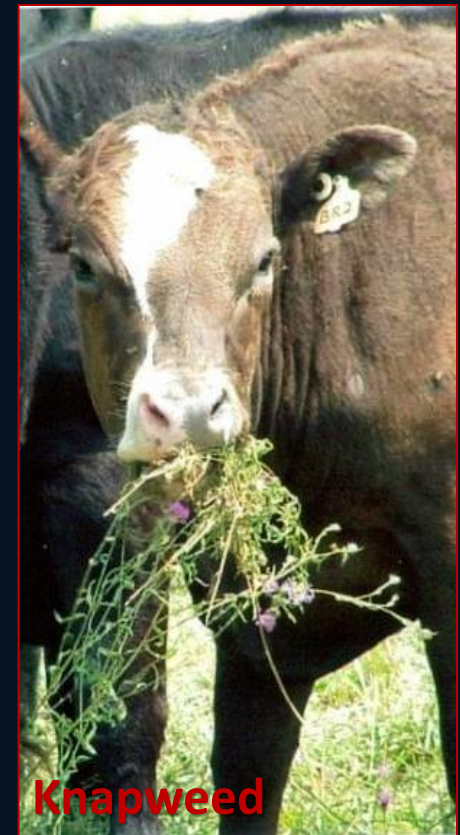
Cattle can learn to eat unfamiliar plants and become connoisseurs of “weeds”



Cattle as weed managers to enhance biodiversity



Kathy Voth



Grazing
management
can change
food and habitat
selection behaviors.

Train livestock
to be weed
eaters...



Boom-Bust
Grazing

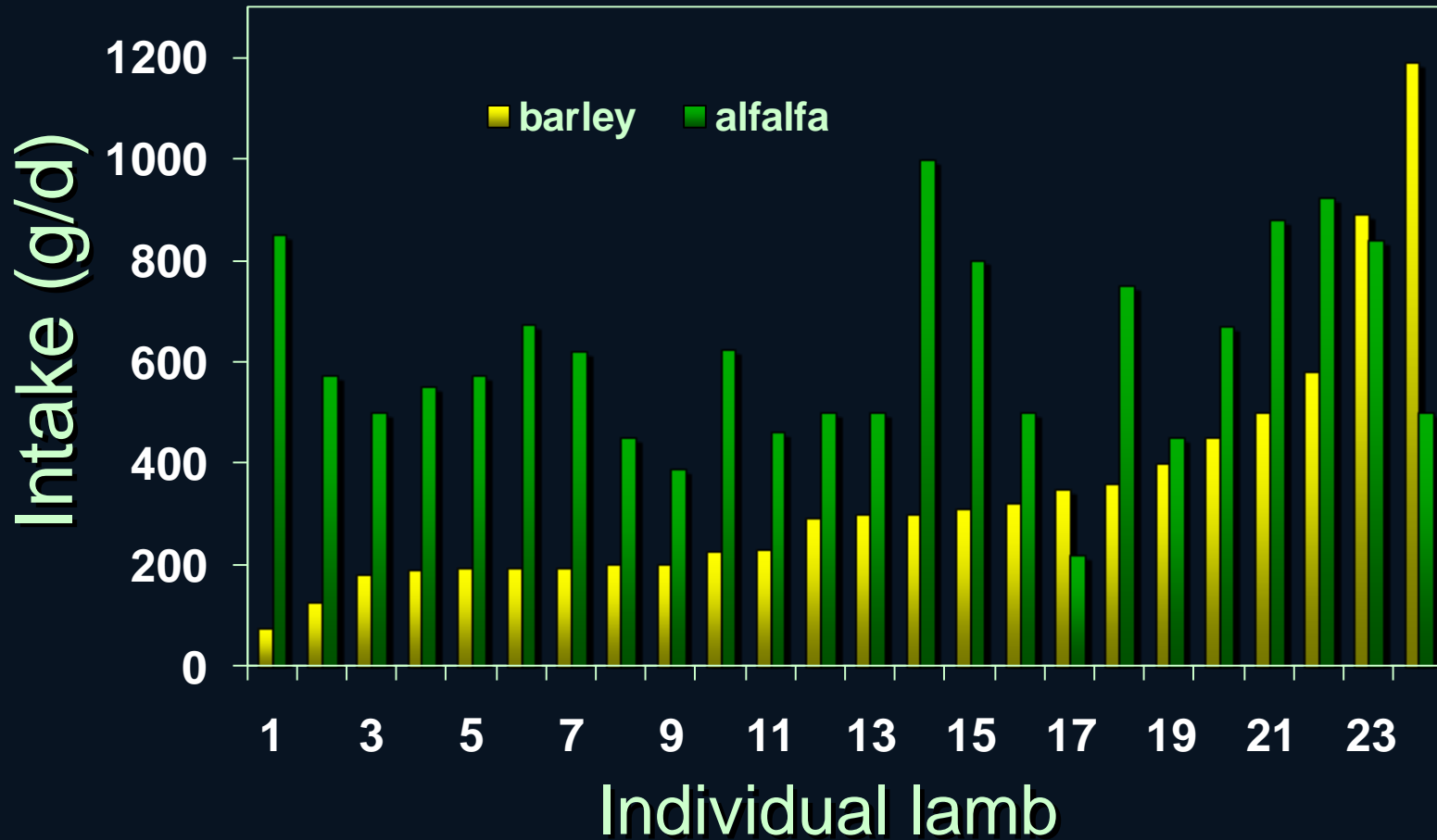
Short-Duration,
Management-
Intensive, and
Mob-Grazing

Livestock can learn to
“mix the best with the
rest” rather than “eat the
best and leave the rest”

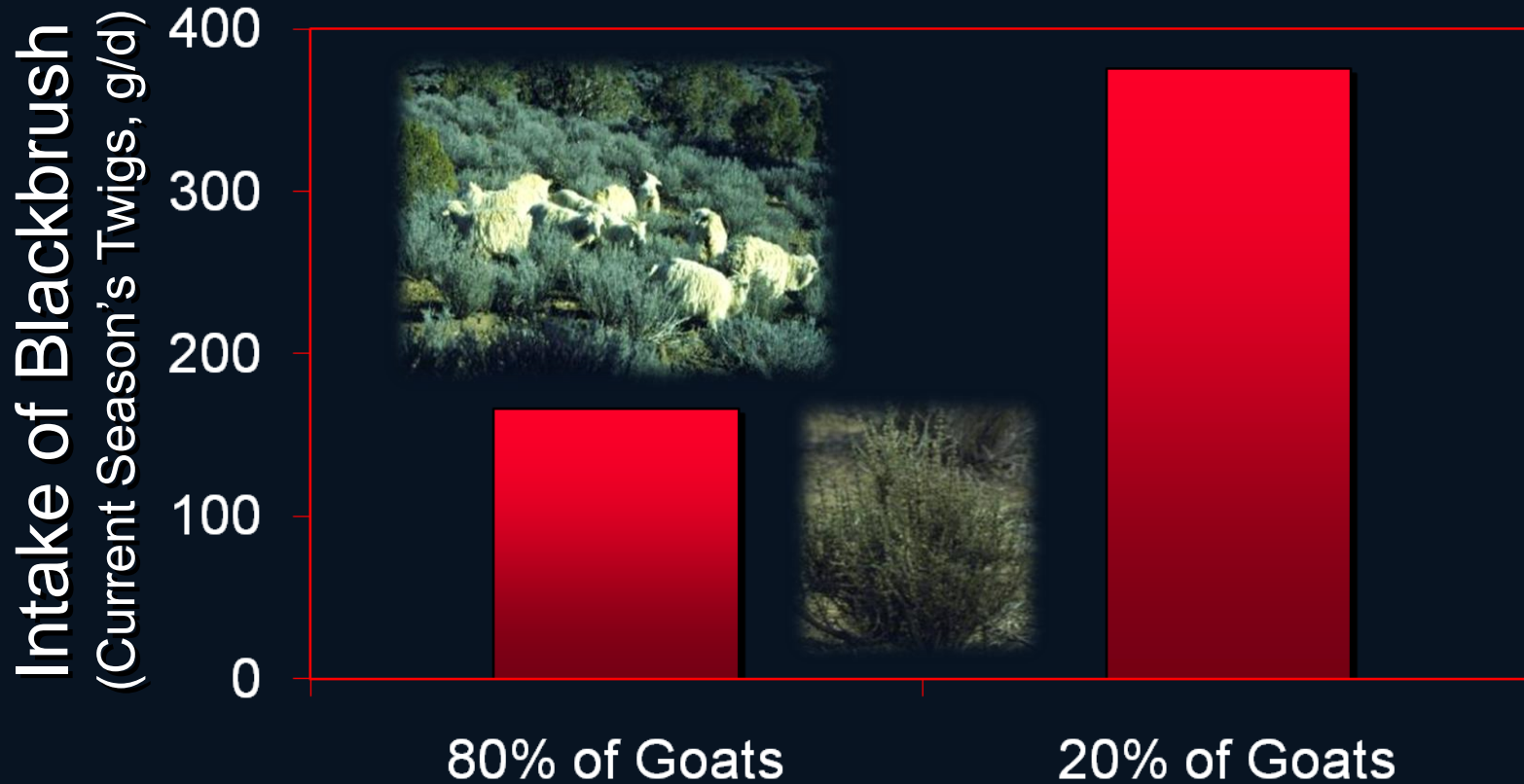
Biodiversity
Enables Individuality



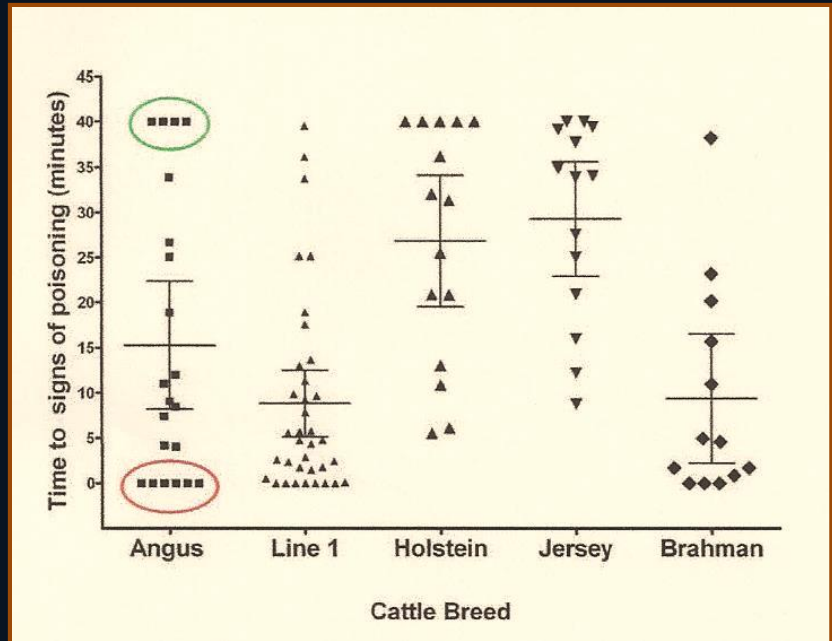
Variation among Lambs



Variation among Goats



Variation
among breeds
and individuals
with respect to
larkspur toxicity.



Why Do Livestock
Eat Poisonous Plants?

If livestock
are wise, why
do they eat
poisonous
plants?

Halogeton
(Hunger)

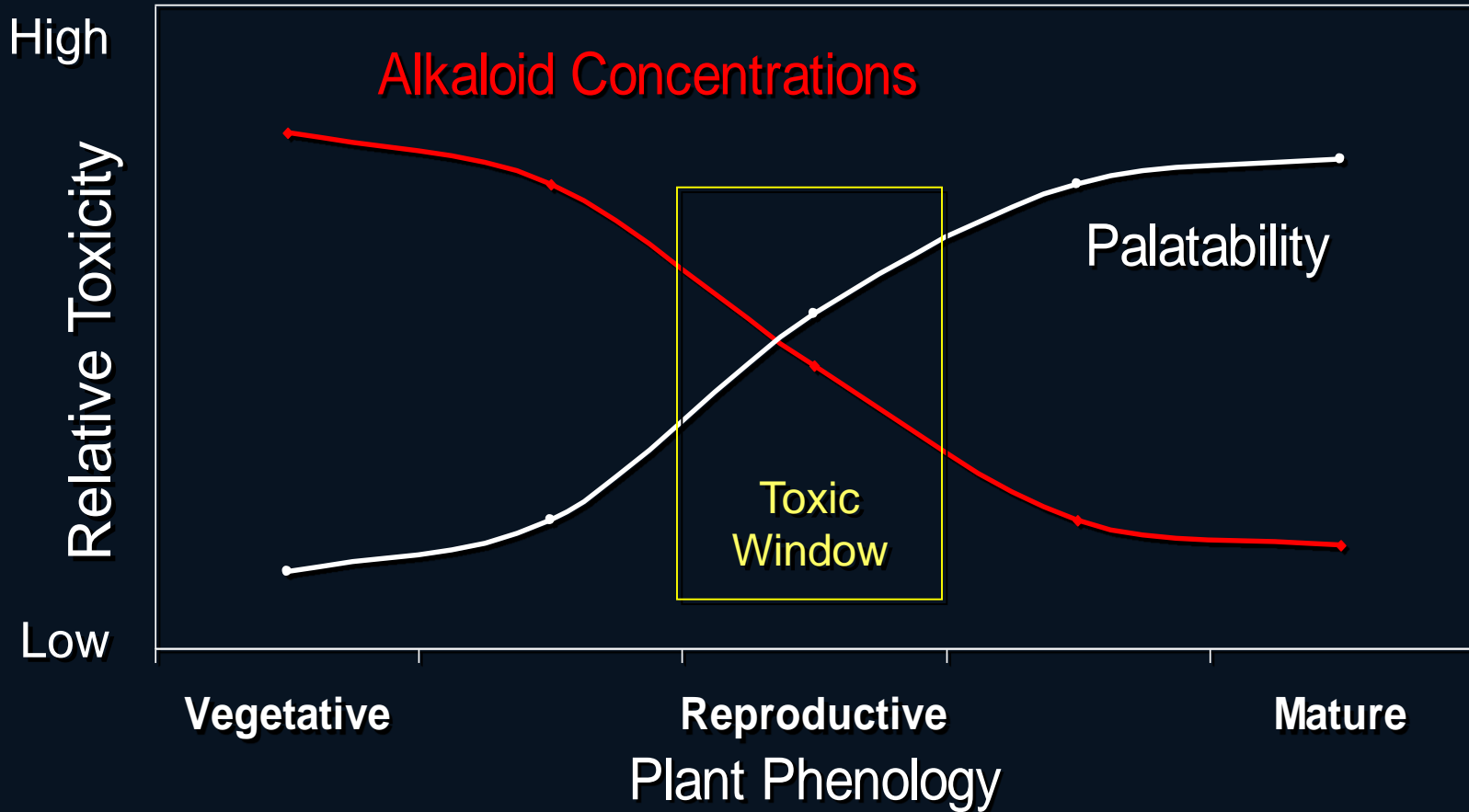


Locoweed
(Feedback Trap)

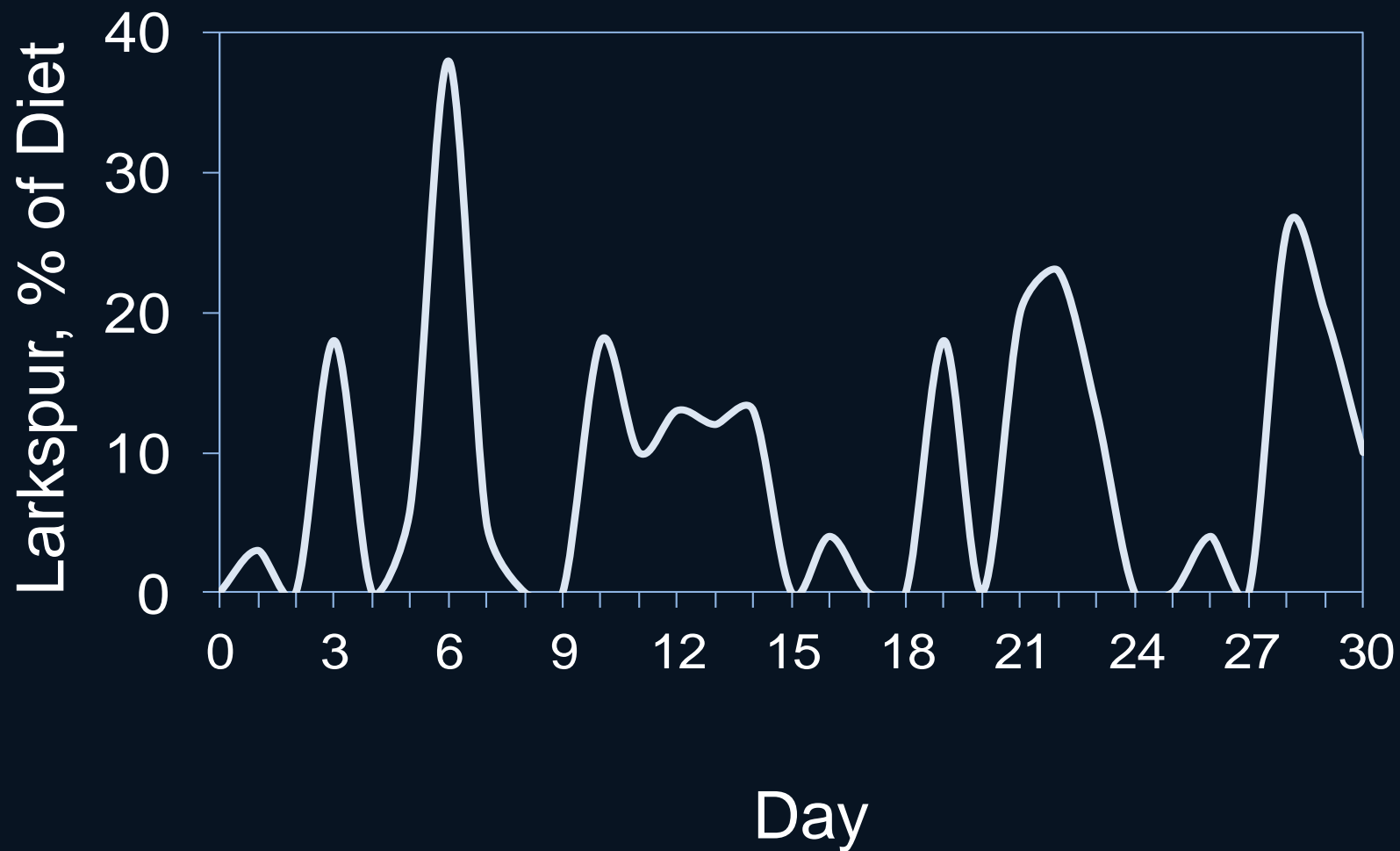
Larkspur
(Deception)



Toxic Window for Larkspur



Alkaloids Limit Intake

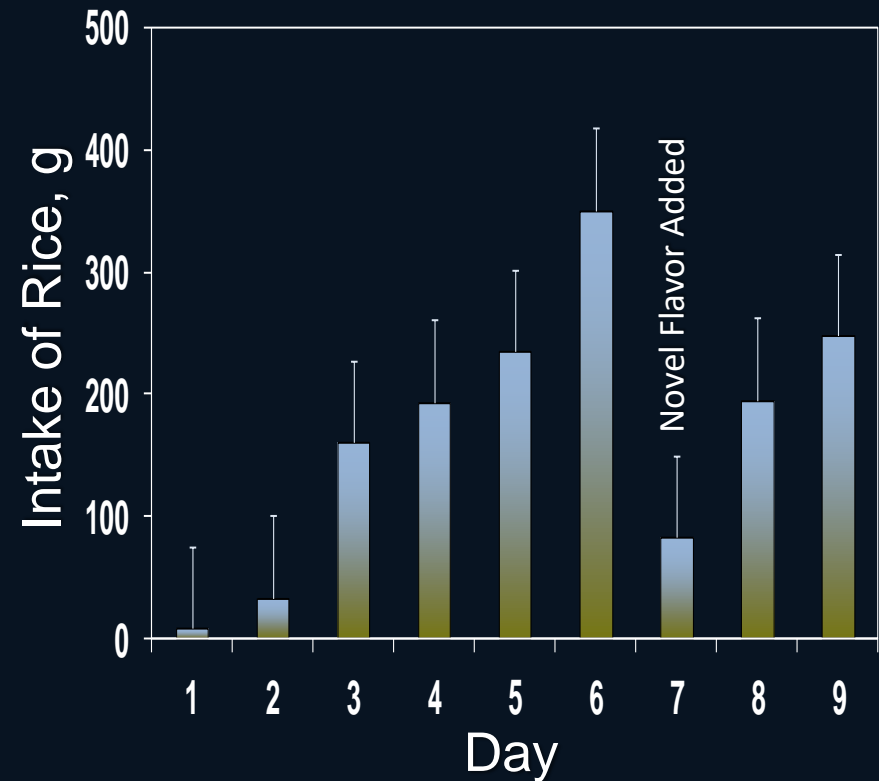


Why did cattle
in Apache county
die from eating
poisonous plants
while those in Gila
county did not?



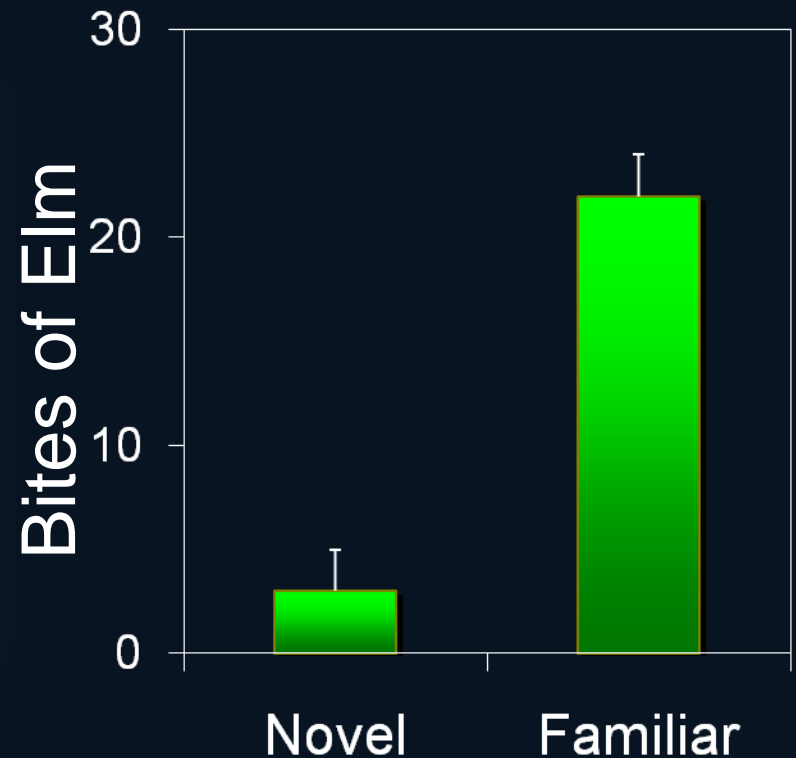
- Differences in Plant Chemistry
 - Different Mixes of Plants
- Stress Unfamiliar Environment
- Preference Familiar vs Novel Foods

If nutritional state is adequate, familiarity breeds content, novelty breeds contempt...

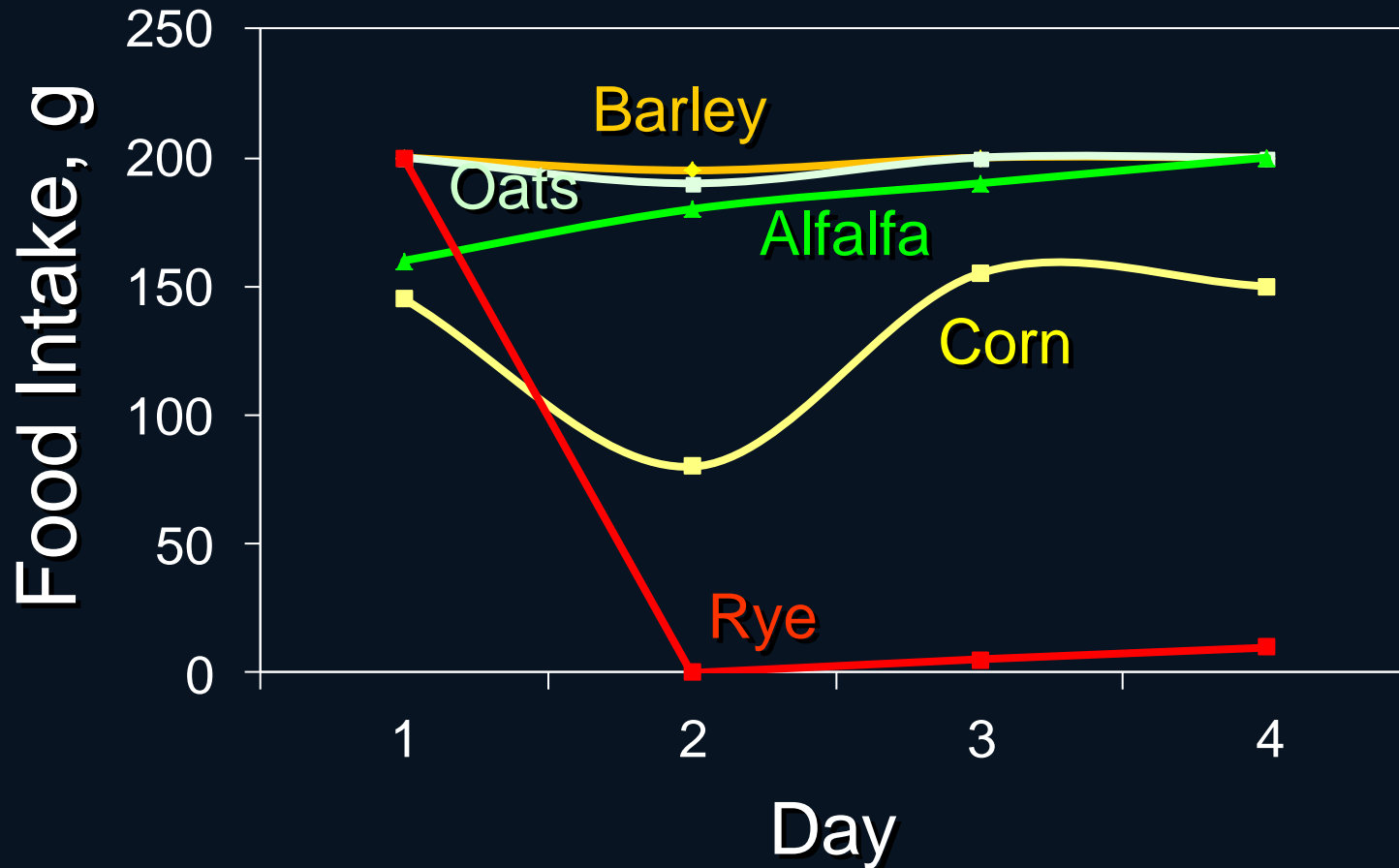


...and animals are neophobic.

Lambs sample familiar foods with novel flavors



Familiar-Novel Dichotomy



A Mother's
Lifelong
Influence on
Diet and Habitat
Selection



In utero
Mother's Milk

Mother
as a Model



Skin and Gut Defenses

Training
livestock to
avoid eating
particular
plants.



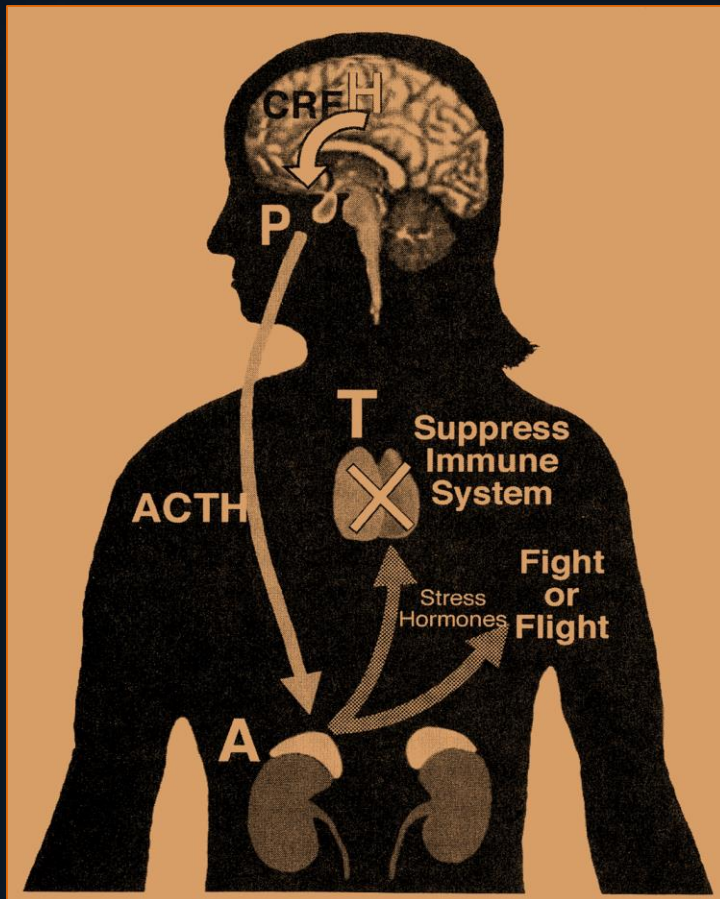
What do they learn
when a human
administers a toxin?

Skin and Gut Defenses are Mutually Inhibitory



The mess boys of the U.S.S. Chase wore immaculate white jackets and served hot cakes, sausages, eggs and coffee with unusual zest and politeness. But the pre-invasion stomachs were preoccupied, and most of the noble effort was left on the plates. R. Capa

Physiology of Stress



Stress, Immune Responses,
and Animal Performance

Bison were offered a choice of feeds or fed a total-mixed ration, in tight or loose confinement, or they foraged on rangelands.

Loose-confinement had higher average daily gains than the other groups, but the rangeland group was least costly to finish and provided the highest net returns.



Living in family groups reduces stress.

The least stressful and most profitable way to finish bison is to leave them on rangelands.

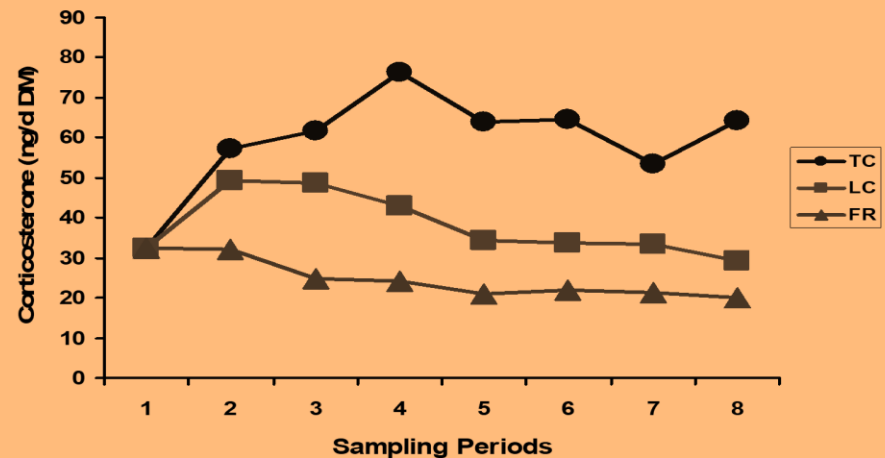


Tight or Loose Confinement

Free-Range



Confinement and Stress in Bison



Compared
with sheep fed a
monotonous diet
early in life, sheep fed
a diversity of foods
and flavors...



- ✓ Less cribbing
- ✓ Lower levels of stress
- ✓ Greater intake of novel foods
- ✓ Higher body weight gains

Issues with Feedlots and Total-Mixed Rations



“Average” Animal
Grain-Aversion
Monotony-Stress
Metabolic Syndrome-Disease
Antibiotics-Resistance

➤ **Total Mixed Ration**
ground and mixed
corn, barley, alfalfa, corn silage

➤ **Free Choice**
corn, barley, alfalfa, corn silage



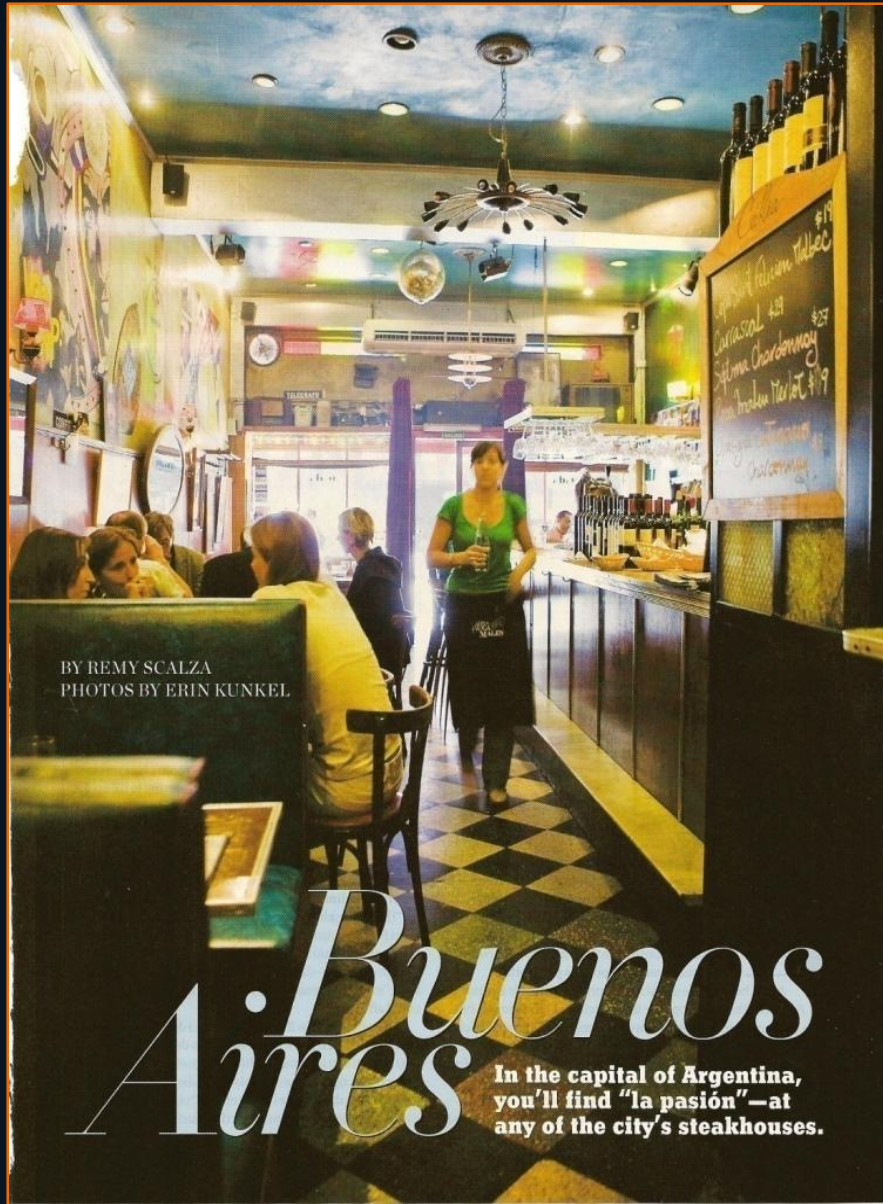
- ✓ Choice ate less than mixed
- ✓ Gained weight at same rate
- ✓ Choice cost less to feed than mixed (\$1.49/kg gain vs. \$1.84/kg gain)

Animal Welfare

Five Freedoms



- ✓ Fear and Distress
- ✓ Express Normal Behavior
- ✓ Hunger and Thirst
 - ✓ Discomfort
- ✓ Pain, Injury or Disease



BY REMY SCALZA
PHOTOS BY ERIN KUNKEL

Buenos Aires

In the capital of Argentina, you'll find "la pasión"—at any of the city's steakhouses.

It's the diet that makes Argentine beef unique. "Argentine cattle are grass-fed," explains Ginger Gentile, director of a TV documentary titled *Beef Is Bueno*. A former vegetarian, she converted to meat after moving to Buenos Aires from New York in 2002.

"They walk around," she says of Argentine cattle. "They live in family groups. For their short lives, they live the way cows were meant to live."



ANIMAL WELFARE RATING: 5+

ANIMAL CENTERED; ENTIRE LIFE ON SAME FARM

ANIMAL WELFARE RATING: 5

ANIMAL CENTERED; NO PHYSICAL ALTERATIONS

ANIMAL WELFARE RATING: 4

PASTURE CENTERED

ANIMAL WELFARE RATING: 3

ENHANCED OUTDOOR ACCESS

ANIMAL WELFARE RATING: 2

ENRICHED ENVIRONMENT

ANIMAL WELFARE RATING: 1

NO CAGES, NO CRATES, NO CROWDING

NOT STEP RATED: DOES NOT MEET
WHOLE FOODS MARKET REQUIREMENTS

Connect with **FACT**

Food Animal Concerns Trust

Upcoming webinars with Dr. Fred Provenza

- 🐔 **April 6: Part 2 – Plant Diversity + Health**
- 🐔 **April 13: Part 3 – Creating Locally Adapted Herbivores**

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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