

Behavior-Based Grazing Management
As a Plant-Herbivore Interaction

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http://www.extension.org/organic_production

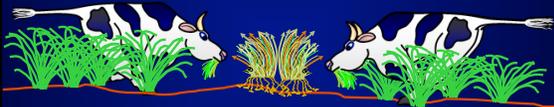




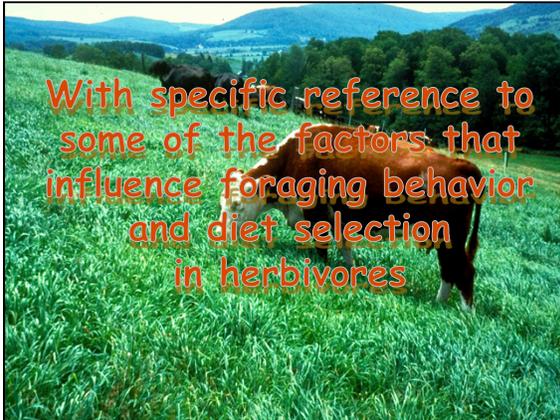
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I use the word "organism"
because even plants have
behavior in that they grow under
different conditions, at
different rates, and change in
yield, quality, and toxicity over
time



Behavior

Behavior can be as simple as a reflexive response
i.e., things like the knee jerk reaction, eye blinking,
or jumping at the sound of a loud noise, and in plant
behavior, something as simple as a yield response
to a fertilizer application

Or

Behavior can involve more complex activities
i.e., group dynamics, mating rituals, or
foraging behavior and diet selection, and in plant
behavior, something as complex as plant community
ecology



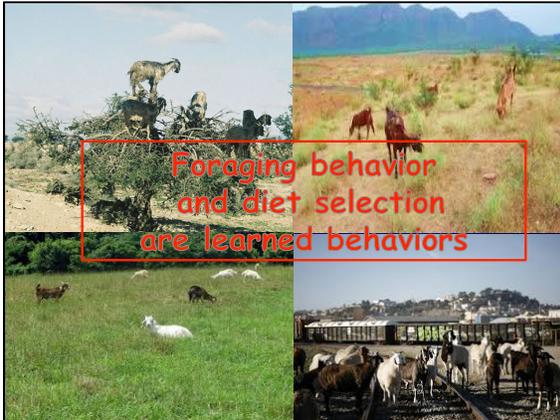
Behavior

Nature
It's in the Genes



Shaped by Experience
Nurture
(Learning)





Behavior

It is part nature, part nurture, and it is a function of consequences

Positive consequences increase the likelihood of a behavior

Negative consequences decrease the likelihood of a behavior



E.L. Thorndike, 1911

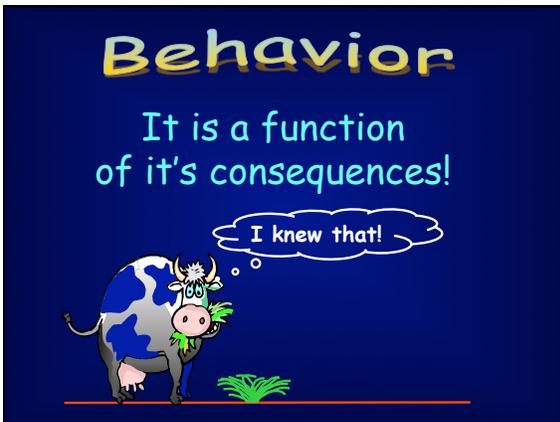
"The law of effect"

If an animal engages in a particular behavior and the outcome results in a **satisfying state of affairs** for the animal, the animal will likely repeat the behavior.

If an animal engages in a particular behavior and the outcome results in an **annoying state of affairs** for the animal, the animal will not likely repeat the behavior.





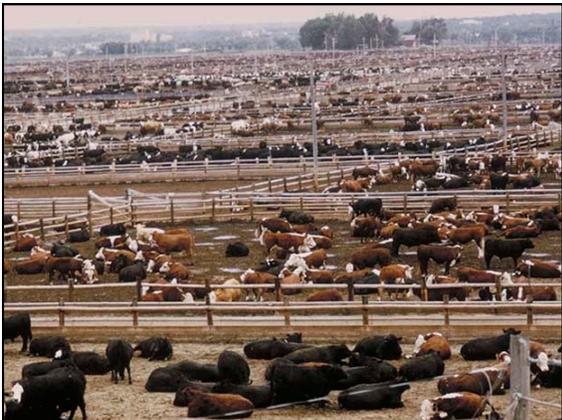


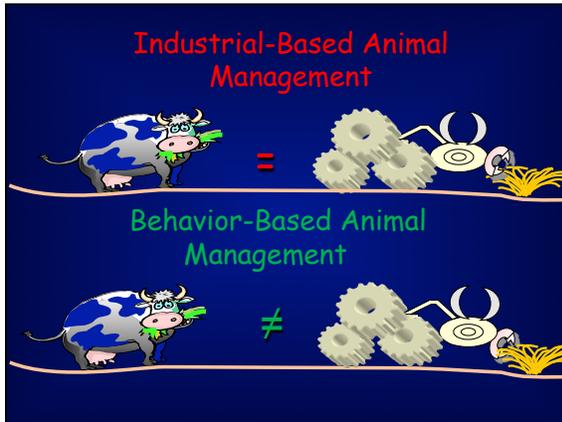
Behavior-Based Grazing Management

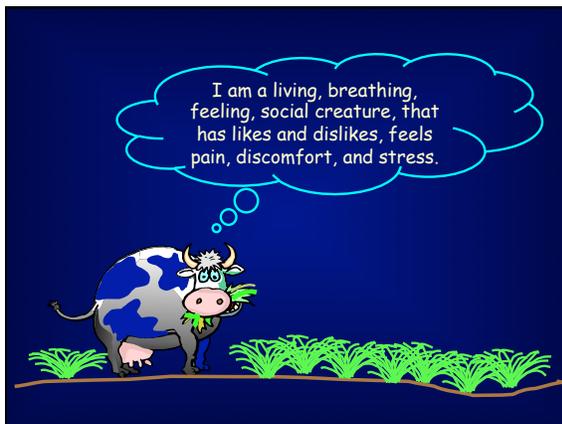
The incorporation of behavioral principles in grazing management planning that enable us to enhance animal well-being, ecosystem health, and enterprise sustainability.

Behavior-Based Grazing Management

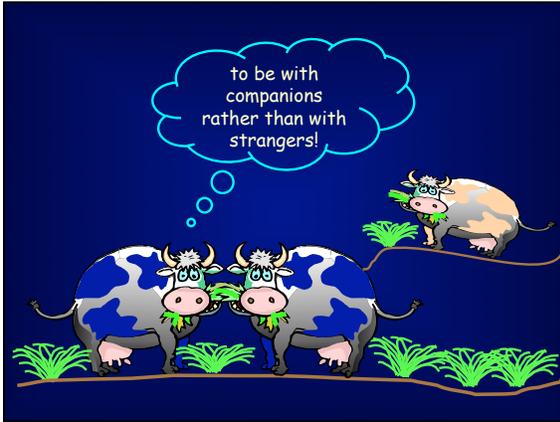
Instead of fighting the nature of the beast at our cost in time, money, oil, and effort, we transform behavioral principles and processes into low or no cost management practices that seek to accommodate what animals need rather than dictate what they are going to get and under what conditions.

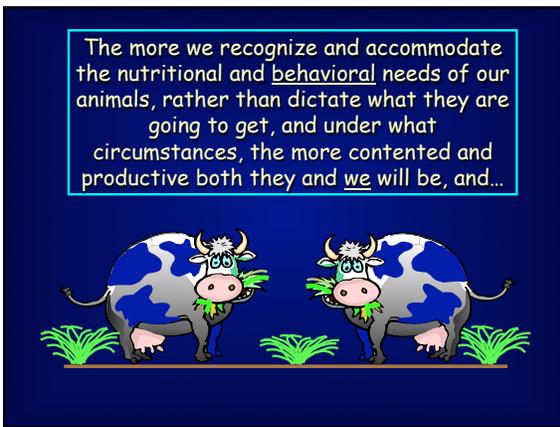




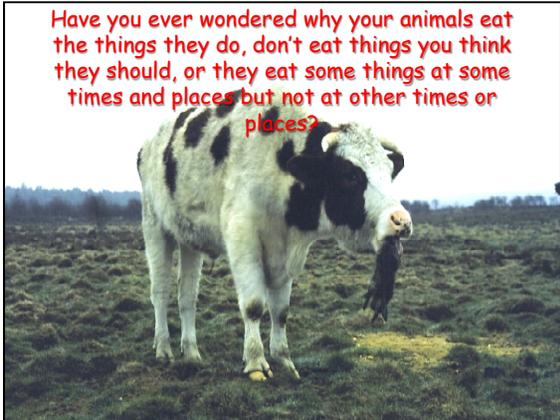


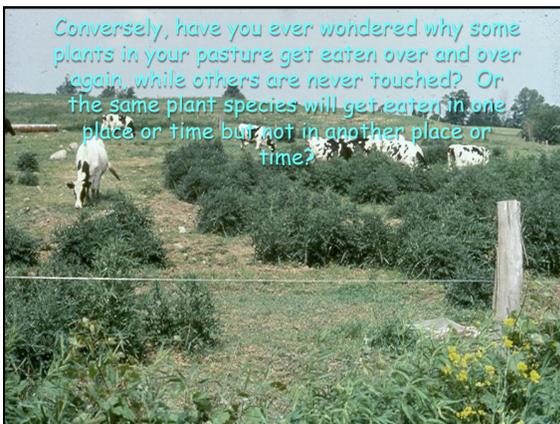




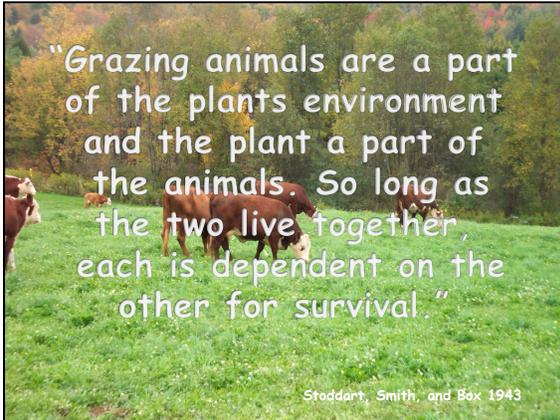




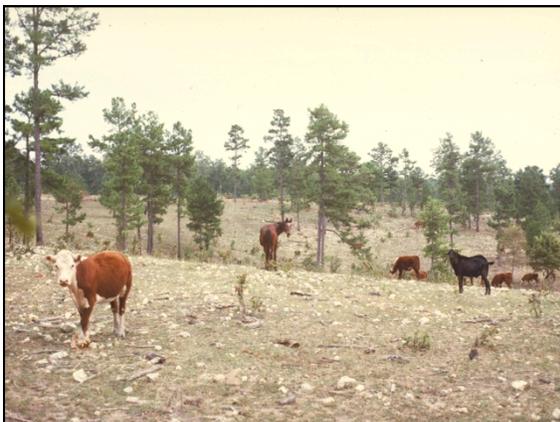












Plants Influence Animals



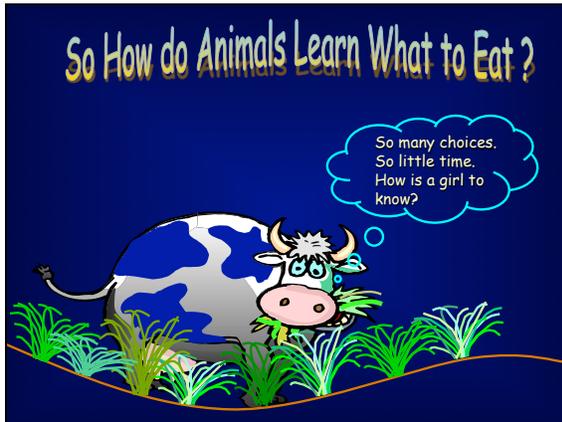
- **Nutrients** (energy, protein, vitamins, and minerals)
- **Defense mechanisms which allow them to avoid, tolerate, or resist defoliation** (stickers, pricklers, toxins, thorns, and growth form, as well as spatial and temporal variations in forage quality, quantity, toxicity, and availability)

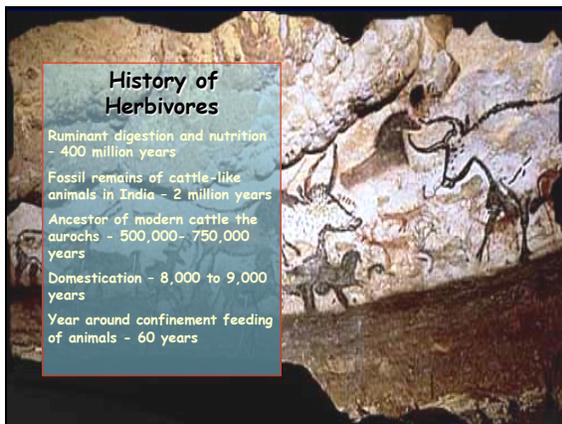


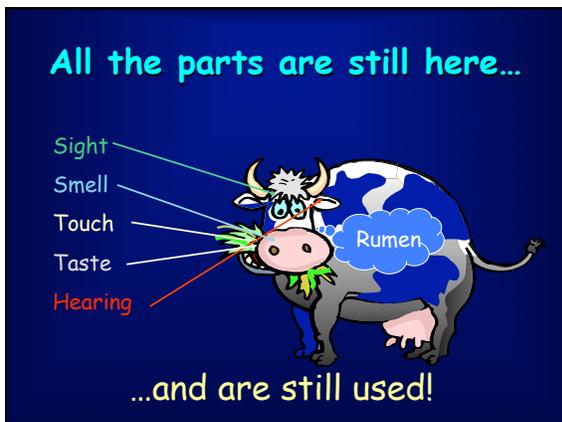
In the plant-herbivore dynamic the only constant is change.

And in order to survive, each in the presence of the other, both plants and animals have to continually adapt or they die.





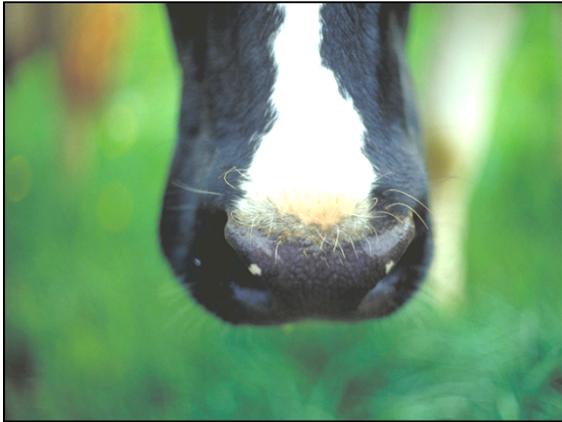












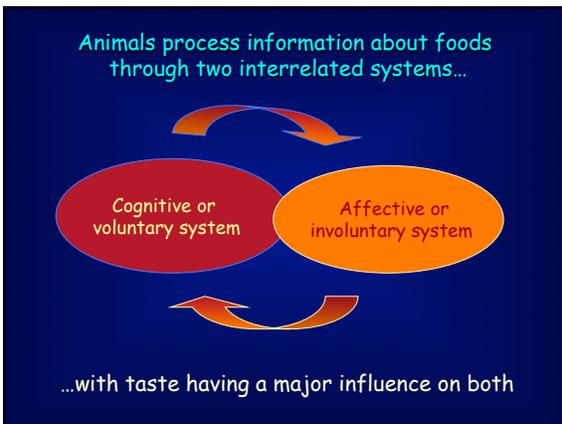


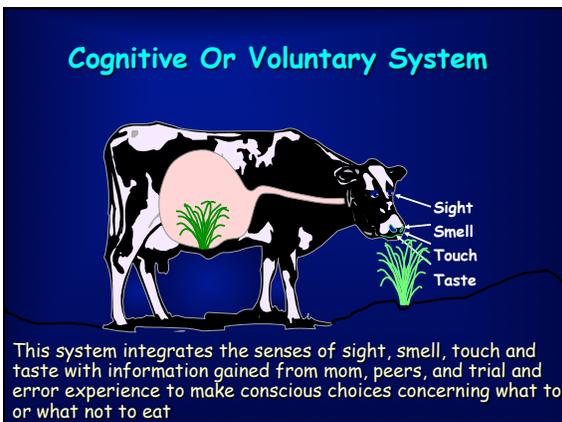
Postingestive evaluation



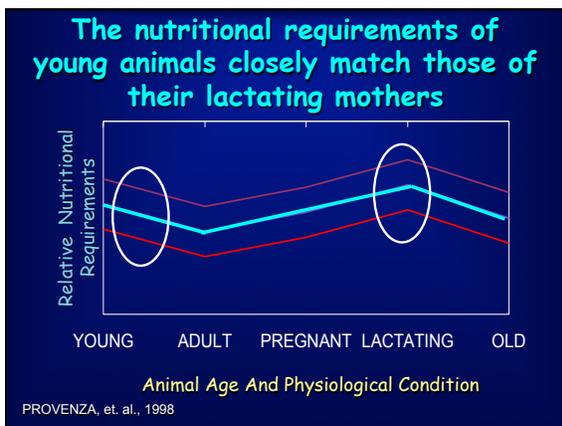
If they don't like it, they don't eat it again!

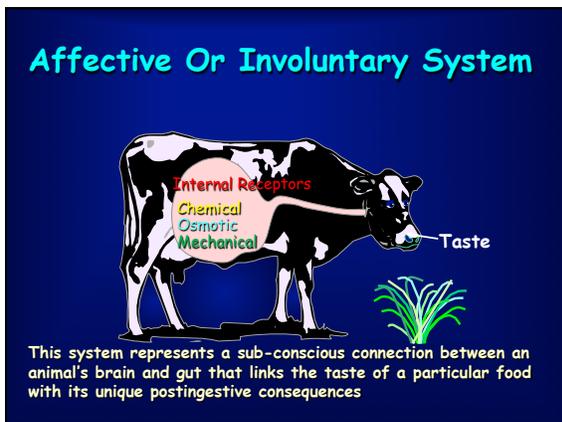


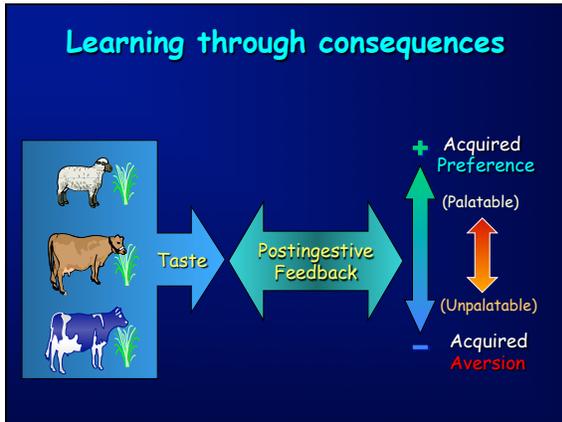


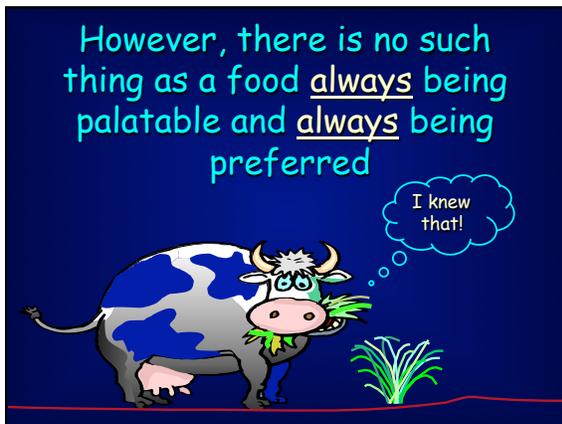






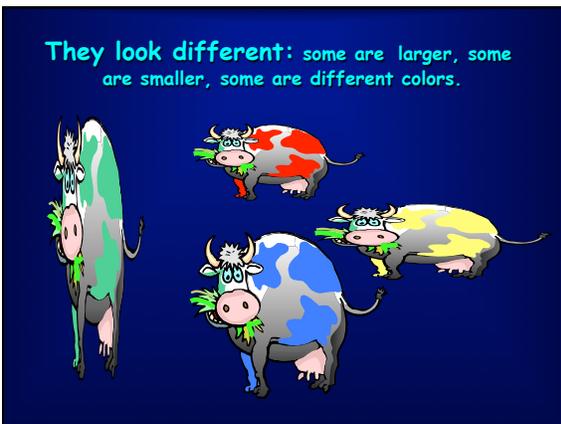


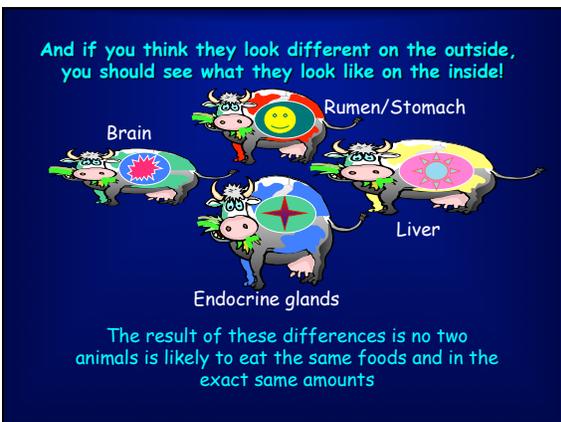


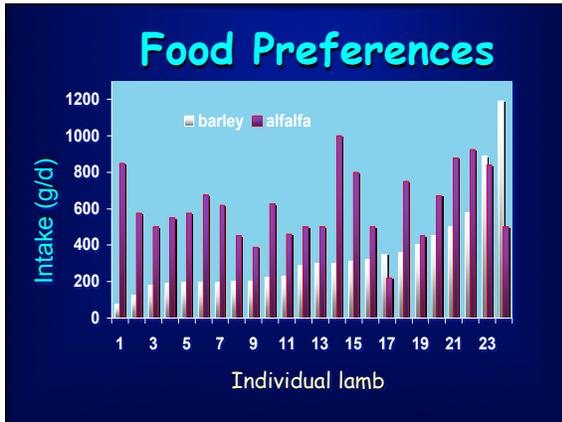


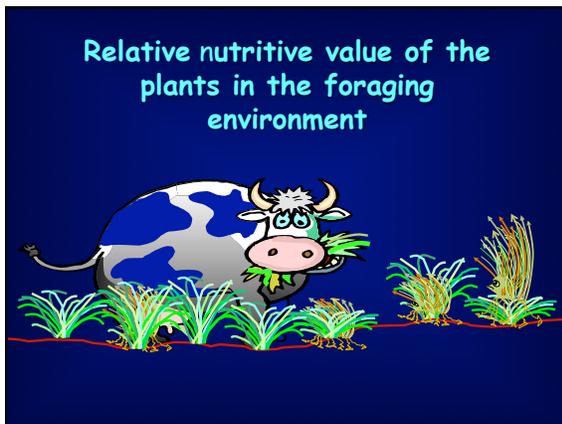


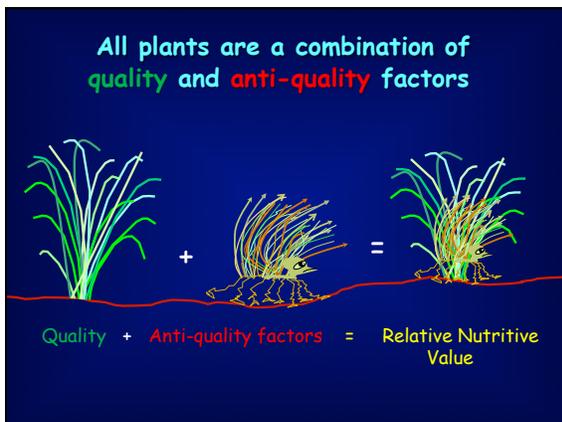






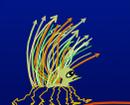






Quality Factors	Anti-quality Factors
	
Nutrients (protein, energy, vitamins, minerals) Soft leaves, low shear and tensile strength + Growth form + Leaf to stem ratio	Toxins (alkaloids, terpenes, phenols, glycosides) Stickers, pricklers, and thorns - Growth form - Leaf to stem ratio

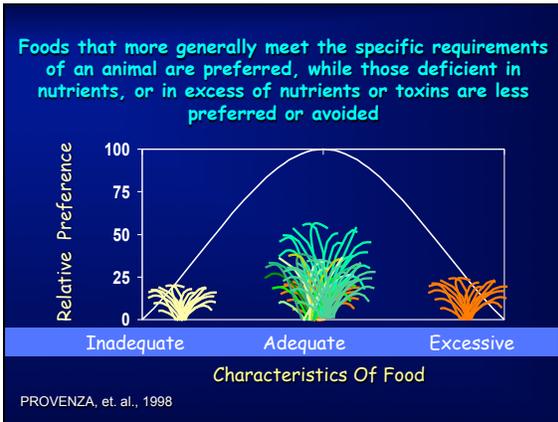
The **true** nutritive value of a plant is best described as the sum of its **positive** chemical and physical attributes (**quality**) minus the sum of its **negative** chemical and physical attributes (**anti-quality**)

Positive Attributes	Negative Attributes	True Nutritive Value		
	-		=	

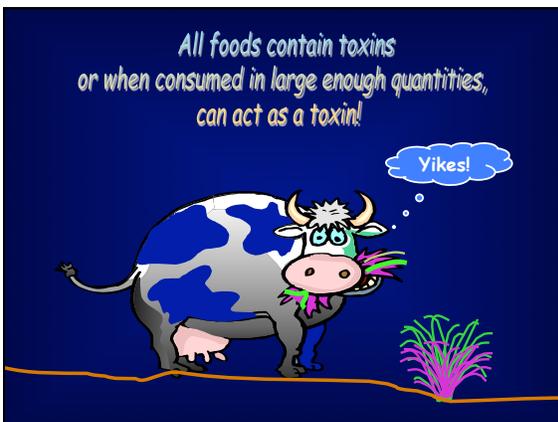
The nutritive value of a plant is a moving target and it varies by:

- the growth stage of the plant
- the time of day
- the time of year
- soil type and fertility
- landscape position and aspect

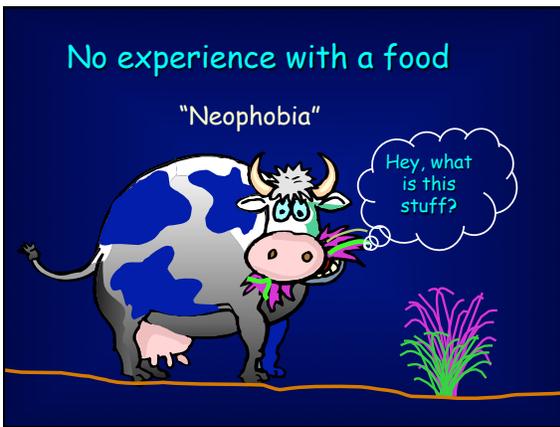




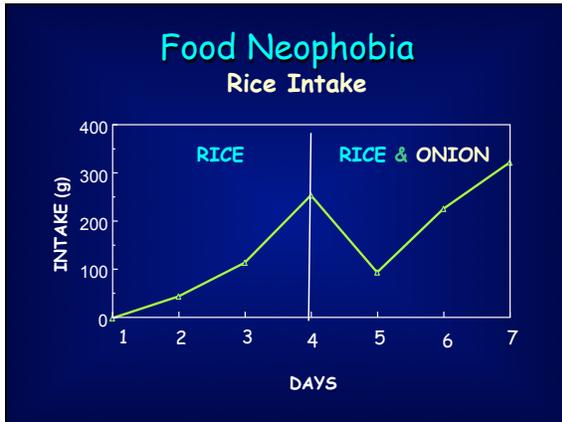












Food Neophobia:

from an evolutionary standpoint, likely evolved to prevent animals from over-eating plants with toxic properties that were not easily identified by the herbivores until it was too late!

Too much experience with a food

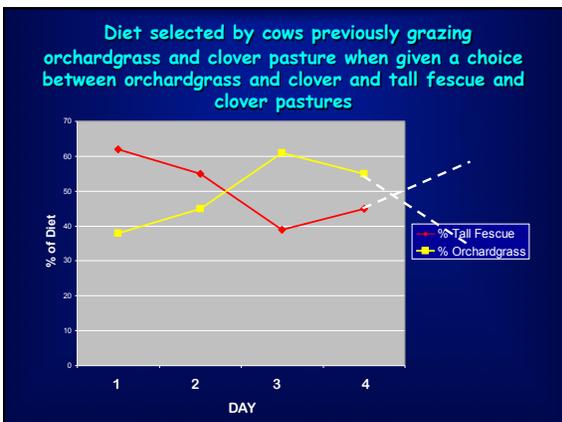
"Transient or conditioned taste aversion"

Oh no!
Not the
same stuff
again?

Conditioned Taste Aversions

Eating any food causes a temporary or transient aversion to the flavor of the food just eaten. Eating a food to satiety or too often causes strong aversions to form. These taste aversions result in varied diets.

Orchardgrass and Clover—Tall Fescue and Clover



Conditioned Taste Aversions:

from an evolutionary standpoint, likely evolved to prevent animals from over-eating plants either too high or too low in nutritional attributes, or that had toxic properties that were detrimental to growth or reproduction



At any given point in time, an individual animal is selecting what to eat based on its age, physiological condition, previous experience with the foods on offer, its recent diet, and the relative nutritive values of the plants that are in its foraging environment.

It's much more than the luck of the bite!

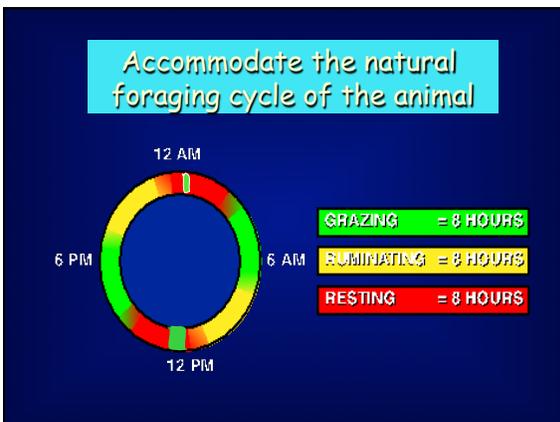


Behavioral-Based Management Considerations

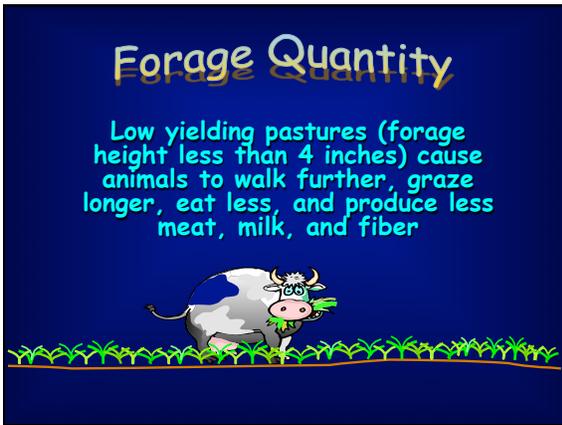


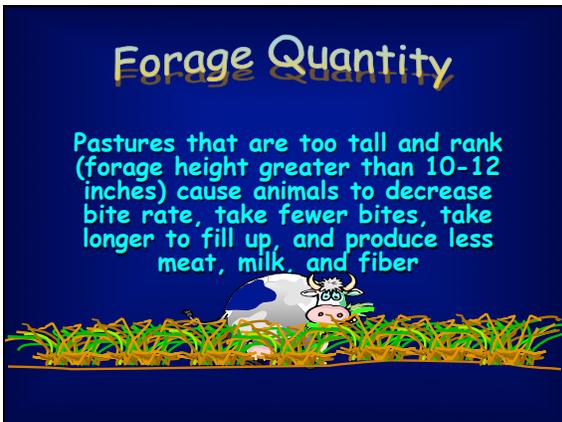


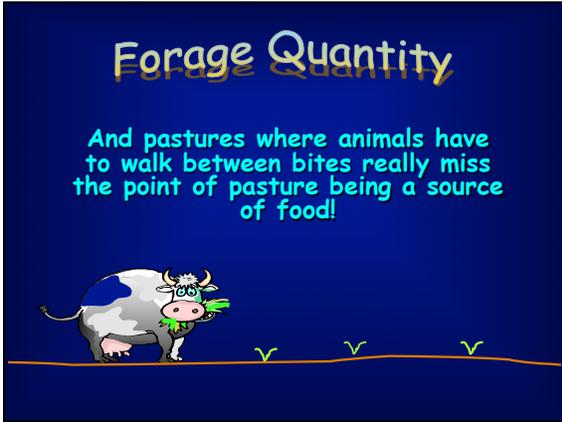


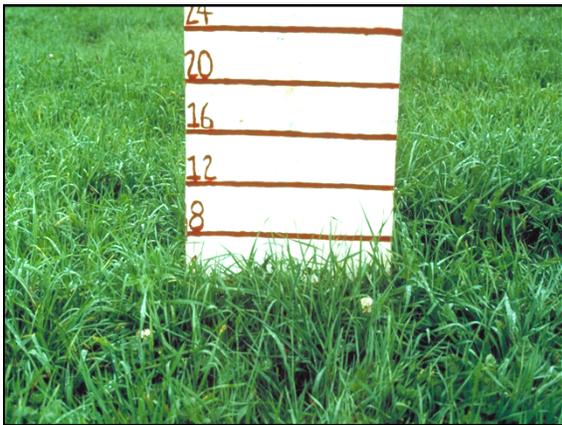
















Conditioned Taste Aversions

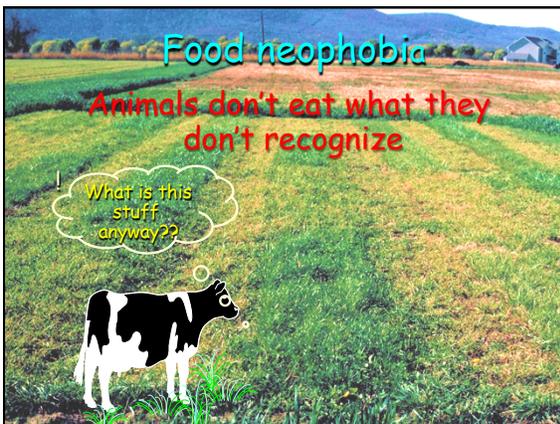
Animals do not like to eat the same foods day after day after day

To reduce taste aversions, pastures should be seeded to diverse mixtures, and mono-cultures should be avoided

Un-supplemented livestock prefer legumes over grasses by a 70%:30%

Clover, Clover, Clover

WEBSITES



Food neophobia

Animals don't eat what they don't recognize

What is this stuff anyway??



Provide water near to where the animals are foraging

PSM -the solution to pollution is dilution!





In the final analysis, if we are looking to optimize the performance and health of our livestock and do so at reduced cost, with the least amount of environmental damage, and with the least amount of stress on both human and animal alike, we must have a better understanding of their behavior and stop dictating to them what they are going to get, and start accommodating what it is they really want and need to live contented healthy lives.



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