

# Animal Behavior and Diet Selection

Rangeland and Livestock Management 101

Fadzayi Mashiri Ph. D

Livestock and Natural Resources Advisor

UCCE Mariposa and Merced

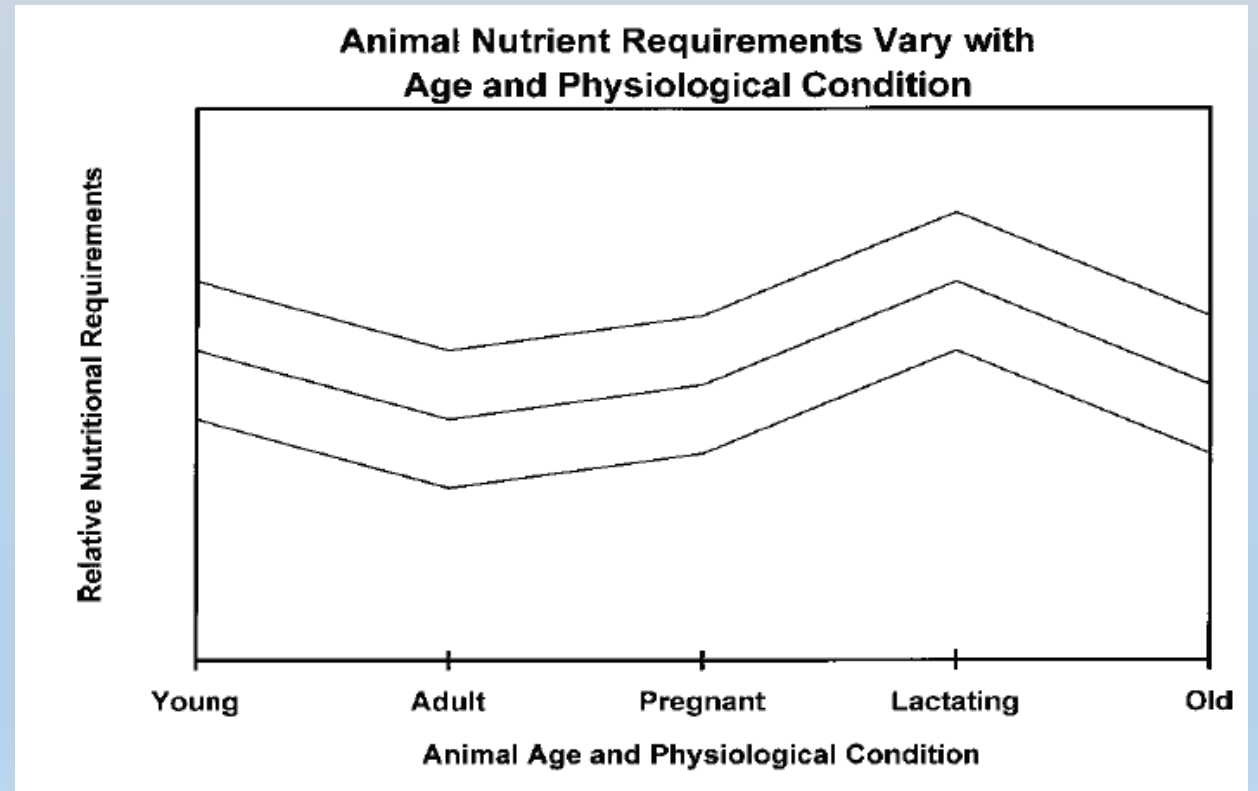


# To cover

- Challenges for grazing animals
- What is palatability?
- Diet selection- how animals decipher forage palatability among the many options
- How animals manage to eat enough forage

# Challenges of foraging animals

- A. Consuming enough nutrients
  - Low average forage quality
  - Selective grazing necessary



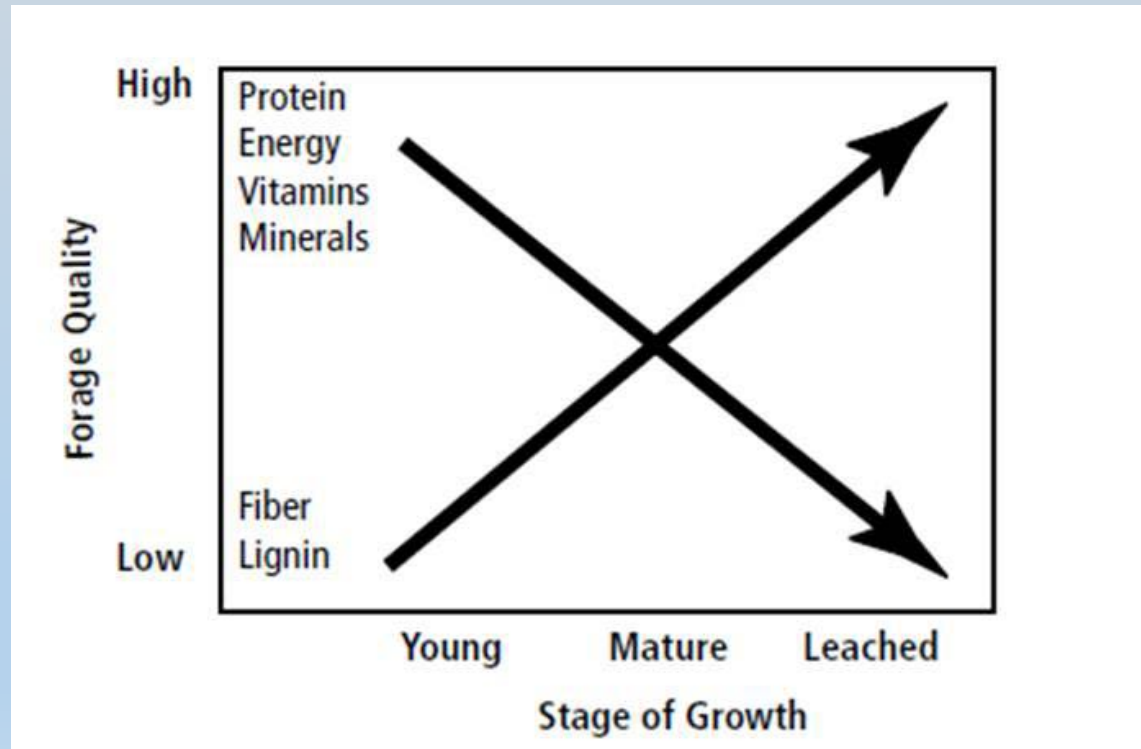
# Challenges cont...

## B. Avoid and/or tolerate plant toxins

- Secondary compounds
- Phenolics: tannins, lignin, salicylic acid
- Terpenoids: aromatic oils, resins, waxes, carotenoids
- Alkaloids - often toxic, ex. nicotine, caffeine, capsaicin

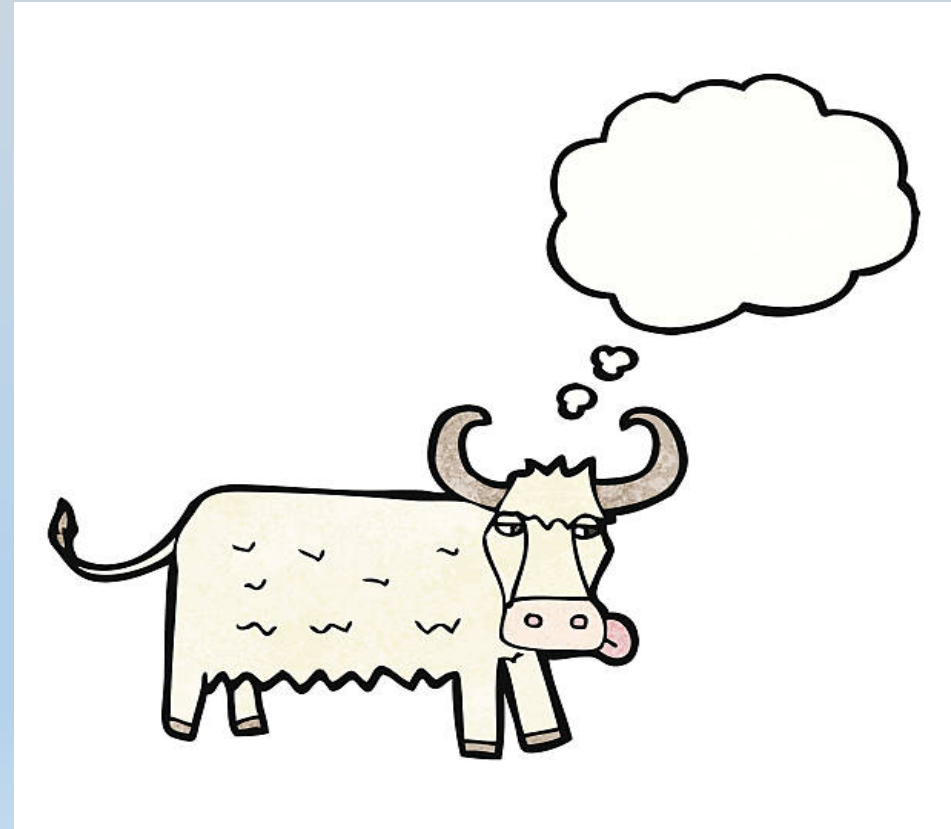
# Challenges cont...

C. Track changing nutrition quality and toxins across landscape and seasons



# Challenges cont...

D. How animals decipher palatability of individual species



# Palatability

- The satisfaction an animal gets from a particular plant as forage, varies with succulence, fiber content, nutrient and chemical content and morphological features such as spines, thorns, awns (Frost and Ruyle, 1993)
  - Plant characteristic
  - Calories
  - Nutritional value
- Does palatability of species depend on animal species?

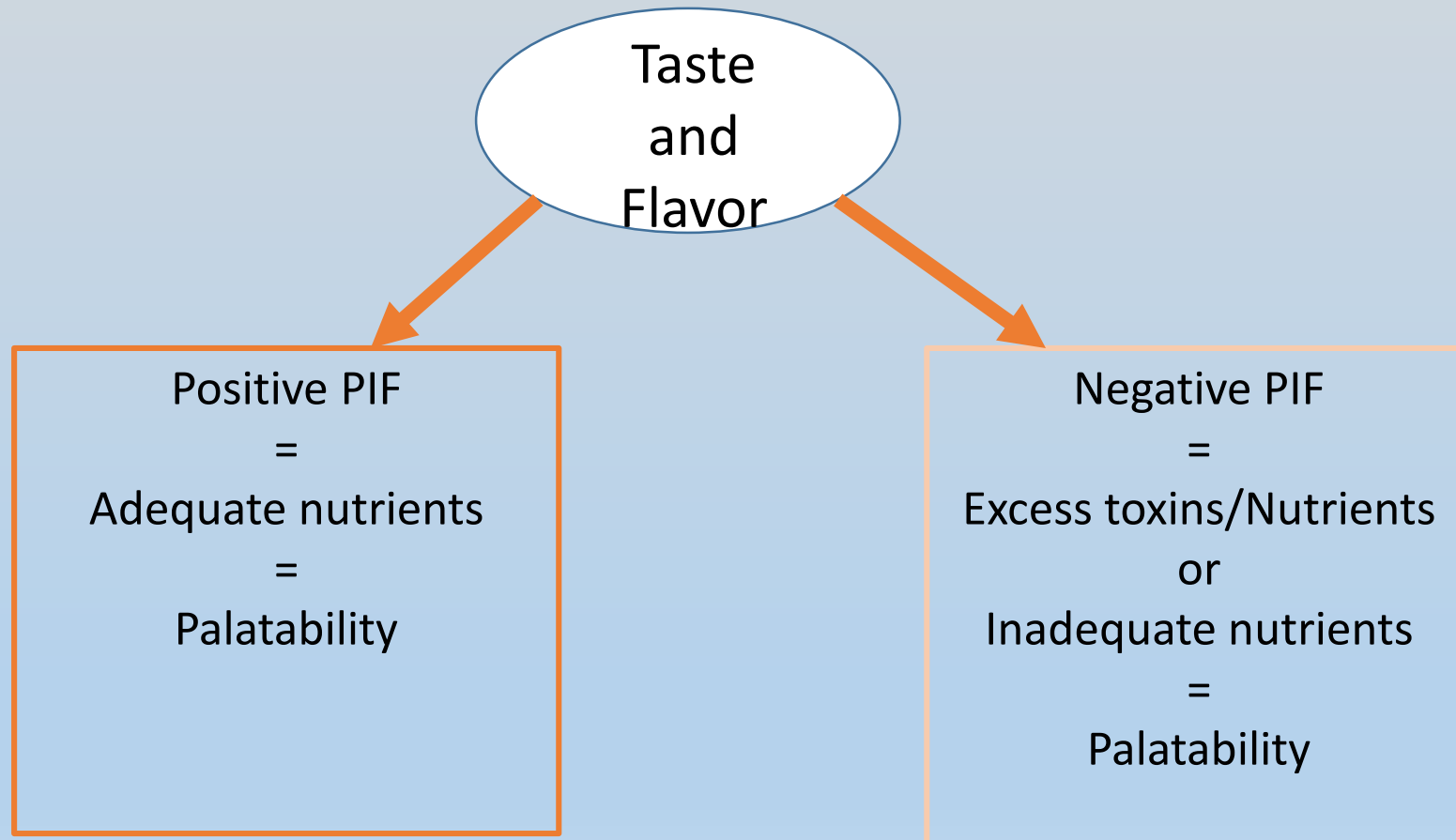
# Preference

- Relative consumption of one plant over the other by an animal given free choice
  - Animal characteristic
  - Physiological characteristics
  - Constrained by conditions
- Highlights animal's ability to assess nutritional value of forages

# Terms

- Postingestive Feedback (PIF) - Feedback from the gut to the brain that allows animals to sense the nutritional or toxicological effects of food ingestion (positive or negative).
- Hedonic shift – adjustment of forage intake (increase or decrease intake) in response to PIF.
- Malaise - Negative PIF. Feeling nausea or unpleasant feelings of physical discomfort.
- Satiety - Positive PIF. Feeling of satisfaction

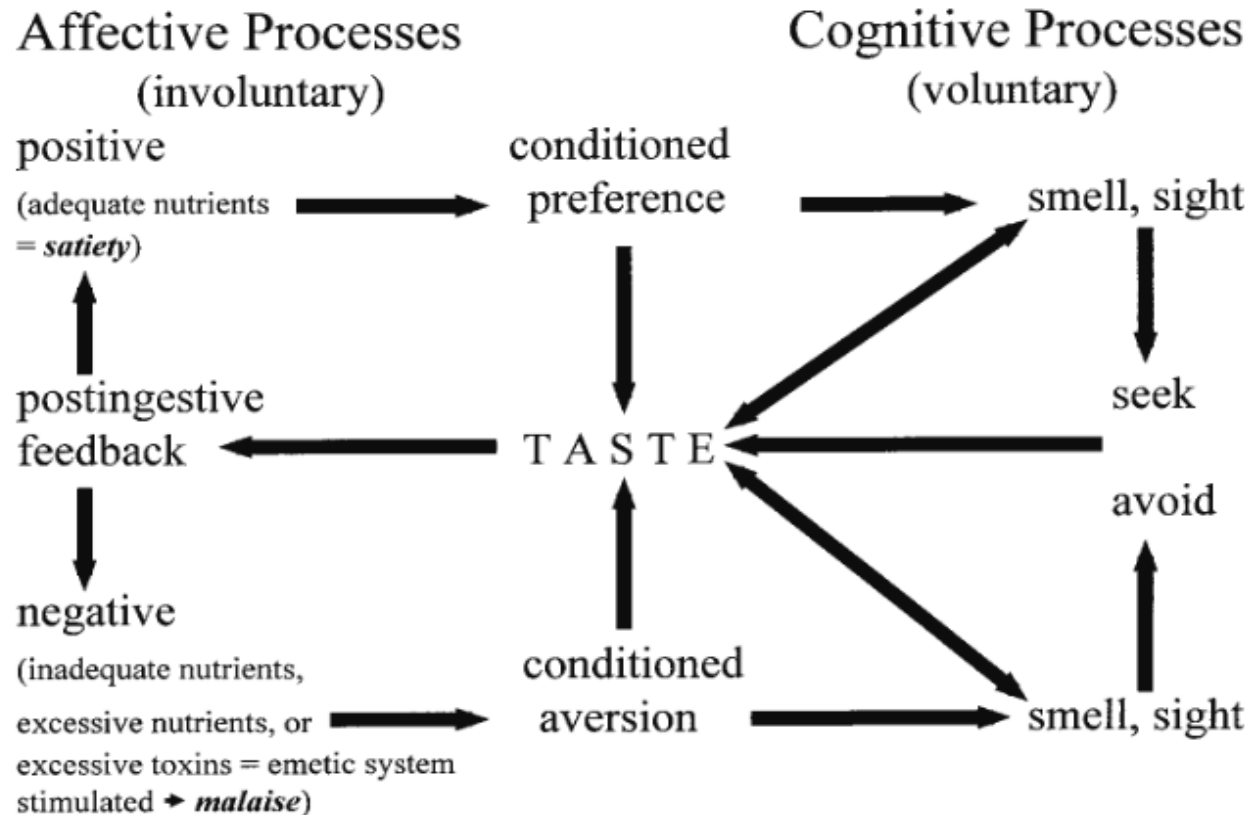
# How animals determine if forage is palatable



*Palatability - relationship between food's flavor and its PIF from the nutrients and toxins (Fred Provenza)*

# How animal decide what to eat

## Affective and Cognitive Processes Govern Diet Selection



# Nutritional wisdom

- Changes in food preferences (palatability), occur automatically.
- Animals don't have to think or remember how they acquire food preferences or aversions



# How animal associate plant flavors to PIF

- Herbivores don't eat many species within a day
- Typical 5 species = 65% of an animal's diet
- Herbivores may eat ~ a dozen species per day
- Separate the species into familiar or novel
- Increase or decrease intake of novel flavors depending on PIF
- Hedonic shift

# Why animals may overingest nutrients and/or toxins

- Animal fails to relate the taste or smell of a particular forage with its PIF
- Means to bind, metabolize, or detoxify toxic compounds is exceeded.
- Emetic system is not stimulated
- Interactions between aversive and positive PIF



# Why animals may overingest nutrients and/or toxins cont...

- Difficulty in differentiating nutritious from toxic plants in unfamiliar environments
- Changes in environmental that alter animal physiology
- Social facilitation
- Subtle molecular changes increase plant toxicity
- Toxins in more than one plant.

# How do animals manage to eat enough feed

- Selective grazing at three levels
  - Plant community
  - Plant species
  - Plant parts

# Animal are efficient feeders

- Feeding stations
- Number of bites per station
- Feeding intervals
- Spend most of foraging time in places where food acquisition is most profitable
- Reduce energy expenditure



- <https://extension.usu.edu/behavior/>

- Thank you!

- Questions?