

# Behavioral Considerations for Grassfed Livestock in the Southwest

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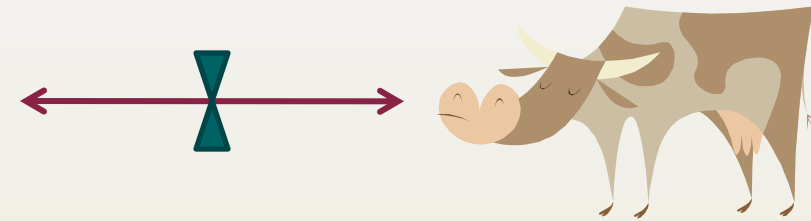
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# Cattle grazing behavior basics



Photo : D. Richman



Selectivity



Implies choices  
(preference, avoidance)



Foraging behavior

# Roadmap

## A. Foraging decisions of cattle

1. *Where to eat?*
2. *What to eat?*
3. *How fast to eat?*
4. *How long to spend eating?*

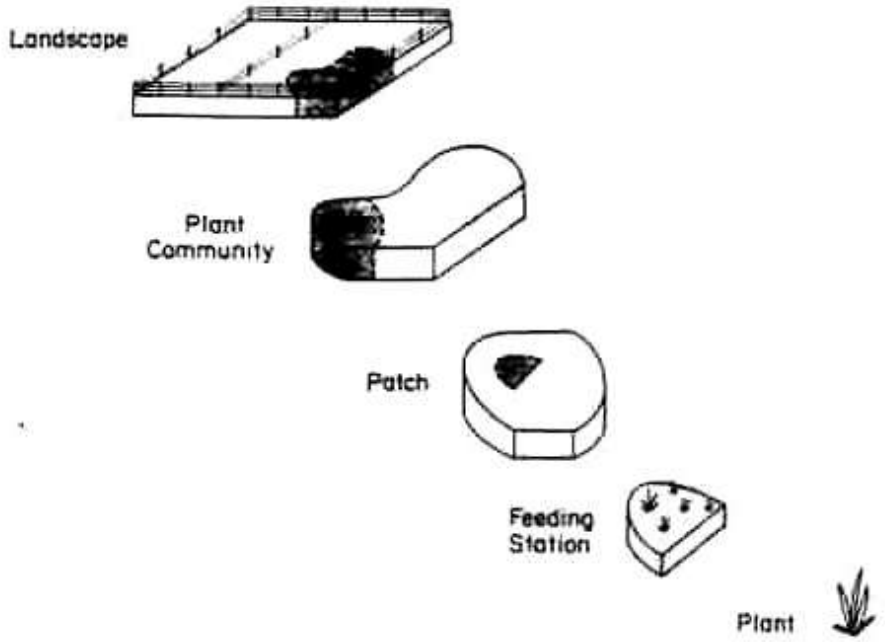
## B. Modifying behavior to achieve management objectives

1. *Focusing on the feeding environment*
2. *Focusing on the animal*
  - a. *Conditioning techniques*
  - b. *Genetic selection (breeds, temperaments)*

## C. Final thoughts

# A. Foraging decisions of cattle

# Hierarchy of Diet Selection



(Heitschmidt and Stuth 1991)



*Where to eat?*



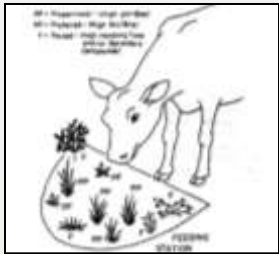
*What to eat?*



*How fast to eat?*

*How long to spend eating?*

B. Modifying behavior : *Focusing on the feeding environment*

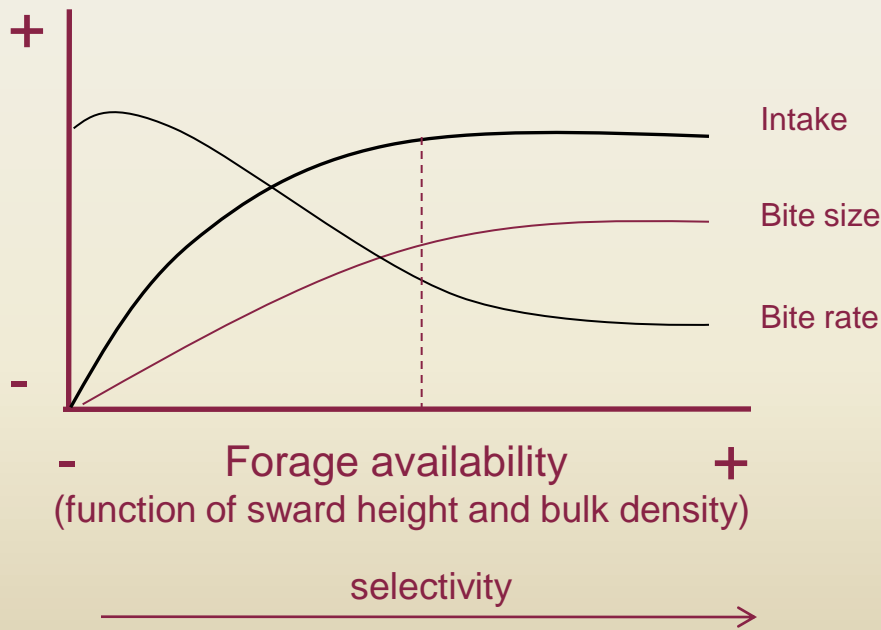


(Heitschmidt and Stuth 1991)



- What to eat?*
- How fast to eat?*
- How long to spend eating?*

## Cultivated pasture



$$\text{Intake} = \text{Bite size} * \text{Bite rate} * \text{Feeding time}$$

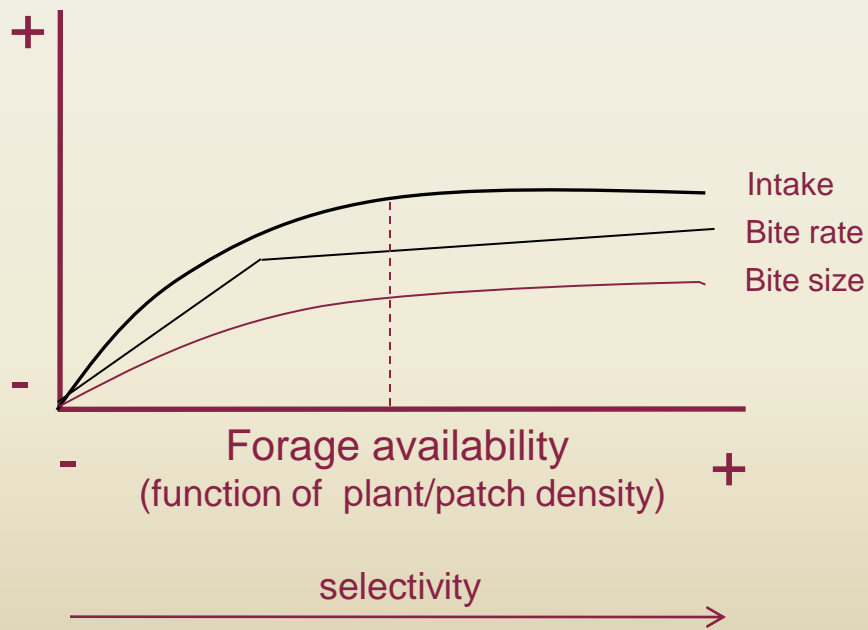


(Heitschmidt and Stuth 1991)

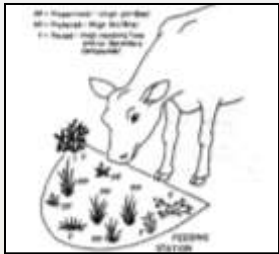


*What to eat?*  
*How fast to eat?*  
*How long to spend eating?*

## Rangeland



$$\text{Intake} = \text{Bite size} * \text{Bite rate} * \text{Feeding time}$$



*What to eat?*  
*How fast to eat?*  
*How long to spend eating?*

(Heitschmidt and Stuth 1991)



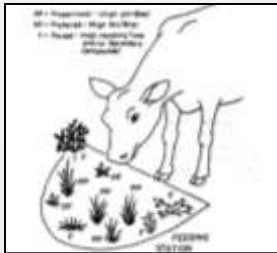
Selectivity – dense patches



Selectivity – sparse patches

(Utsumi, 2003)

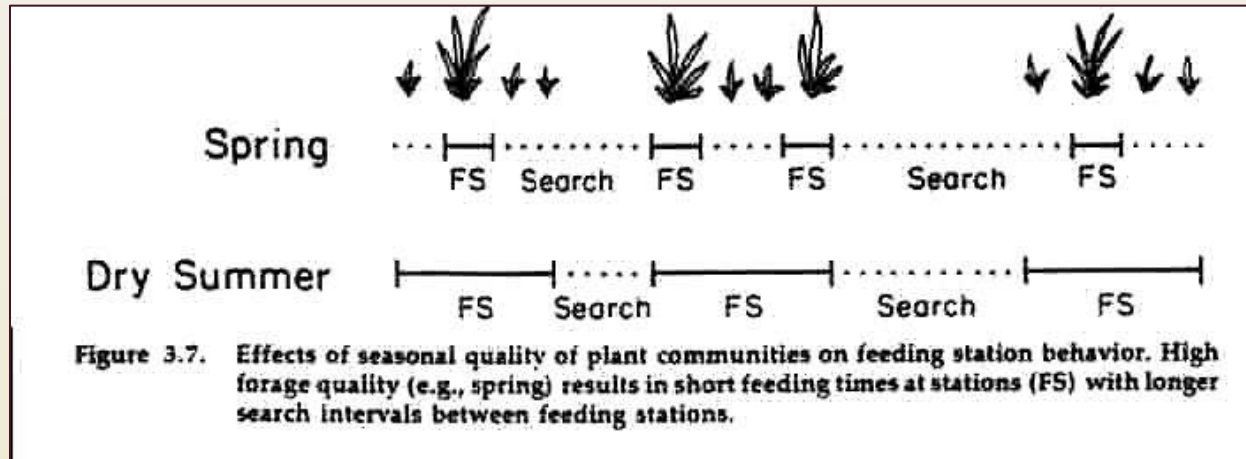




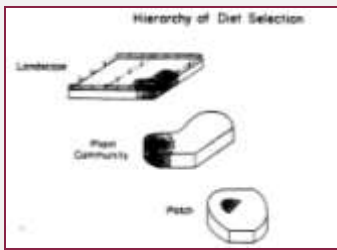
(Heitschmidt and Stuth 1991)



*What to eat?*  
*How fast to eat?*  
*How long to spend eating?*



(Heitschmidt and Stuth 1991)

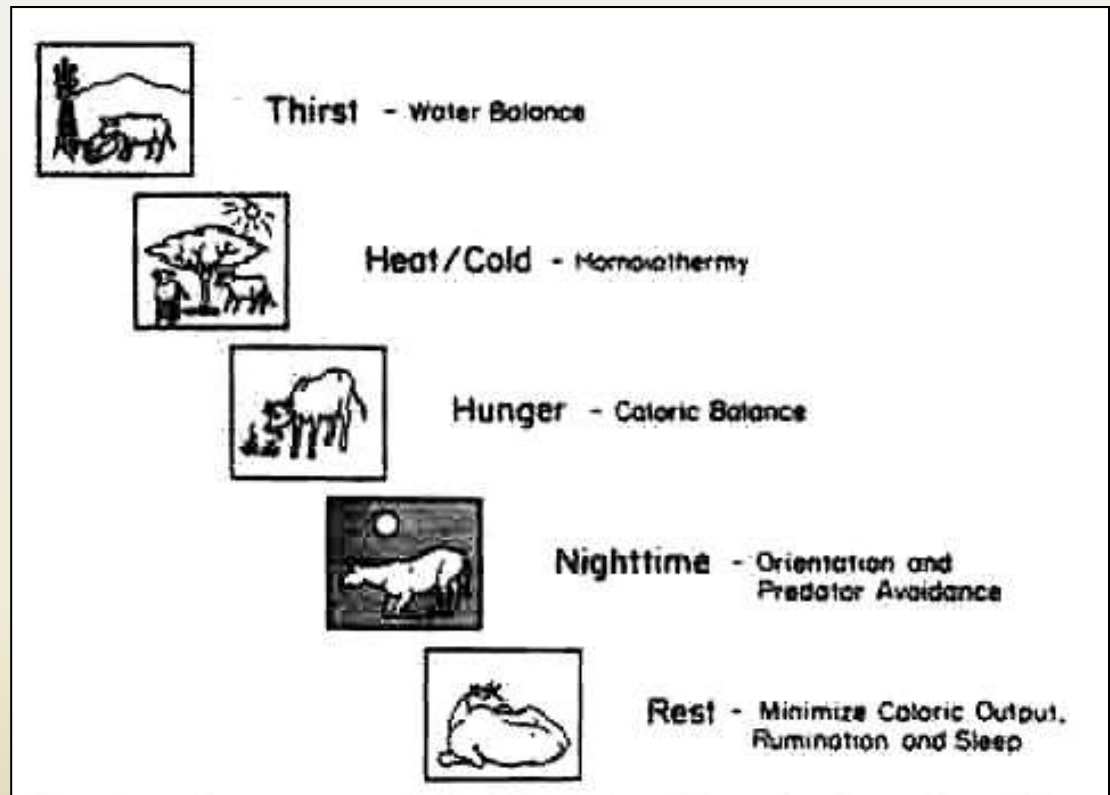


(Heitschmidt and Stuth 1991)

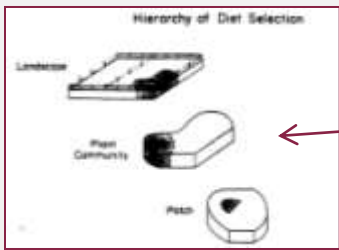


*Where to eat?*

Hierarchy of animal- related factors that influence *“where to eat”* decisions



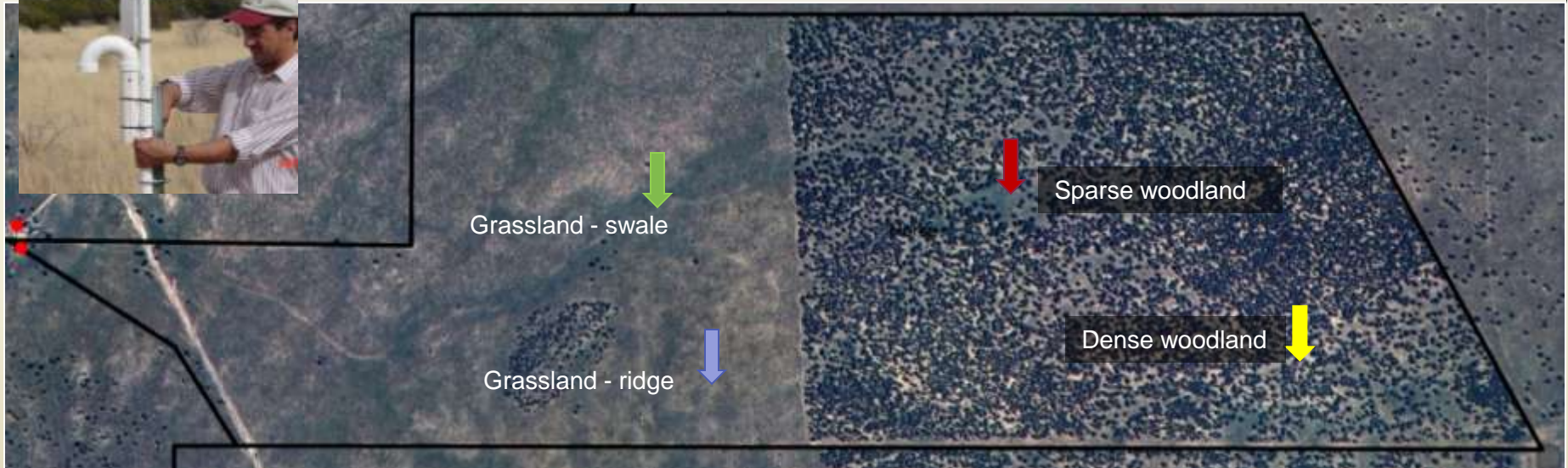
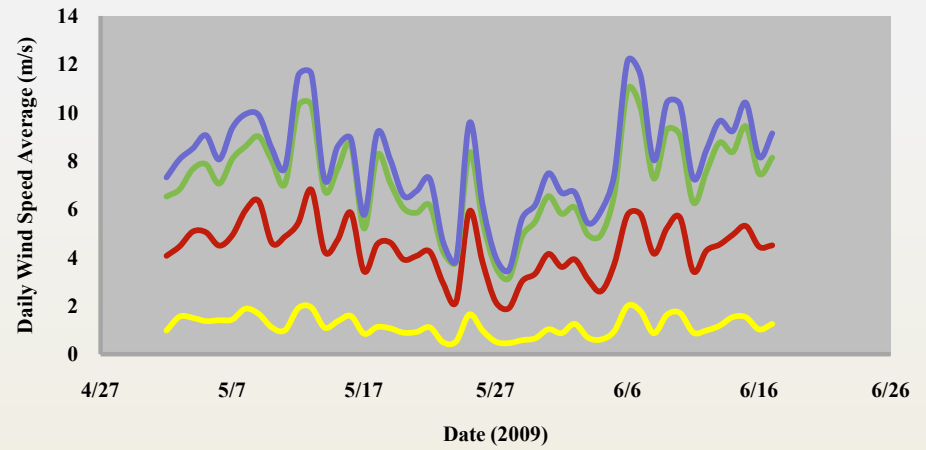
(Heitschmidt and Stuth 1991)

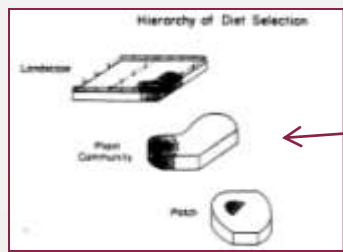


*Where to eat?*

(Heitschmidt and Stuth 1991)

Wind Speed in Relation to PJ Cover

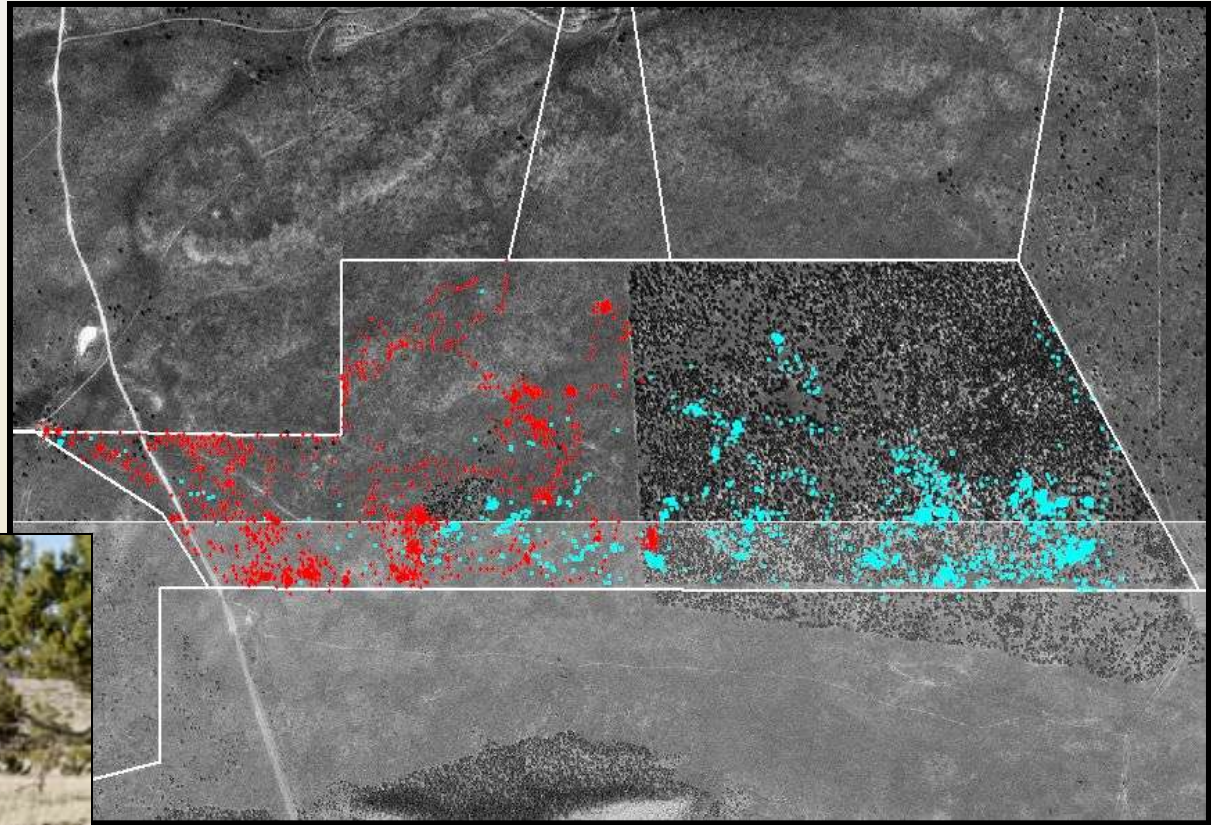




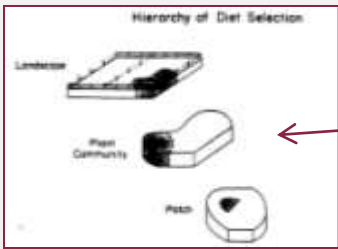
*Where to eat?*

(Heitschmidt and Stuth 1991)

## Manipulating plant community structure

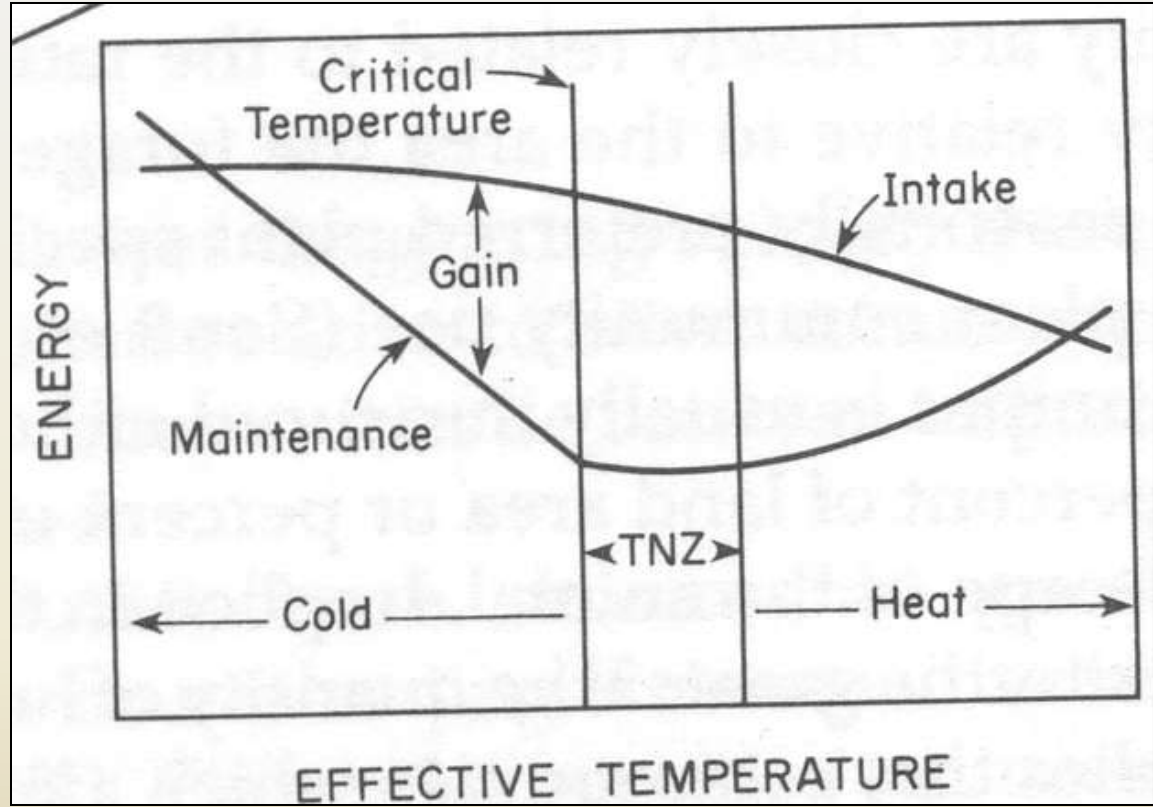


(Black-Rubio et al. 2008)

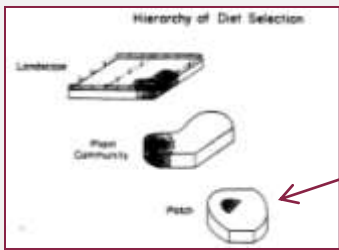


(Heitschmidt and Stuth 1991)

*Where to eat?*



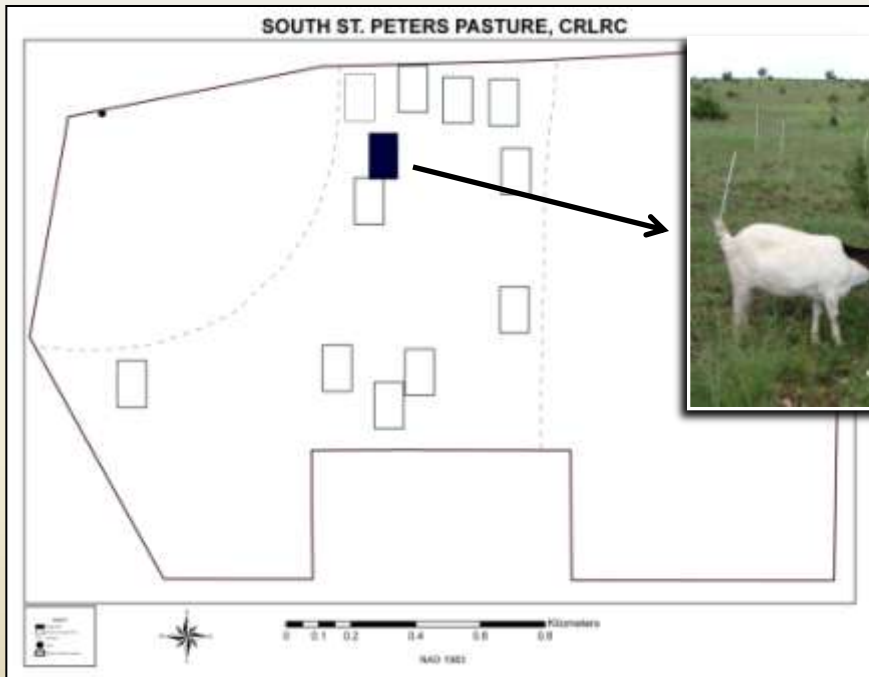
(Heitschmidt and Stuth 1991)



*Where to eat?*

(Heitschmidt and Stuth 1991)

## Manipulating vegetation patch structure



(Utsumi, 2008)

# SOUTH ST. PETERS PASTURE, CRLRC

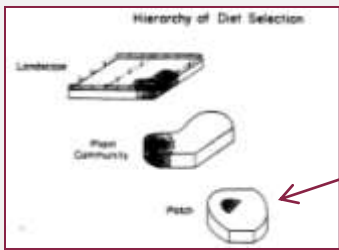
Noon  
Water  
PM  
Modified patches

AM



(Utsumi, 2008)





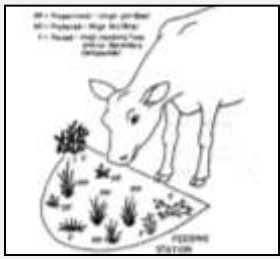
*Where to eat?*

(Heitschmidt and Stuth 1991)



(Utsumi, 2008)

B. Modifying behavior : *Focusing on the animal –  
conditioning techniques*

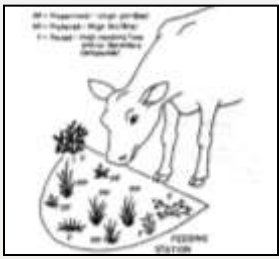


} *What to eat?*

(Heitschmidt and Stuth 1991)

Animals have the ability to relate the taste of a food  
with its post-ingestive consequences (i.e. what happens in  
the gut after a food is ingested)

(Provenza 1995)

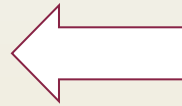


} *What to eat?*

(Heitschmidt and Stuth 1991)

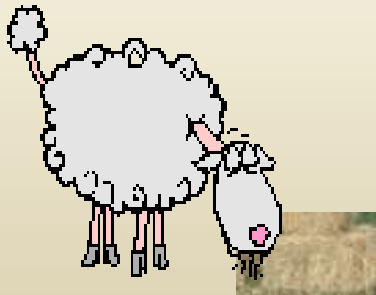
Animal conditioning :  
positive hedonic shifts

1) Low intake



2) If lambs receive E via a stomach tube (positive PIF)

3)



Intake can increase dramatically

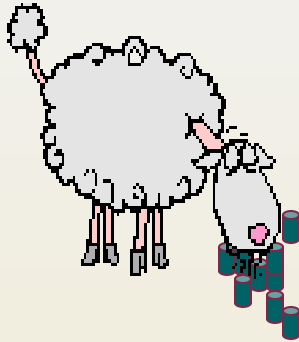


} *What to eat?*

(Heitschmidt and Stuth 1991)

Animal conditioning :  
negative hedonic shifts

1)

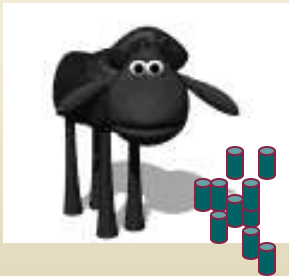


High intake

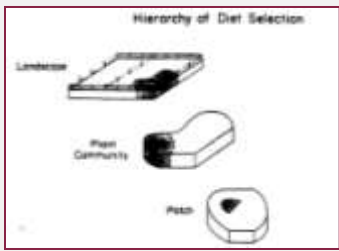
2)

If Lambs are given LiCl via a stomach tube (negative PIF)

3)



Intake can decrease dramatically

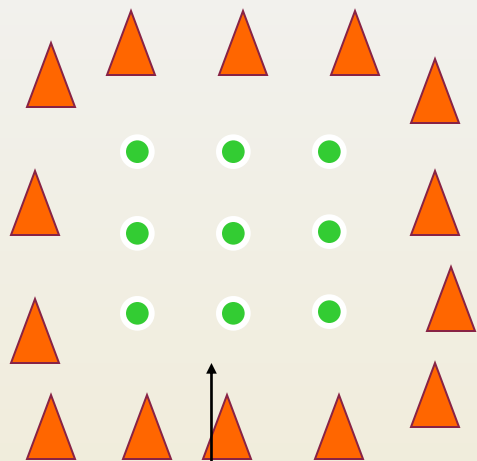


(Heitschmidt and Stuth 1991)

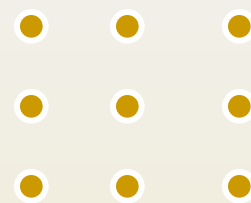
*Where to eat?*

Animal conditioning :  
location avoidance training





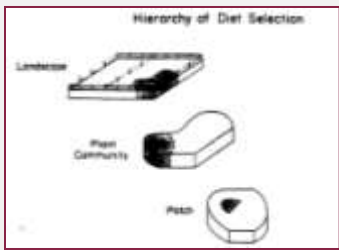
High quality unsafe feeding site



Moderate quality safe feeding site

(Cibils et al., 2004)





(Heitschmidt and Stuth 1991)

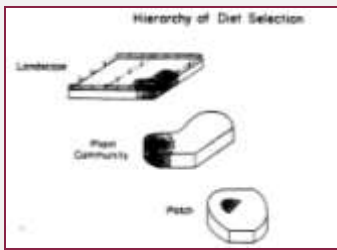
*Where to eat?*



Animals learn to avoid feeding sites associated with painful stimuli

(Cibils et al., 2004)



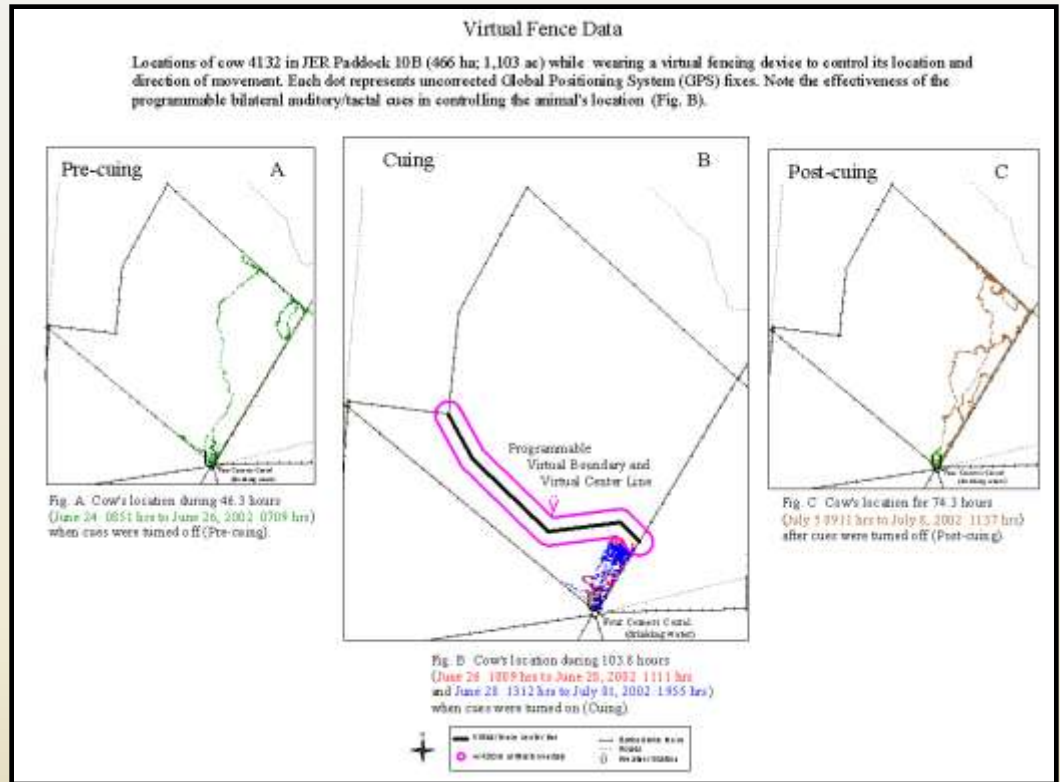


Where to eat?

(Heitschmidt and Stuth 1991)

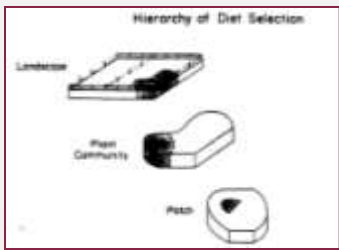


(Agric. Research, 2000)



(Anderson et al. 2001)

B. Modifying behavior : *Focusing on the animal – genetic selection (breeds, temperaments)*



(Heitschmidt and Stuth 1991)

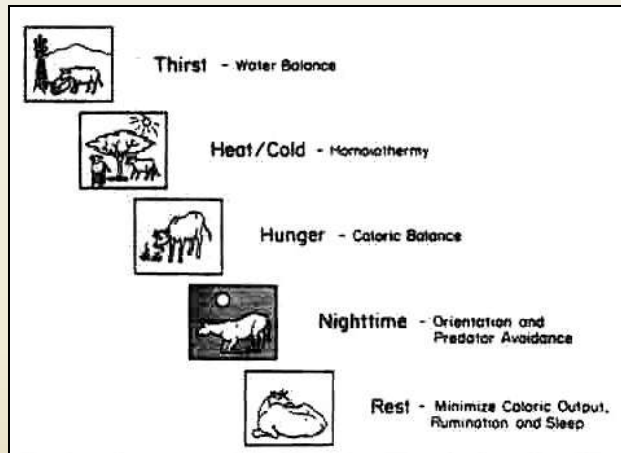
*Where to eat?*



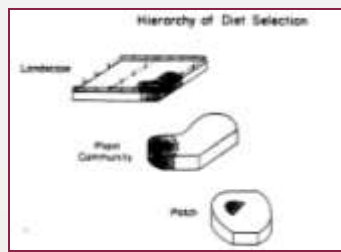
*Breeds*



COURTESY NMSU/DARRIEL J. PEHR  
 Researcher Ed Fredrickson works with Criollo cattle on the Jornada Experimental Range in southern New Mexico.



(Heitschmidt and Stuth 1991)



(Heitschmidt and Stuth 1991)

*Where to eat?*

## Temperament

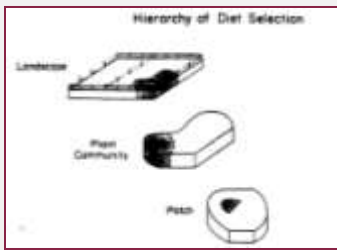
Young cows were classified on the basis of their supplement feeding rate in confinement (a proxy for temperament):

**Proactive** : fast eaters, bold, excitable

**Reactive**: slow eaters, react with immobility when stressed, appear to be calmer



(Wesley, 2008)



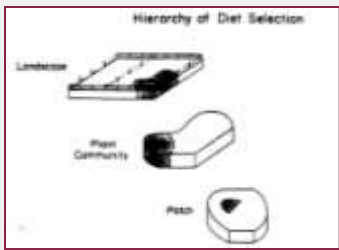
(Heitschmidt and Stuth 1991)

*Where to eat?*

## Proactive (PR) and reactive (RE) cows compared

	PR	RE
Supplement feeding rate (s)	561	4390
Blood cortisol (ng/ml)	8.77	5.51
Body weight (kg)	434	395
Adjusted calf weaning weights ( kg)	207	179
Length of post-partum anestrus (days)	44	68
Avg. time spent at water (min/day)	73	172
Avg. area explored in a day (ha)	21	17
Avg. distance traveled in a day (km)	5.3	5.2

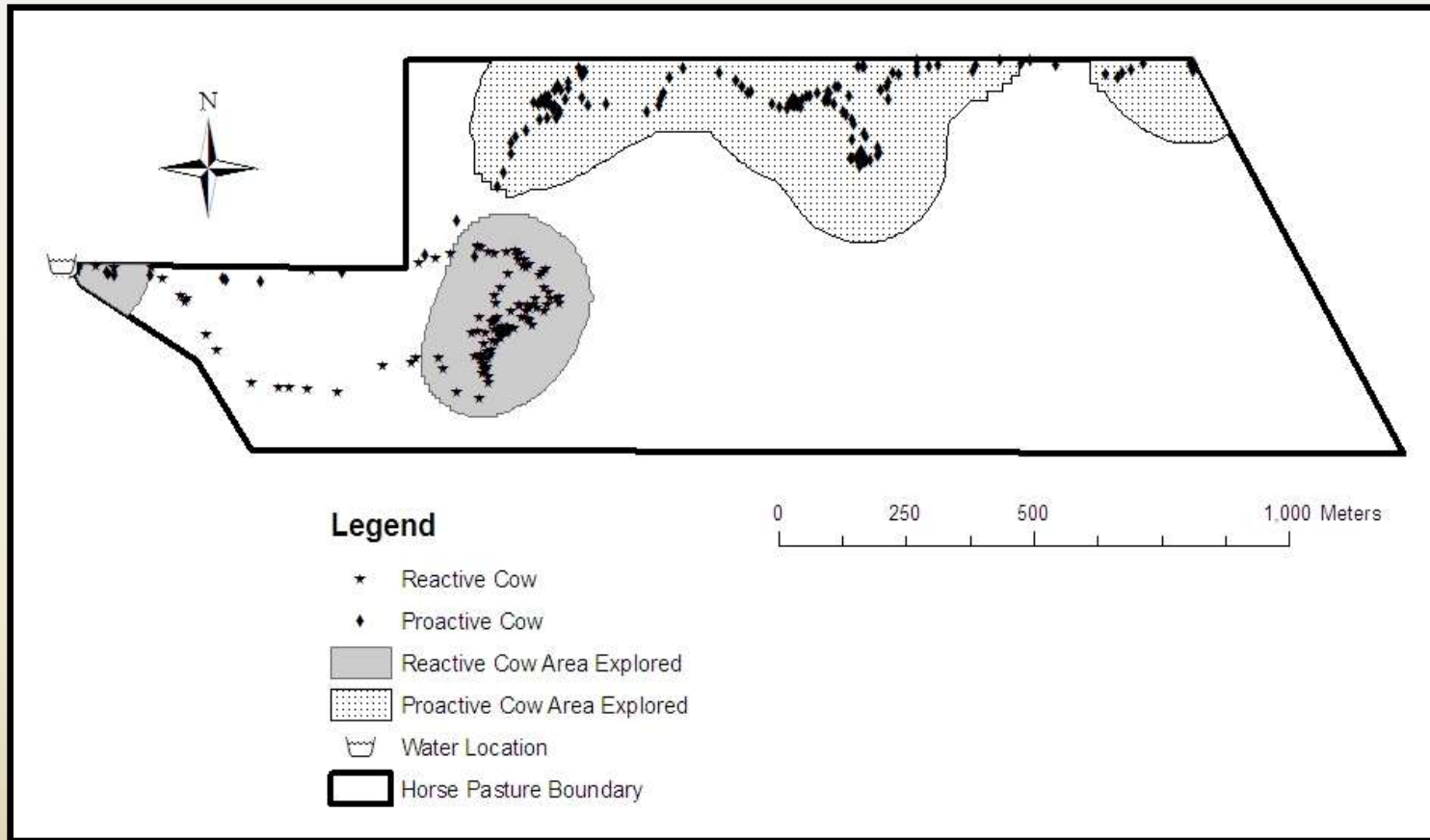
(Wesley, 2008)



*Where to eat?*

(Heitschmidt and Stuth 1991)

Do PR and RE cows explore a pasture differently?



(Wesley, 2008)



# Final thoughts



- Behavior manipulation to achieve management objectives on rangelands will likely be most successful if “*where to eat*” foraging decisions are involved.
- A combination of environment- and animal-focused manipulation strategies can significantly influence “*where to eat*” kinds of foraging decisions of cattle.

# Thank you

**Acknowledgements:** USDA-CSREES, NM Agricultural Experiment Station, Corona Range and Livestock Research Center, Santiago Utsumi, Robert Wesley, Christy Black.

