

# Range Management: Evaluating Intensive vs. Extensive Strategies

David D. Briske

Ecosystem Science & Management  
Texas A&M University





# Presentation Objectives

- Success of intensive rotational grazing systems
- Grazing systems vs grazing management
- Intensive vs extensive management strategies
- Management for change and uncertainty





# Assumed Benefits of Rotational Grazing

- Increased control of grazing patterns
- Improve species composition
- Enhance forage quality
- Improve soil surface hydrology
- Increase plant production/stocking rate

Briske et al. 2008





# Evidence Does Not Support IRG

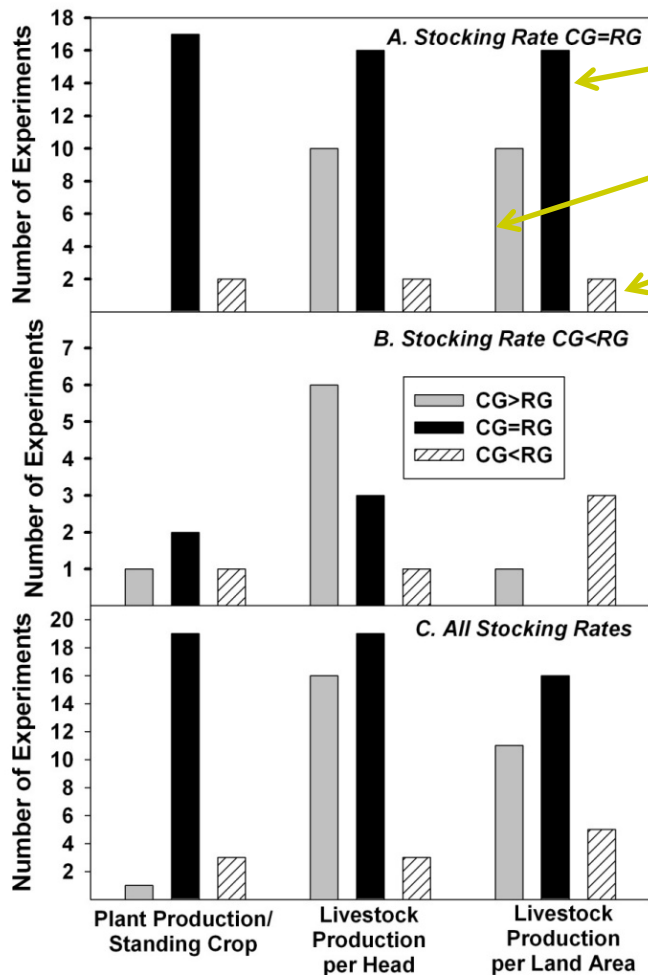
- **Few advantages** exist for intensive rotational compared to continuous grazing systems.
- **Stocking rate** is more important than type of grazing system.
- **Management decisions** can affect vegetation independently of grazing system.

Hart and Norton 1988  
Holechek et al. 2001

# Experimental Data



Majority (84-92%) of experiments show no advantage of rotational grazing for plant and animal production.



CG = RG

CG > RG

CG < RG

40 experiments  
300 – 750 mm year



Briske et al. 2008



# Reasons for Limited Benefit of IRG

- Grazing **selectivity** continues to occur
- Forage **quality** is not always improved
- Soil surface **hydrology** is not improved
- Forage **production/stocking rate** not increased
- Insufficient **management** time and skill



Hart and Norton 1988  
Holechek et al. 2001

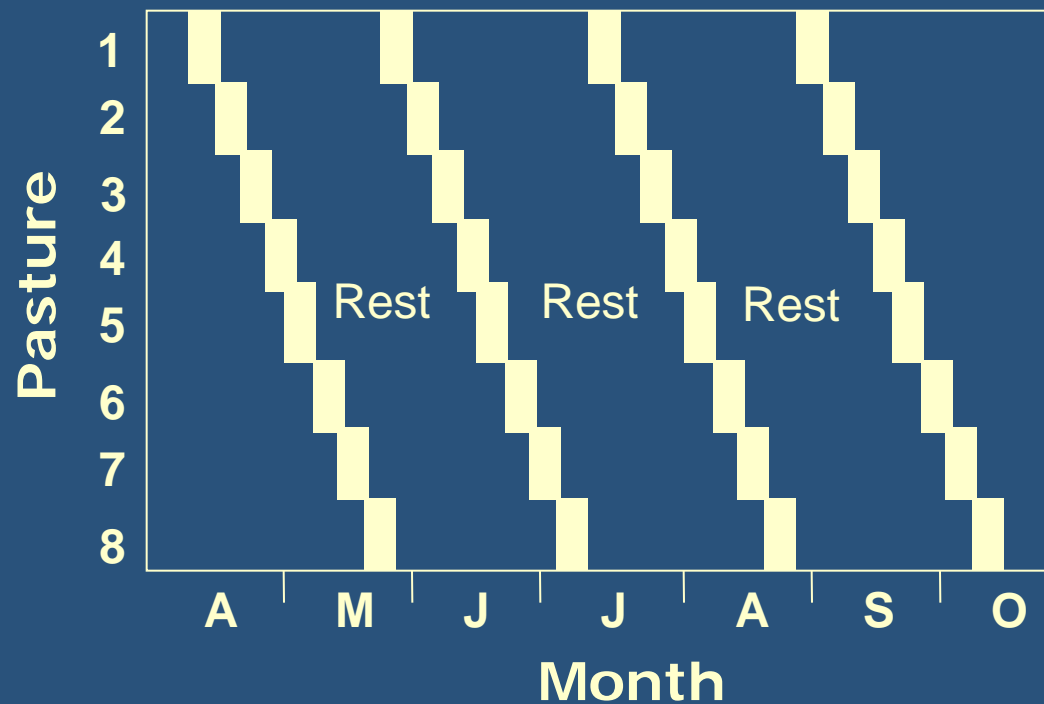


Grazing Season – 200 days

Precipitation – 400 mm

Growing Season – 65 days

## Rotational Grazing System



# Components of Grazed Ecosystems



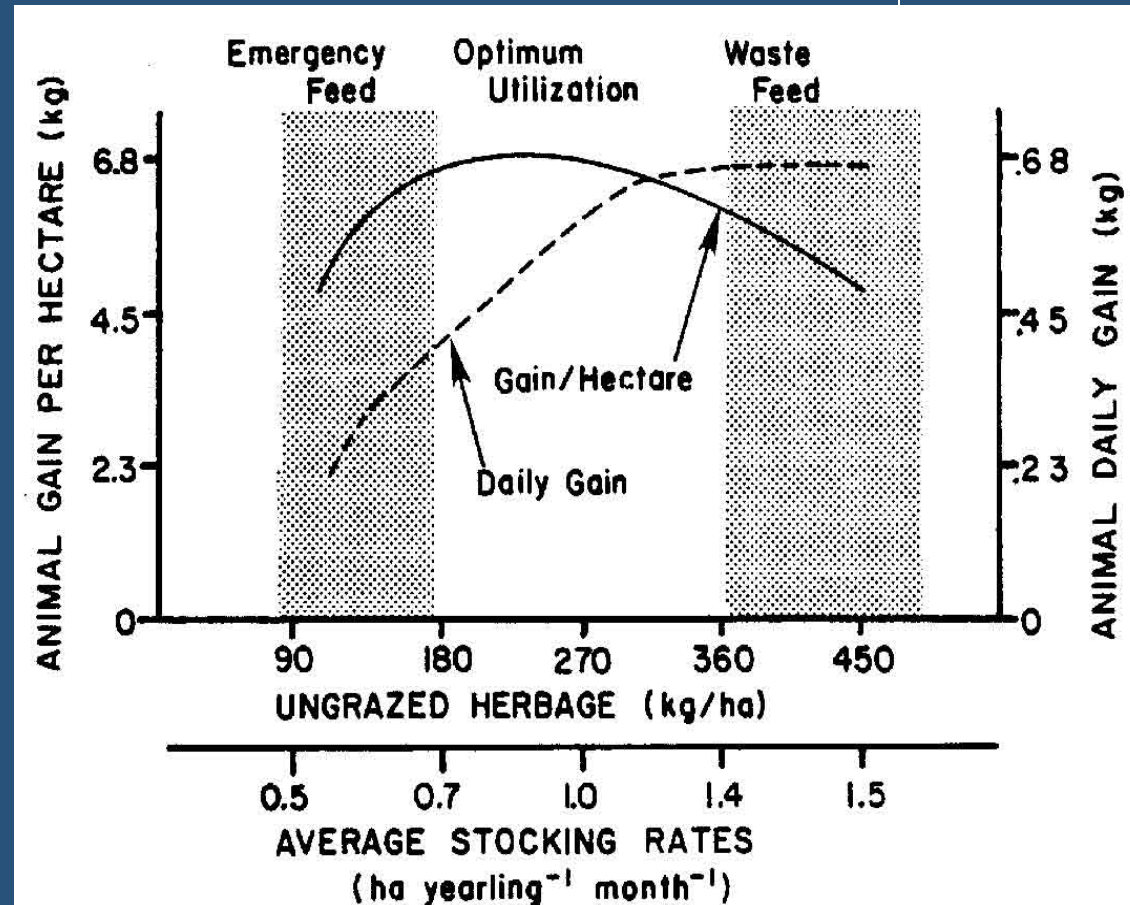
- Weather
- Stocking rate
- Management decisions
  - i) adaptive management i.e., forage inventory, drought management, animal care
  - ii) agribusiness/economics i.e., labor cost, cost/animal
  - iii) Individual goals, capabilities, and values
- Grazing systems
  - i) short successive rest
  - ii) improved animal distribution & harvest efficiency
  - iii) moderate SR required to maintain animal production



# Optimal Stocking Rate



- Optimal stocking rate critical for livestock production
- Balance individual animal gain with gains per land area
- Problem is to manage forage variability



# Livestock Rotation Can be Valuable



- Different plant species
  - Forage quality
  - Seasonal variation
  - Livestock preferences
- Soil and site variation
- Elevational gradients
- Precipitation gradients



# Management More Important than Grazing System



- What *management actions* are most important?
- What *management skills* are most important?
- What *percentage of managers* possess these skills?
- How can these *skills best be learned*?
- Is *management* more effective in intensive grazing systems?

# Grazing System vs Management



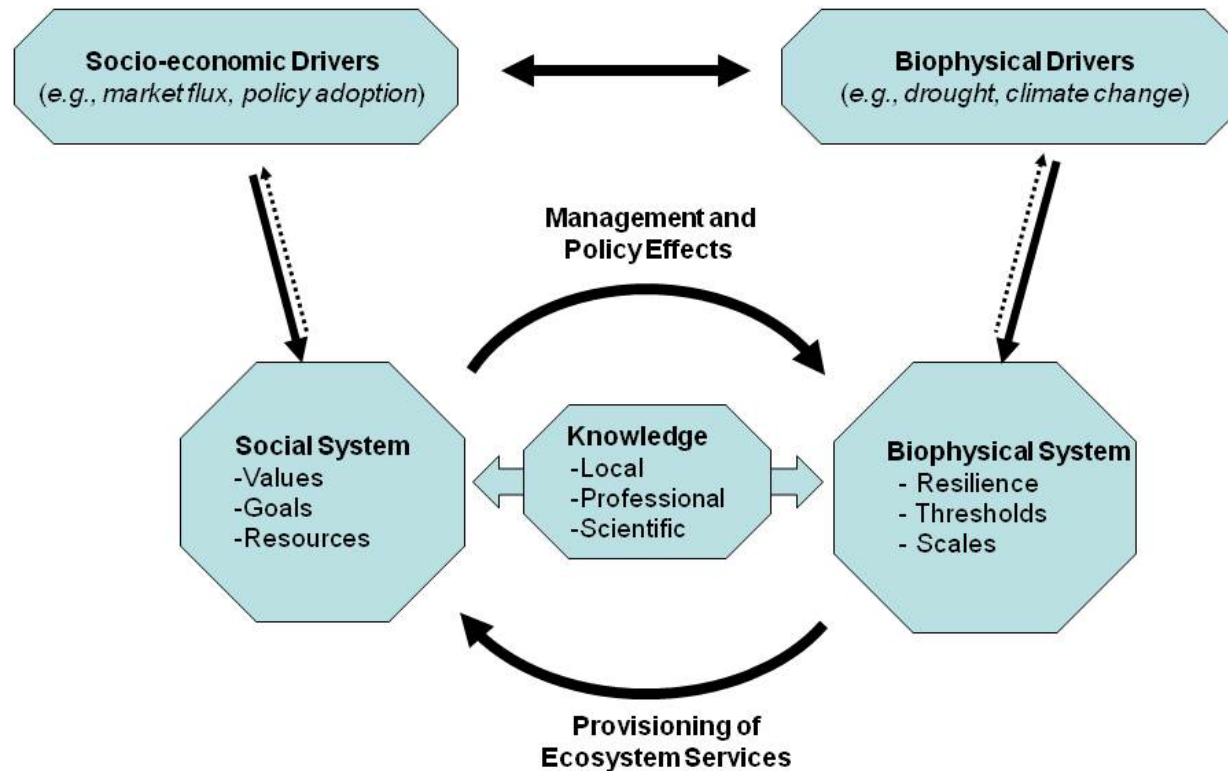
**Grazing Management** - manipulation of grazing in pursuit of desired goals - SRM 2011.

**Grazing System** - specialization of grazing management which defines recurring period of grazing and deferment – SRM 1989.

New interpretation – SRM 2011

**Grazing System** - integrated combination of soil, plant, animal, social and economic features, grazing methods, and management objectives to attain desired goals.

# Social Ecological System





# Extensive vs Intensive Management

## Extensive Management

- Low production
- High variability
- Little infrastructure
- Low operating costs
- **Emphasis on effective management**
- Work within limits to create net profit.

## Intensive Management

- High production
- Low variability
- Large infrastructure
- High operating costs
- **Emphasis on energy inputs and technology**
- High production need to cover high cost



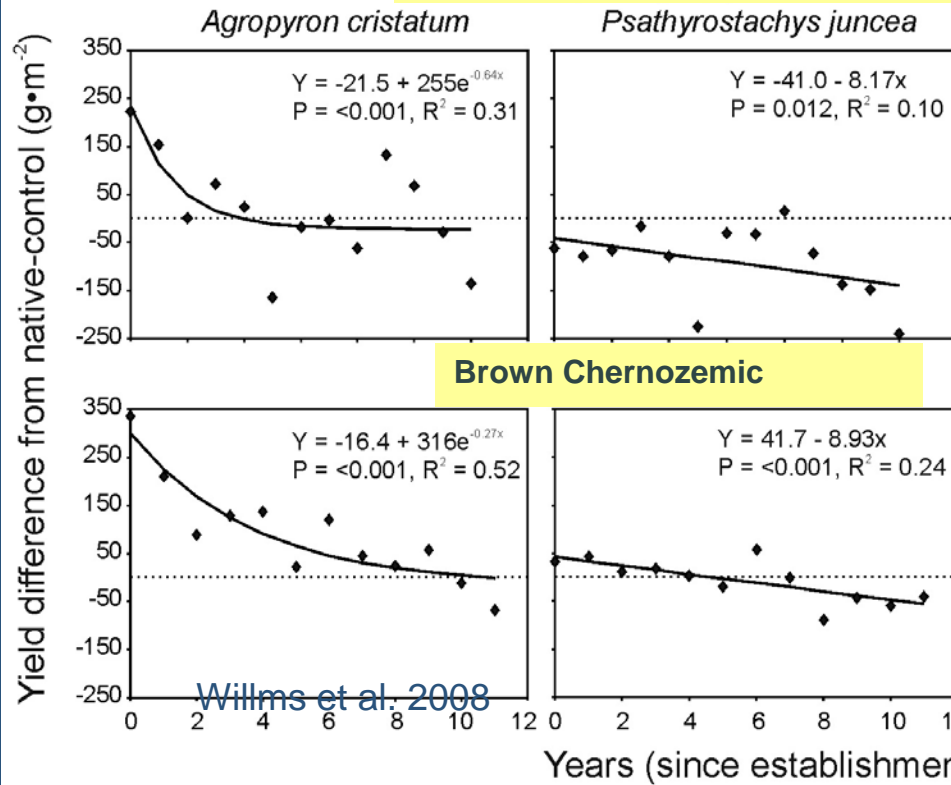
# Potential Management Strategies

- **Intensify Livestock Production Systems**
  - Grazing systems
  - Forage production systems
  - Supplemental feeding
- **Improved Livestock Production Efficiency**
  - Cull inefficient animals & improved genetics
  - Drought/winter management and forecasting
- **Diversify Income Sources**
  - Value added (quality) to livestock products
  - Market value for ecosystem services

# Forage Production Systems



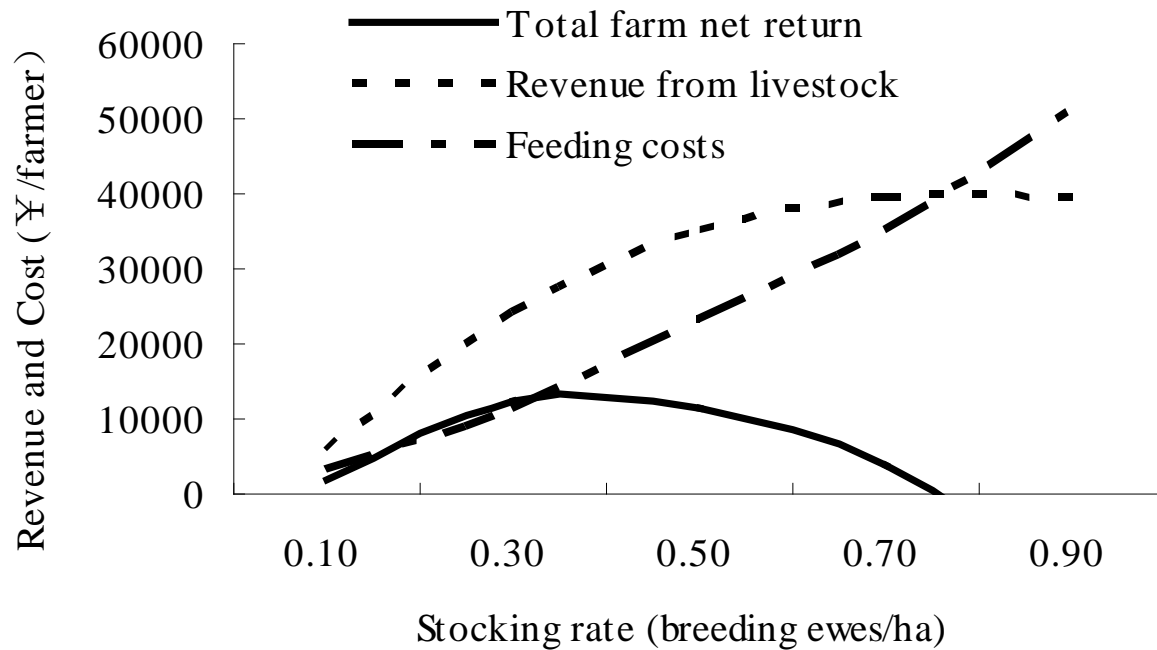
## Dark Brown Chernozemic



- Potential Value
- Necessary to offset low seasonal forage supply
- Considerations
  - Seeding failure & erosion
  - Cost of planting, irrigation & fertilization
  - Competition with human food production & prices



# Household Income in China



# Strategies for Chilean Patagonia?



- Intensify livestock production systems?
- Increase livestock production efficiency?
- Diversify income with other products?
- Increase markets for ecosystem services?
- Some combination of these strategies?



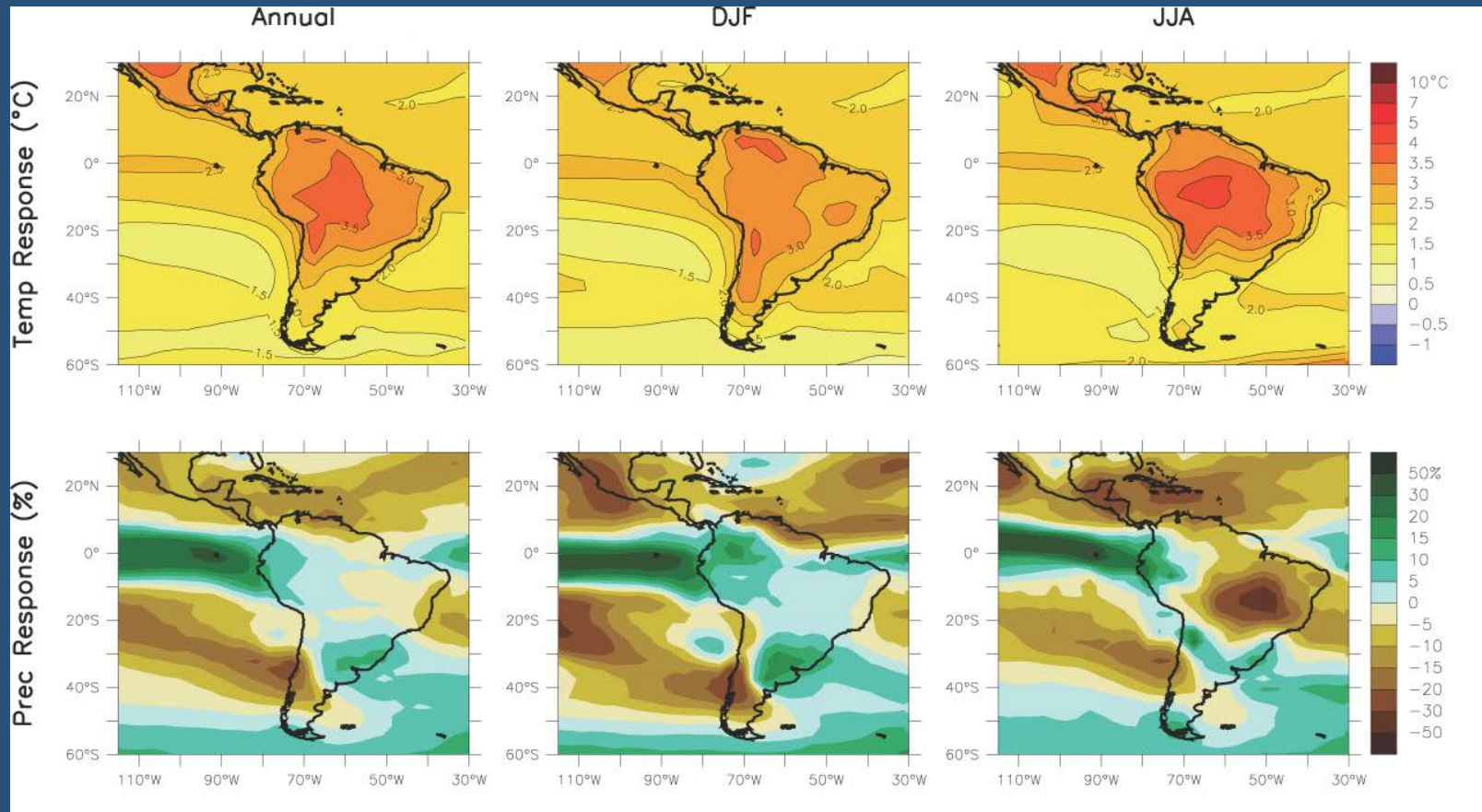
# Future Management Challenges



- Warming and drought
- Livestock markets
- Production vs conservation
- Availability of water
- Cost of energy
- Institutions and policies
- Others ?????



# Climate Change Projections



Warming 1 – 2 C by 2060; 2 – 5 C by 2100; especially in winter.

Precipitation decreases 30%, especially in winter; large variability

Less snow and glaciers reduce snow melt from Andes

(IPCC 2007)



# Adaptive Management



- Likely to provide the best available information to guide regional grazing management strategies.
  - Shared management objectives and research questions
  - Design practical management plans with best information
  - Collaboratively interpret monitoring results and outcomes
  - Modify current management to effectively achieve goals



# Categories of Adaptation



- Human
  - Risk perception
  - Goals and values
- Enterprise
  - Flexible stocking rates
  - Forage reserves
  - Breed and species of livestock
- Institution
  - Grazing associations for regional management
  - Policies to support flexible management
  - Markets for non-traditional goods





# Value of Grazing Associations

- ‘Strength in numbers’ – share information
- Affect management over large areas
- Market timing and purchasing power
- Ship products directly to market
- Greater financial and human capital
- Improved management flexibility
- Vertical integration of production systems



# Final Conclusions

- Grazing systems do not significantly increase *ecological processes* on rangelands.
- Current *priorities are reversed*, grazing systems emphasized over management.
- *Adaptive management* is most important in grazing ecosystems, but poorly understood.
- *Collective regional planning*, involving many stakeholders, is best approach for future.