Assessing the impact of long term climate forecast on north central Florida livestock producers using linear programming

International Workshop on Regional Integrated Assessment of Climate Impacts
Castelvecchio, Italy, September 2002

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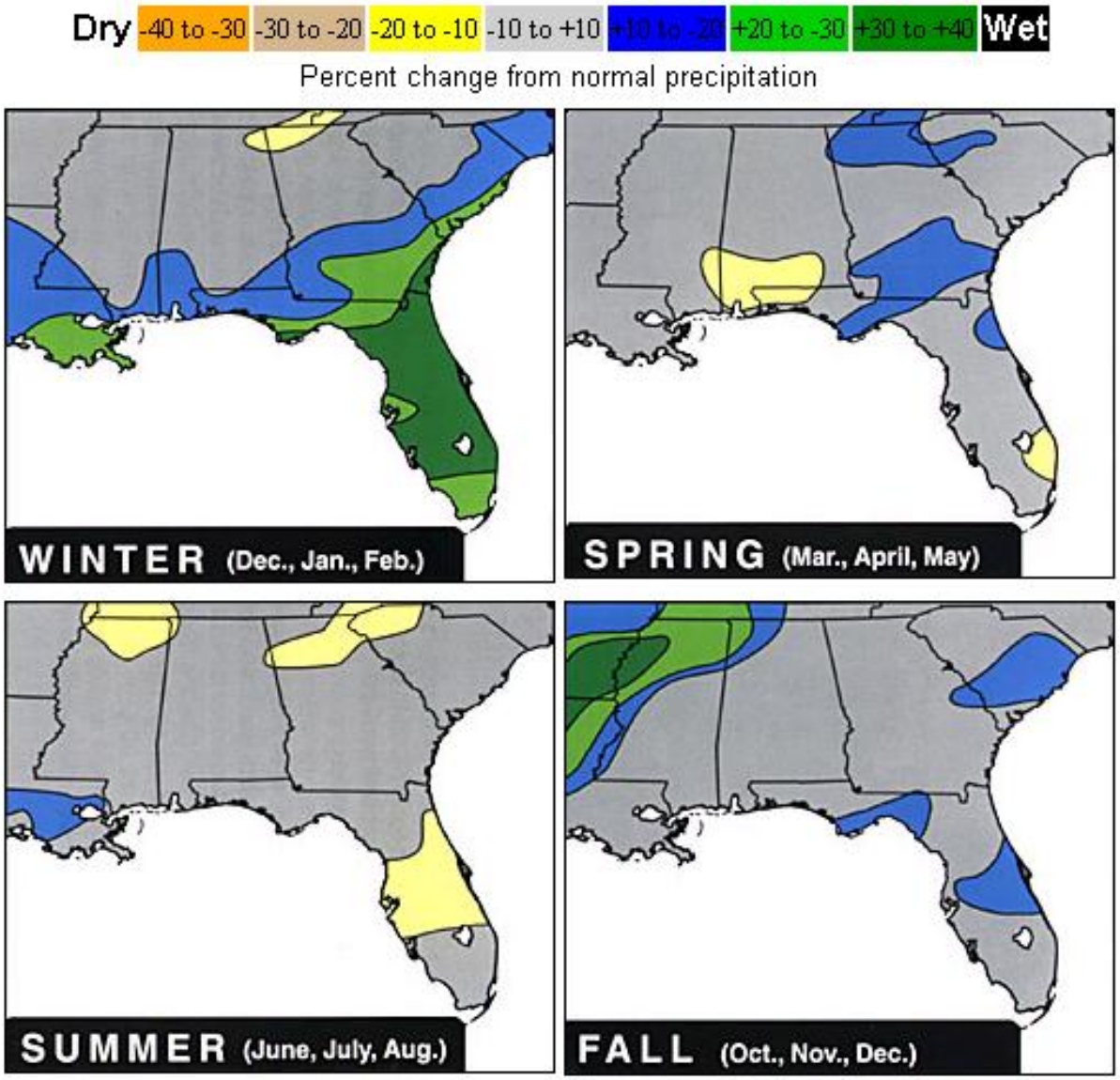
OUTLINE

- ENSO prediction technology
- Florida Consortium: UF, UM, FSU
- Making it useful for Florida farmers
- Methodology
- Beef cattle production system in NCF
- Model
- Future research

El Niño Seasonal Precipitation

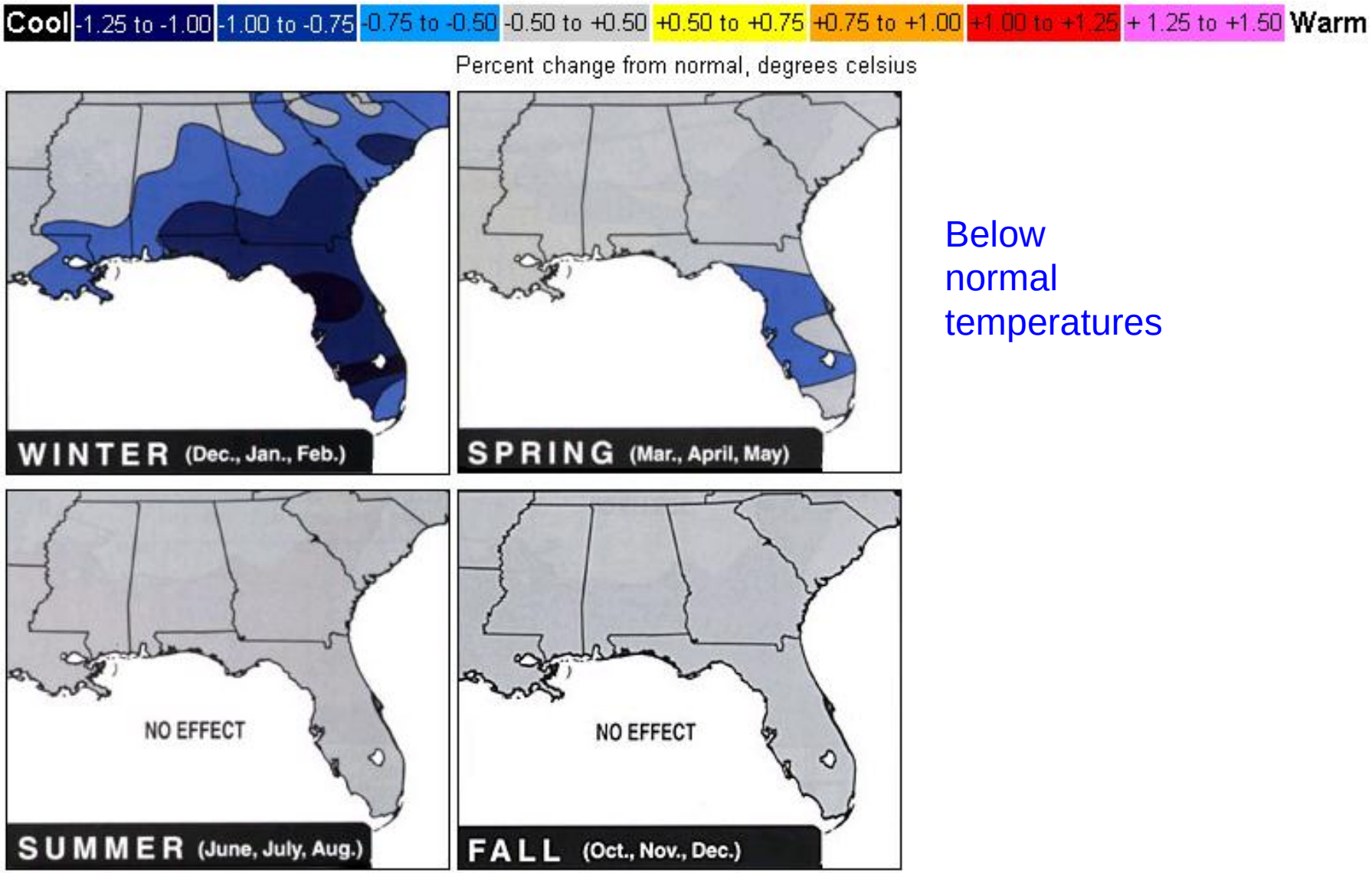
These images show percentage above or below normal precipitation in an El Niño year.



Above average rainfall

El Niño Seasonal Temperature

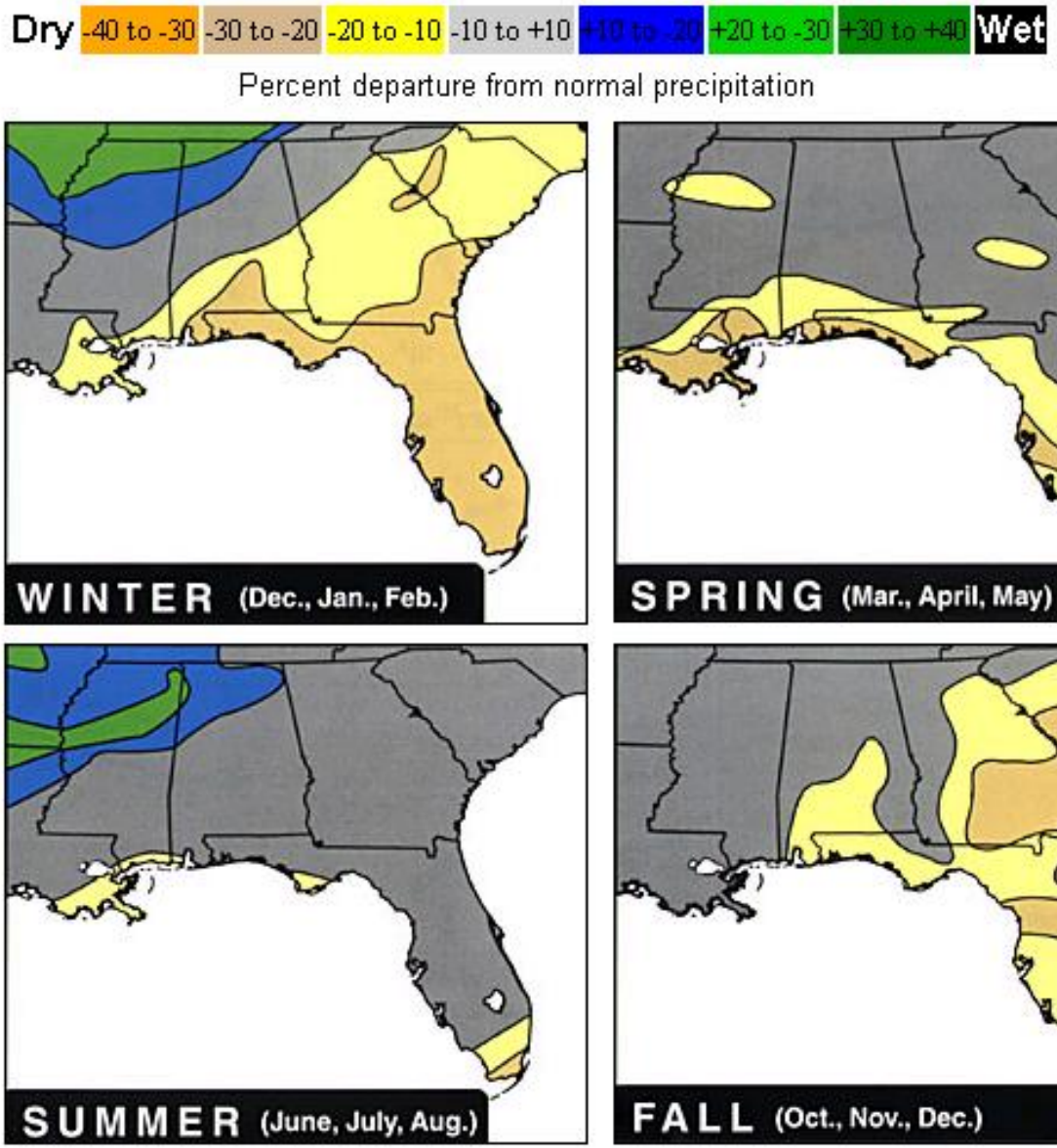
These images show the change from normal temperature, in degrees celsius, during El Niño years.



Below normal temperatures

La Niña Seasonal Precipitation

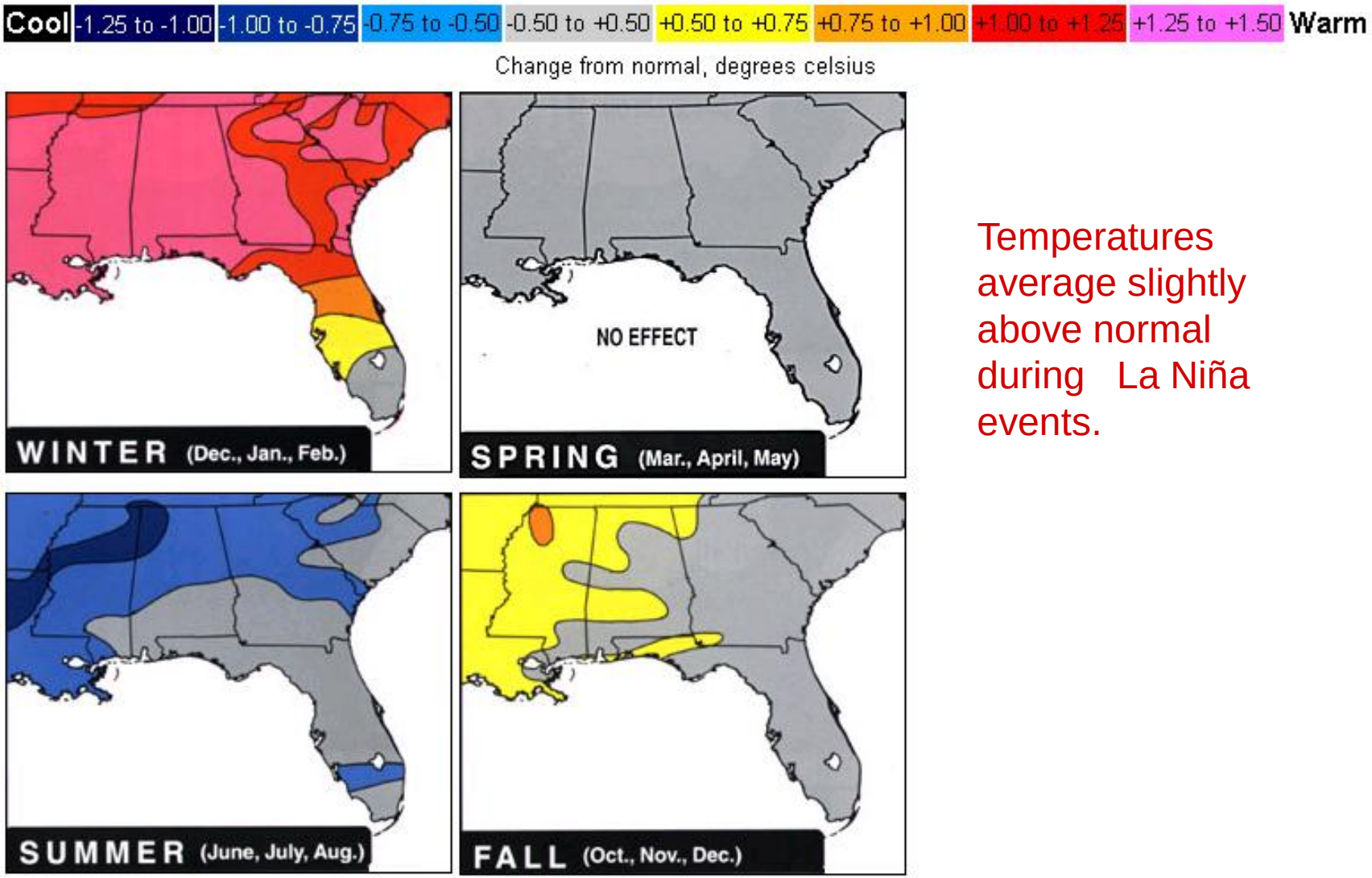
Graphs show percentage change from normal precipitation in a La Niña year.



Generally dry conditions prevail during La Niña's in late fall, winter and early spring

La Niña Seasonal Temperature

These images show the change from normal temperature, in degrees celsius, during La Niña years.



Temperatures average slightly above normal during La Niña events.

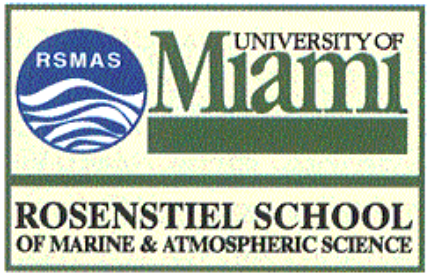
The Florida Consortium for the regional assessment of climate variability and impact of climate forecasts on the Americas

THE FLORIDA STATE UNIVERSITY

Center for Ocean-Atmospheric Prediction Studies

UNIVERSITY OF FLORIDA

Institute of Food and Agricultural Sciences



Research question

How Florida ranchers could benefit by using currently available methods for forecasting climate to adjust various decisions?

Data Collection

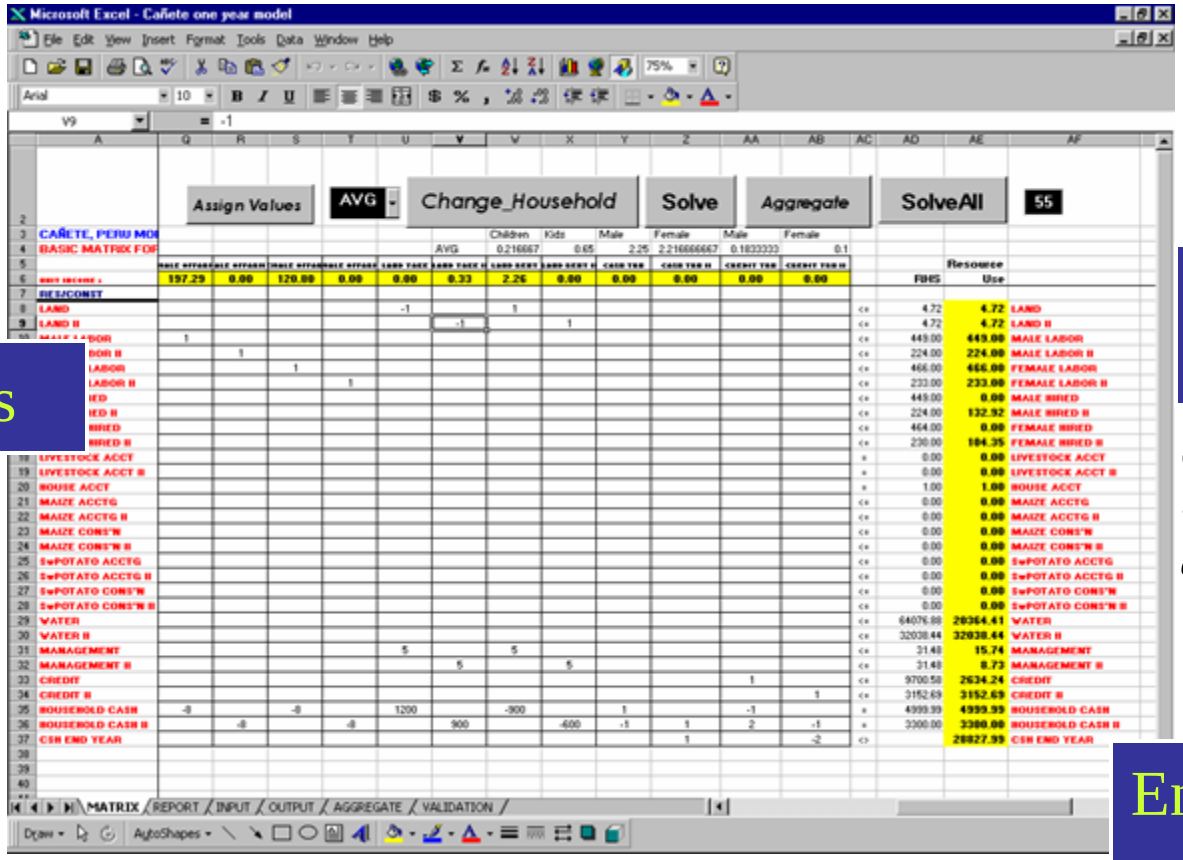
- Four *sondeos* (1991-2001)
- Published data (Florida Cooperative Extension Service)
- Participatory linear programming (2002) – Validation Process

Methodology

Linear program modeling

Activities

(e.g., maize, cotton, livestock)



Resources

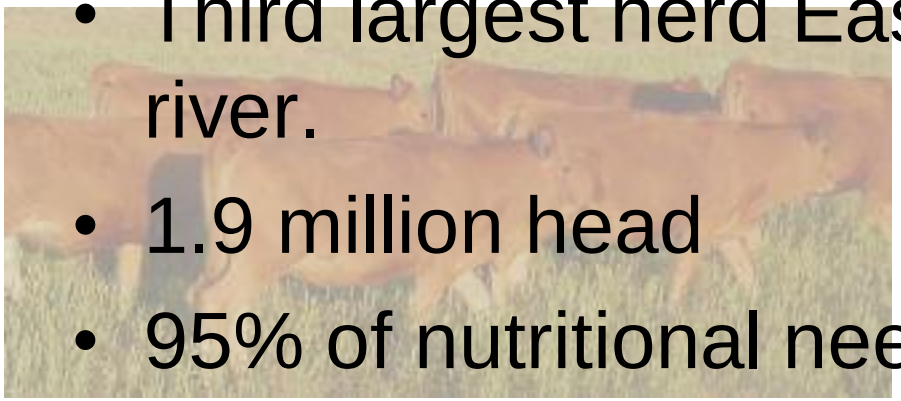
(e.g., land, labor)

Constraints and Goals

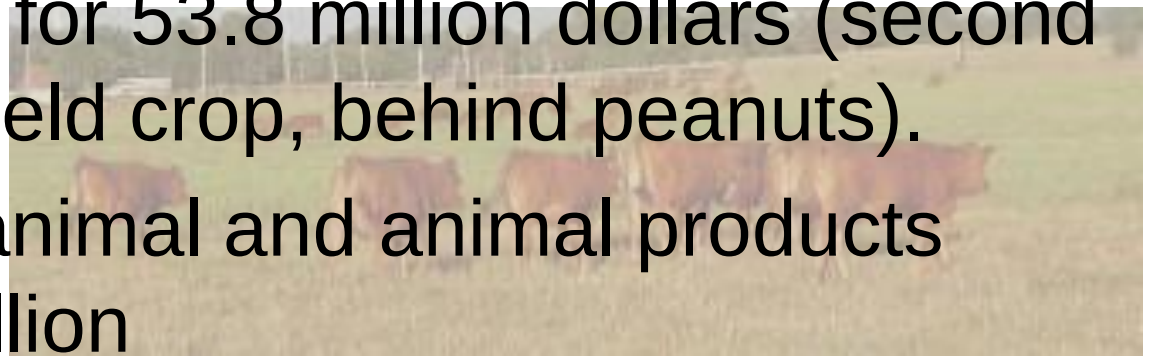
(e.g., food consumption, available cash)

End year cash

Beef cattle production system in north central Florida



- Third largest herd East of the Mississippi river.
- 1.9 million head
- 95% of nutritional needs provided by forages
- Hay accounts for 53.8 million dollars (second largest cash field crop, behind peanuts).
- Total sale of animal and animal products nearly 500 million



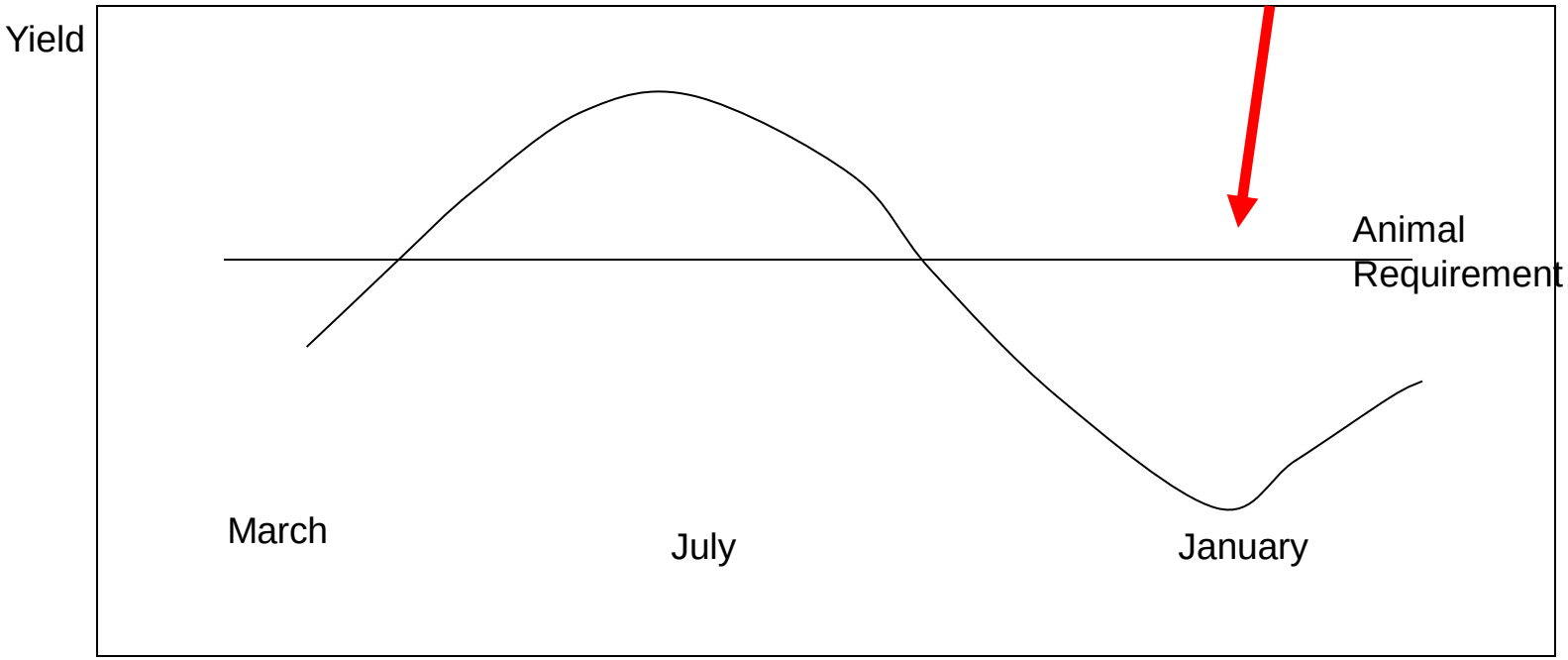
Source: Florida Agric. Stat. Serv., 1999

Production calendar

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
FALL-**SUMMER**												
SPRING-**WINTER**												

BREEDING												
CALVING												
PALP. & CULL												
MAKE HAY												
SUPPLEMENT CATTLE												
TILLING												
GRAZING RYEGRASS												
GRAZING BAHIA GRASS												
SELL CULL COWS												
SELL YEARLINGS												
	WINTER			SUMMER						WINTER		

Winter bottleneck



Production curve, Bahia grass

Forages and feeds

- Bahia grass (*Paspalum notatum*)
- Bermuda grass (*Cynodon dactylon*)
- Small grains (rye, oats, wheat)
- Ryegrass (*Lollium multiflorum*)
- Hay
- Citrus pulp
- Molasses slurry

LP Model

- Cow – Calf operation
- Two years
- Profit maximization
- El Niño, La Niña scenarios vary according to calculated potential yield indexes
- Yield is linked to stocking rate (carrying capacity) on Bahia grass and ryegrass
- Validated with eight local ranchers interviews. Changes suggested were incorporated

Results

Optimal management for each ENSO phase, based on average climate effects on pasture production in each phase for a 400-acre ranch in North Florida. Also shown are expected profits for
Two years for each ENSO phase occurring during the second year.

ENSO Phase Year 2	Animals in Winter	summer hay made (bales)	winter rye grass planted (acres)	profit in 2 years (US$)
Neutral	259	147	226	60174.73
El Niño	247	152	242	54611.80
La Niña	206	303	0	44314.21

Significance

- If ranchers had confidence in climate predictions they would make different decisions depending on ENSO phase

- Results suggest practical options, which are consistent with decisions that ranchers thought that they might alter if they have a reliable climate forecast

Future

- Improve user friendliness
- Tailor more management strategies which could be adjusted by ranchers
- Monitoring results over several years
- Assess the “cost” of wrong forecasts