FORAGE LEGUMES:
WHERE HAVE WE GONE WRONG?

AgriLIFE RESEARCH
Texas A&M System

Jim Muir

Ukulima Farm:
Sustainable agriculture & natural resources

- South Africa Trust
  - Limpopo Province
  - Very new
- Borlaug Institute
  - Texas A&M University
- Focus on sub-Saharan Africa
- All US projects have African partners
- Focus on emerging farmer

Why has tame pasture and rangeland legume research failed to impact production?

- Natural systems are legume-rich
- Benefits of legumes are well established
- Millions have been invested in research
- Millions invested in extension and development
- Yet adoption is minimal

Warning!!

- Society will tire of funding without return
  - Science is an investment
  - $$ for Agriculture & Natural Resources practical
  - Cannot hide behind "science" forever

Why does government not value us?

- What is agronomy?
- What are forages?
- Tax-payers don't see us

Result?

- Forage Agronomy is fading
  - Fewer scientists every year
  - Fewer PhDs every year
  - Little or no forage funding
- Forage Legume Agronomy non-existent
  - As researchers retire or die, not replaced
  - Replaced by bioenergy, conservation agriculture, hydrology etc.
  - Atrophy
  - Private industry or NGOs replace universities and NRI?

Ye
Olde
Forage
Legume
Agronomist

Maybe a good thing?

- It may be time to close doors on forage science?
  - Merge into rangeland/veld management?
  - Retool ourselves into relevant disciplines?
    - Bioenergy feedstocks
    - Natural resource conservation
    - Green manures and soil amelioration
- One thing for sure: change has happened

So, how do we save ourselves?

- 1st are we worth saving?
- 2nd anything left to save?

And legume forage agronomists wept, for there were no more worlds to conquer.

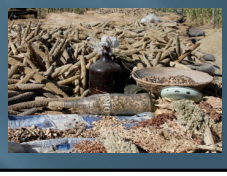
So, how do we save ourselves?

- 1st are we worth saving?
- 2nd anything left to save?
- 3rd do we reinvent ourselves?

Suggestions

1. Research within systems

- **Classical isolation trials lead to failure in the field**
- **Look at legumes within context**
- **Multi-disciplinary groups**
  - **Forage may be a minor component**
  - **Social science may trump natural science**



Suggestions

2. Stand persistence > nutritive value
   - Ruminant nutrition vs. ecology
   - Low palatability is ASSET
   - Humble shall inherit the earth
   - Survival trumps production

Suggestions

3. Anti-quality = quality?!?
   - Learn from nature: all that glitters is not gold
   - Low palatability = survival
   - CT has myriad roles

Current Debates

1. Mixed vs. pure stands
   - What does nature teach us?
   - What is best for ecosystem, including ruminant?
   - Mixtures difficult to maintain
   - Art more than science?

Current Debates

2. Native vs. exotic
   - Native > naturalized > exotic
   - Where is the next invasive coming from?
   - Exotics domesticated for a reason
   - Domesticating locally is expensive

Current Debates

3. Wide adaptation vs. specialized
   - Larger market (ecological and commercial)
   - Less expensive

Current Debates

4. Single purpose vs. multiple purpose
   - Forage often least important use
   - Easier to introduce
   - Sneak via backdoor

Current Debates

5. Early promise not always fulfilled
   - First impressions sometimes prove false
   - Over-sell or deception?

Current Debates

6. Ecosystems services
   - Land reclamation
   - Hydrology
   - Soil phytoremediation
   - Species diversification
   - Ecosystems stability

Current Debates

7. Germplasm wars
   - Who owns our research?
   - Universities/companies/IRC becoming greedy
   - Originators becoming paranoid
   - Share the wealth!!

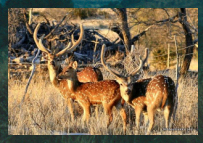
Any Good News?

Some successes
- Long term ones such as lucerne (alfafa)
- Newer ones such as:
  - *Lespedeza cuneata* in SA and USA
  - *Stylosanthes* spp. in Brazil & Australia
  - *Moringa oleifera* pan-tropical
  - *Leucaena leucocephala* pan-tropical

Adapt Animal to Forage

- Metabolic rates
- Specialists vs. generalists
- Bulk vs. selective
- Harvest mechanisms
- Digestive tracts
- Grazers vs. browsers

The Tao of Forage Legumes



Forage Legumes oversold before their time?

- Economic incentive necessary for adoption
  - N fertilizer historically inexpensive
- Environmental concerns already here
  - Legumes fix problems, not make them

The Future?

- Ruminant production WILL be relegated
  - To poorest climates
  - To poorest soils
  - Give way to cereal & pulse crops
  - Give way to urban water catchment
  - Give way to climate change
- Forage legumes will inherit
  - pastures
  - rangeland

Reviving Forage Research

Take risks

- That's what we get paid to do!!