



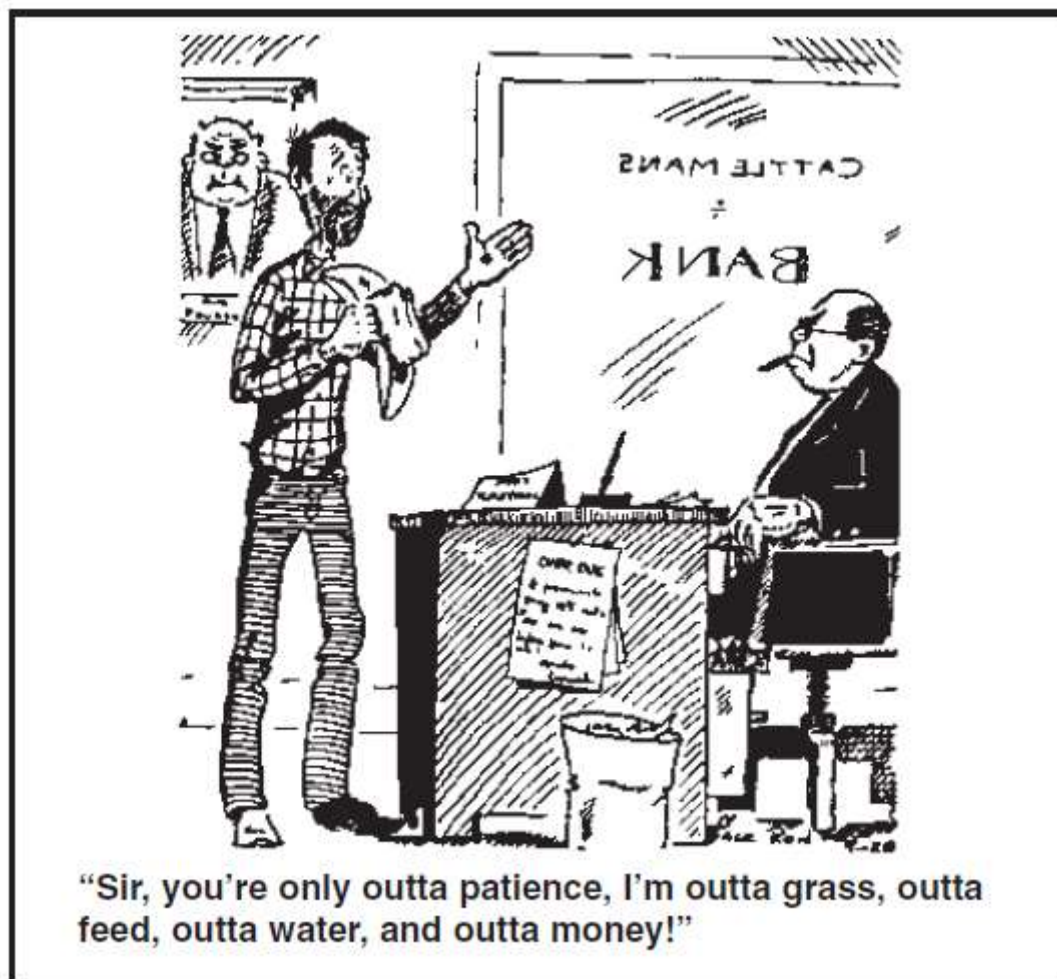
# Alternative summer forages to offset purchased concentrate costs: A Queensland Perspective.

Dr David Barber  
Senior Research Scientist (Dairy)  
Nutrition and Feeding Systems

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# Why Alternative Forages?



# Feeding system changes in northern Australia



## *Tropical/Temperate Pasture Systems*

- High water allocation
- Smaller farm size
- High rainfall areas

## Mix of Feeding System

- Tropical/temperate Pasture: 40%
- Partial Mixed Ration (PMR): 45%
- Total Mixed ration (TMR): 15%

## *PMR & TMR Systems*

- 7 years Drought
- Concentrate use increased
- No Irrigation water
- Silage feeding increased



## *PMR & TMR Systems*

- Investment into feeding & cow comfort infrastructure
- Alternative forages to replace concentrates



# Profitable use of concentrates

- Purchased grain, concentrates and other:
  - Approx 25% - 33% of costs alone

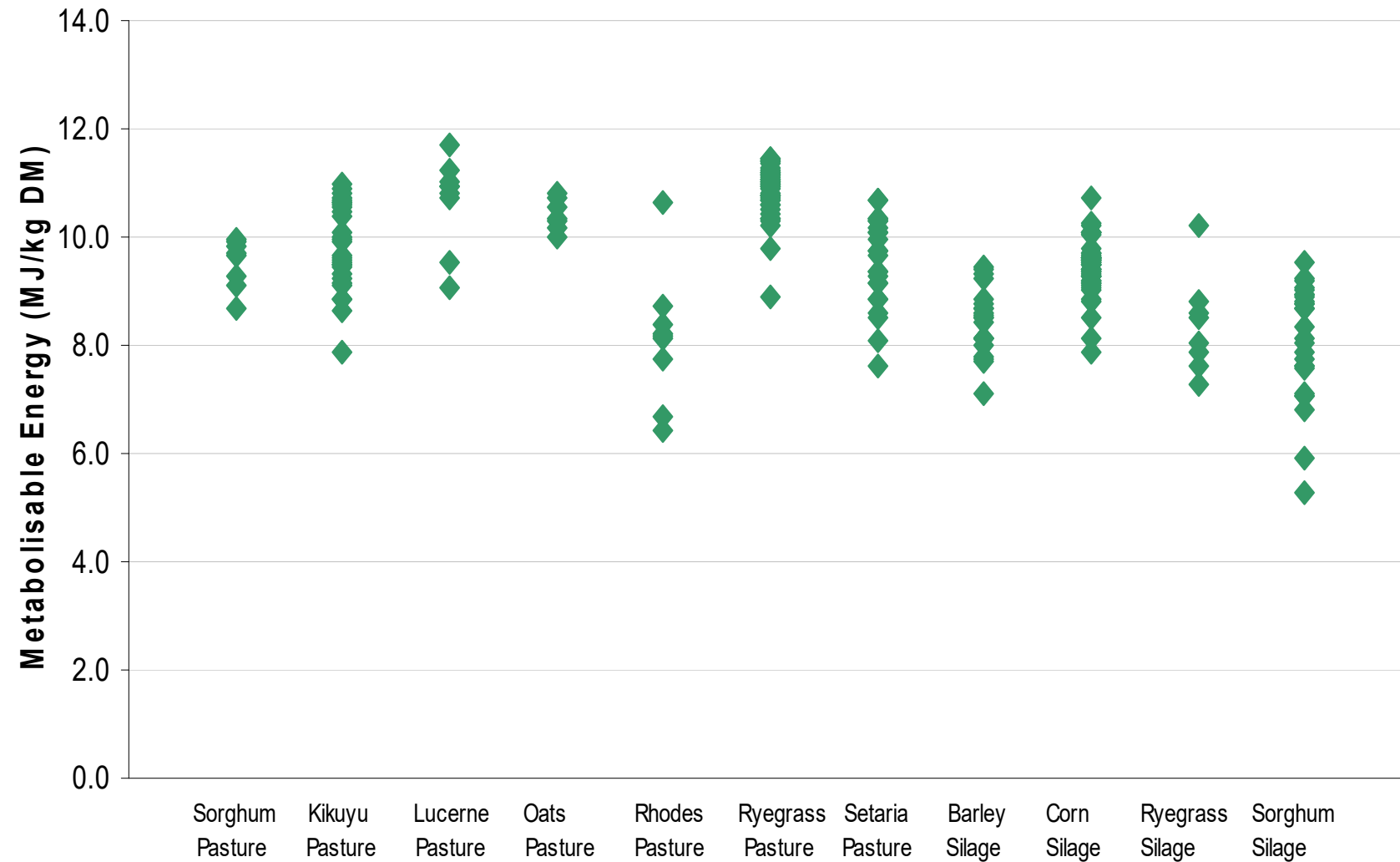
	Vic	NSW	Qld
c/L	11.5	13.8	19.9
\$/kg MS	1.49	1.80	2.74
% of costs	27.6	25.6	33.8

- Concentrate Use:

T/cow/yr	Vic	NSW	Qld*
Ave	2.3	2.6	3.6
Top 25%	2.7	3.1	4.2

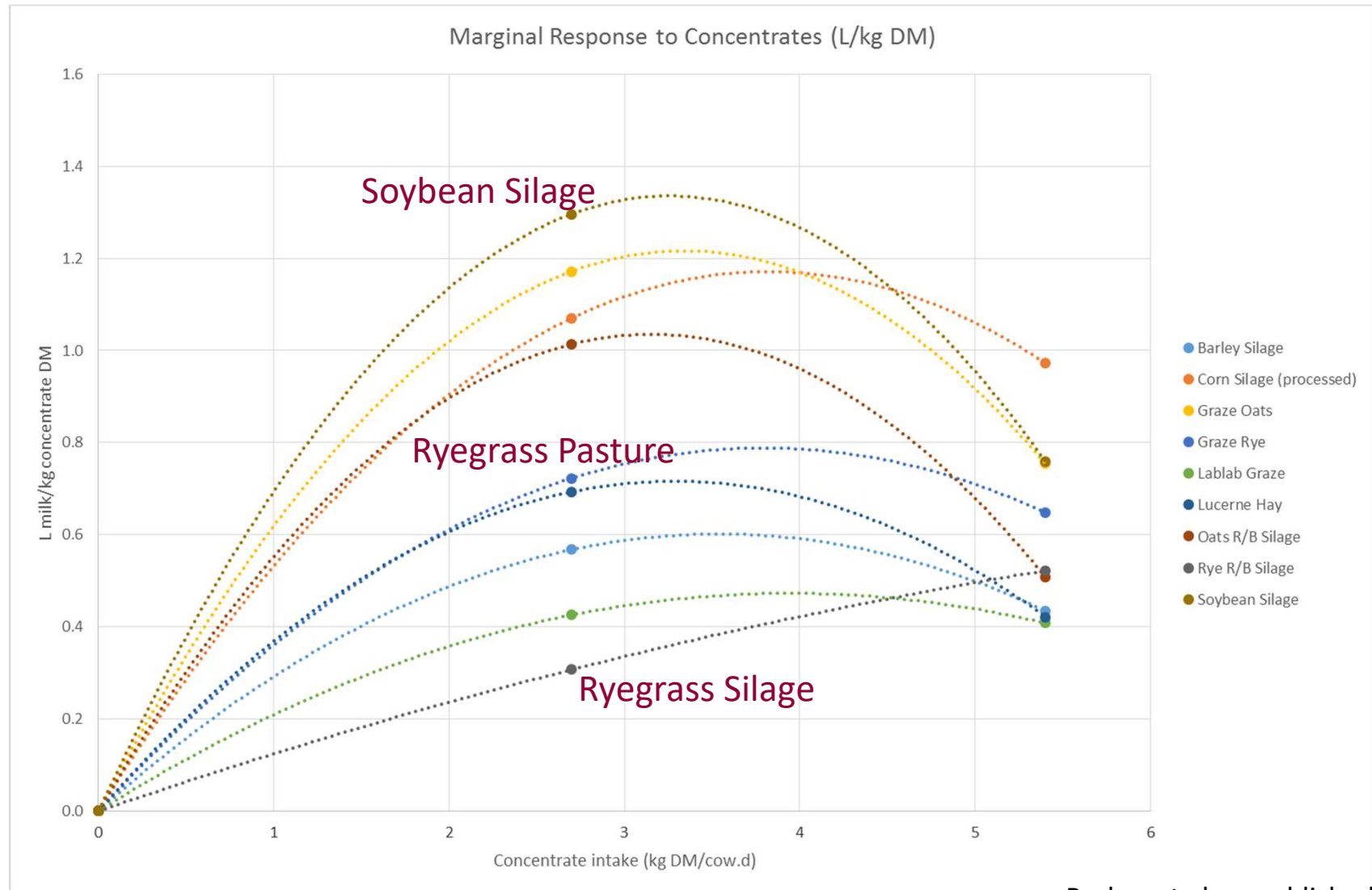


# Why the reliance on starch and protein?



Barber et al, unpublished data  
Department of Agriculture and Fisheries

# Profitable use of concentrates



Barber et al, unpublished data  
Department of Agriculture and Fisheries

# Selecting Alternative Forages

- A change in feeding systems has driven a change in forage selection
- Need to consider the feeding system type
- Depends on what you are looking for in your system:
  - Quantity
  - Quality
  - Low cost
  - Specific nutrients
  - All of the above!!!

# Potential Forages

## Cereal Silage Crops:

- Corn
- Forage Sorghum
- White Sorghum
- Red sorghum
- Barley
- Triticale

## Pastures:

- Kikuyu
- Setaria
- Annual Ryegrass
- Lucerne
- Lablab
- Oats
- Chicory/Plantain
- Prairie/Fescue
- Brassicas

## Protein Silage Crops:

- Soybeans
- Lablab
- Forage wheat
- Lucerne
- Lupins
- Faba Beans

## Headlages:

- Corn
- White Sorghum
- Red Sorghum
- Wheat
- Barley
- Triticale

**Over 25 forage  
options to balance  
nutrients in the diet**

## Novel Forages:

- Fodderbeet
- Duckweed
- Filamentous Algae
- Quinoa
- Cassava



# Quantity vs Quality

- Our biggest challenge with tropical forages
  - High yielding
  - Lower quality relative to temperate forages
  - High Water Use efficiency (WUE)
- Management is critical
  - Forage selection
  - Harvest time & height
- Annual temperate forages can be used strategically to fill quality gaps (Autumn)

# Legumes

Soybeans



Lablab



Lucerne



# Soybeans

- High Protein Silage
- DM Yield
  - 3 to 6 t DM/ha Dryland
  - 6 to 12 t DM/ha Irrigated
- Cost: \$150 – 200/t DM
- Harvest (90 to 110 days):
  - flowering to Pod development
  - Use a swather



Variety	Yield (t DM/ha)	ME	CP%	NDF%
P791	3.91	9.82	23.6	39.2
Bunya	4.78	9.63	22.3	37.3
A6785	3.14	9.48	21.8	38.0
Hayman	5.61	8.91	19.5	43.4
Leichhardt	4.14	8.95	17.7	41.4



# Lablab

- High Protein Grazing or Silage
- DM Yield
  - 3 to 5 t DM/ha Dryland
  - 5 to 9 t DM/ha Irrigated
- Cost: \$100 – 150/t DM
- 4-8 week establishment
- 4 week inter grazing interval

	ME	CP%	NDF%
Dryland	10.3	23.6	31.9
Irrigated	11.1	32.1	28.1



# Cereal Crops

High Chop Corn Silage



White Sorghum Silage



Forage Sorghum





# High-chop Corn

*High chopped corn  
cut at approx. 40cm*

*Standard corn chop  
height ~10cm*





# High chopped V normal corn silage?

	Normal	High Cut (40 cm)	
Dry Matter Yield (t/ha)	18.50	17.00	-1.5
Dry Matter (%)	40.4	41.4	
ME (MJ ME/kg DM)	10.8	11.3	+0.5
CP (%DM)	8.9	8.9	
Starch (%DM)	38.7	41.7	+3.0
NDF (%DM)	37.2	32.2	-5.0
NDF Dig 24hr (% of NDF)	44.6	51.3	+6.7

Total cost in pit (\$/t as fed)	60.98	63.71	
Cost \$/t DM	151.05	153.89	+2.84
Cost \$/kg Starch	0.39	0.37	-0.02

Potential Benefit – up to 8 L/cow  
due to higher DM & starch intake

# White Sorghum

- High Starch Silage or Headlage
- DM Yield
  - 5-7 t DM/ha Headlage
  - 12-18 t DM/ha Silage
- Cost:
  - Headlage - \$145/t DM
  - Silage - \$150/t DM



- Headlage:
  - Offset grain use at lower cost
- Silage:
  - Replace 2-3 kg DM corn silage at lower cost

	ME	CP%	NDF%	Starch%
Headlage	11.3	13.2	25.0	47.5
Silage	9.46	12.2	48.5	20.5

# Forage Sorghum

- Grazing or Silage
- DM Yield
  - 3-6 t DM/ha each grazing
  - 8-16 t DM/ha Silage
- Cost:
  - Pasture - \$75/t DM
  - Silage - \$150/t DM

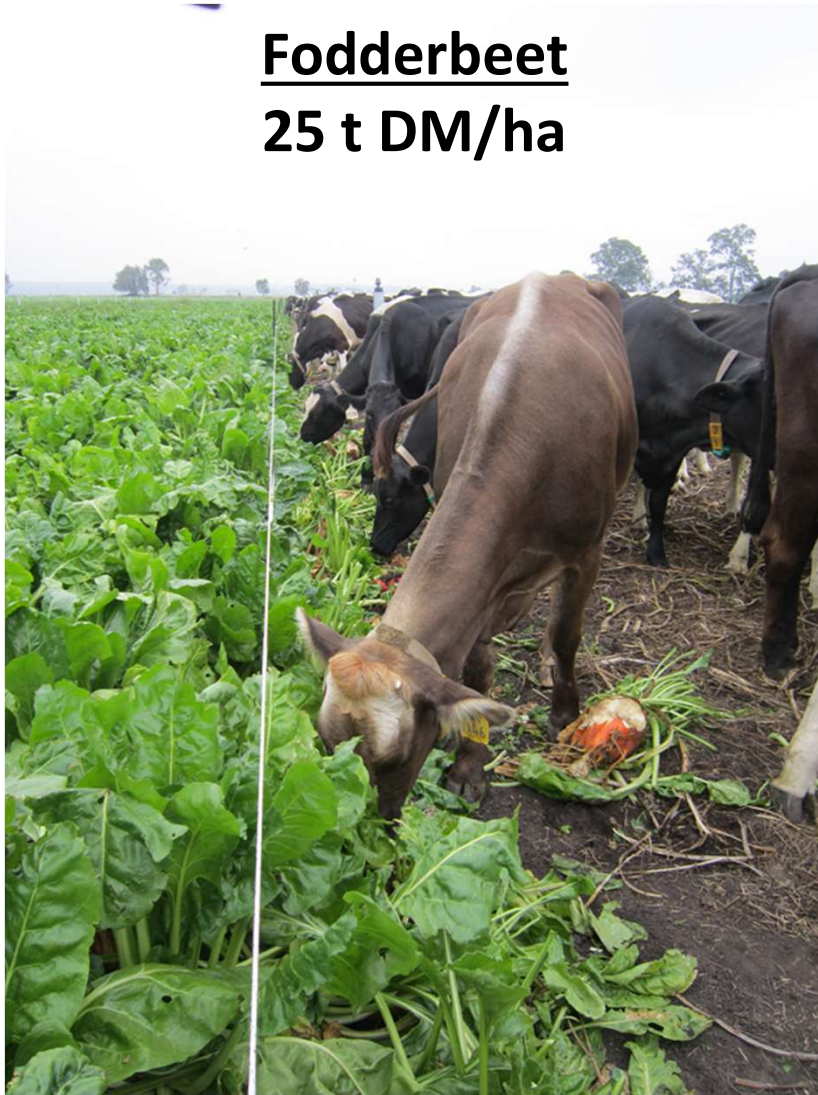


	ME	CP%	NDF%	Starch%
Pasture	9.1	19.3	52.7	-
Silage	7.8	11.1	56.2	12.3



# Temperate Forage Crops

Fodderbeet  
25 t DM/ha



Field Pea  
3 t DM/ha





# Temperate Forage Crops



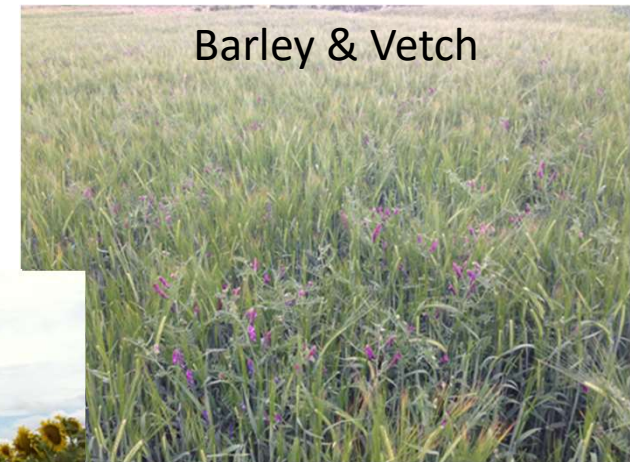
Brassicas  
5-10 t DM/ha

Turnips  
3-5 t DM/ha





# Forage Combinations for Silage





# Developing High Forage Feeding Systems

- Margins on-farm declining
  - Concentrate use & cost increasing
  - Production per cow only increased slightly
- Over 25 forage types available
- Can we substitute high starch and protein forages for grain and protein meal increase MOFC?

# Feed alternatives developed previously



## Corn Silage –

- \* High cut
- \* Yield 52 t/ha wet; 17 t DM/ha
- \* Cost \$65/t wet; \$157/t DM
- \* 37.7 c/kg starch (corn = 53.2 c/kg starch@\$335/t)

**Offset  
Starch**



## Headlage –

- \* Grain variety grown and cut at height of first leaf
- \* Yield 11.5 t/ha wet; 6.6 t DM/ha
- \* Cost \$80/t wet; \$142/t DM
- \* 33.8 c/kg starch (corn = 53.2 c/kg starch@\$335/t)

# Feed alternatives developed previously



## Soybean Silage –

- \* Yield 9 t/ha wet; 5.4 t DM/ha
- \* 20.5% CP; 45% NDF
- \* Cost \$75 /t wet; \$123 t/DM
- \* 60.0 c/kg CP (canola = \$1.22/kg CP @ \$460/t)

**Offset  
Protein**



## Lablab Silage –

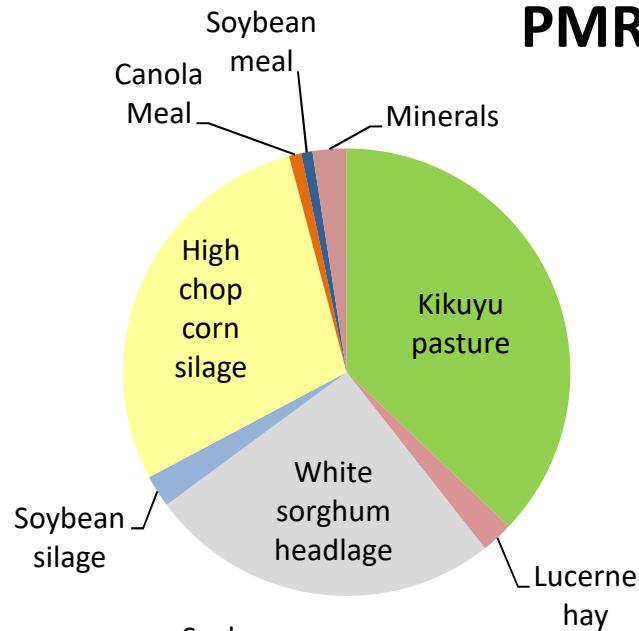
- \* Yield 24.4 t/ha wet; 8.3 t DM/ha
- \* 20% CP; 51% NDF
- \* Cost \$52 /t wet in bag; \$152 t/DM
- \* 75.4 c/kg CP (canola = \$1.22/kg CP @ \$460/t)

## Irrigated System

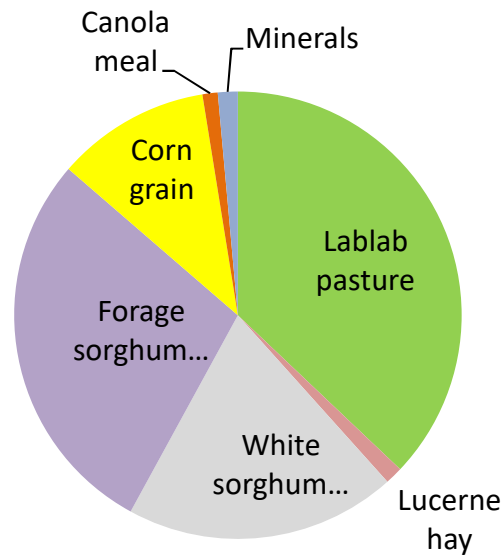
## Dryland System

## Semi-Irrigated System

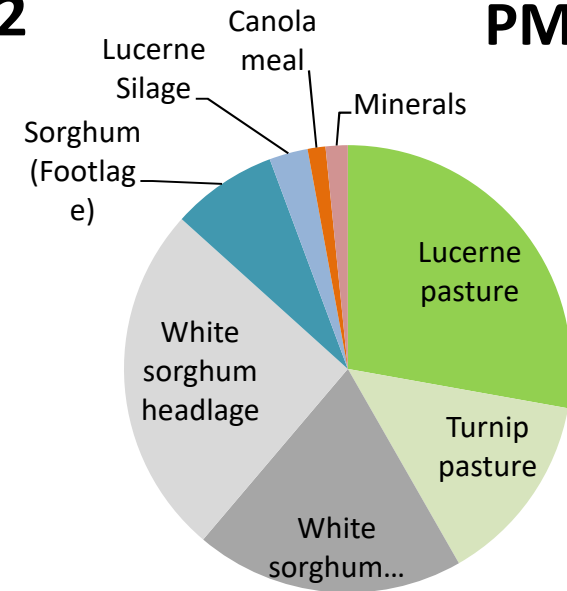
**PMR1**



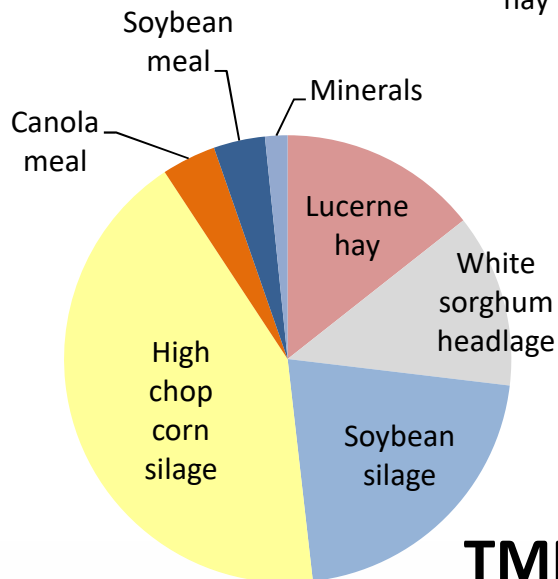
**PMR2**



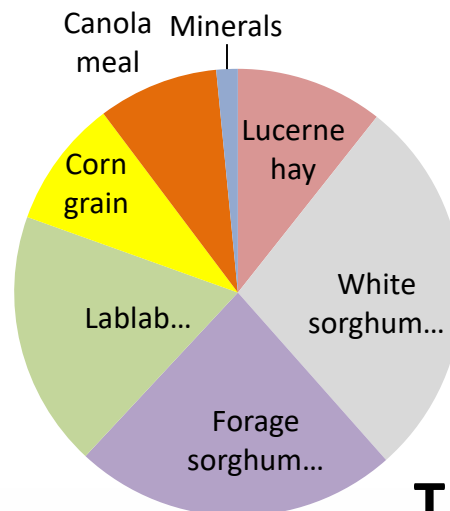
**PMR3**



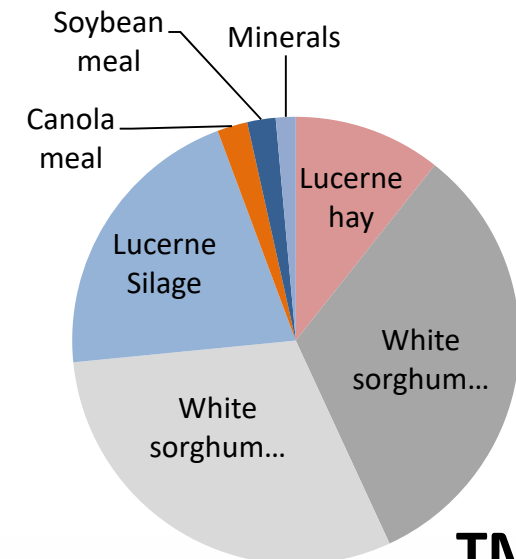
**TMR1**



**TMR2**



**TMR3**



# High Forage Developmental Trial

- Industry F:C ratio between 40:60 & 60:40
- 5-year average MOFC: PMR - \$6.11

TMR = \$4.67

	Phase							
	1			2			3	
	TMR	PMR		TMR	PMR		TMR	PMR
Milk Yield (L/cow)	22.6	19.0		22.8	20.6		26.0	24.0
Forage:Conc. Ratio	89:11	92:8		79:21	87:13		90:10	92:8
Diet Cost (\$/cow/day)	5.29	3.74		5.23	3.98		5.01	4.78
MOFC (\$/cow/day)	8.27	7.66		8.45	8.38		10.59	9.62

# Key Messages



- Choose forages that provide the most cost-effective mix of nutrients for your feeding system & environment.
- Tropical forages may provide options with low water availability.