What research tells us about forage mixtures for pasture?

Part 2

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Complex Mixtures:
Production System to Extend the Grazing Season

Research Team:
Forage Production System

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Complex mixtures: Forage Production System

- Objective:
  - Evaluate the potential of alfalfa-based complex mixtures to stockpile for grazing early fall

Forage Production System:
Complex Mixtures to Stockpile early fall

- 5 forage alfalfa-based complex mixtures
- 3 sites
  - Nappan – simulated grazing
  - Normandin – simulated grazing
  - New Liskeard – simulated grazing
- Seeded in 2014
- Data recorded in the next two years (2015-2016)

Forage Production system trial: Species

Legume

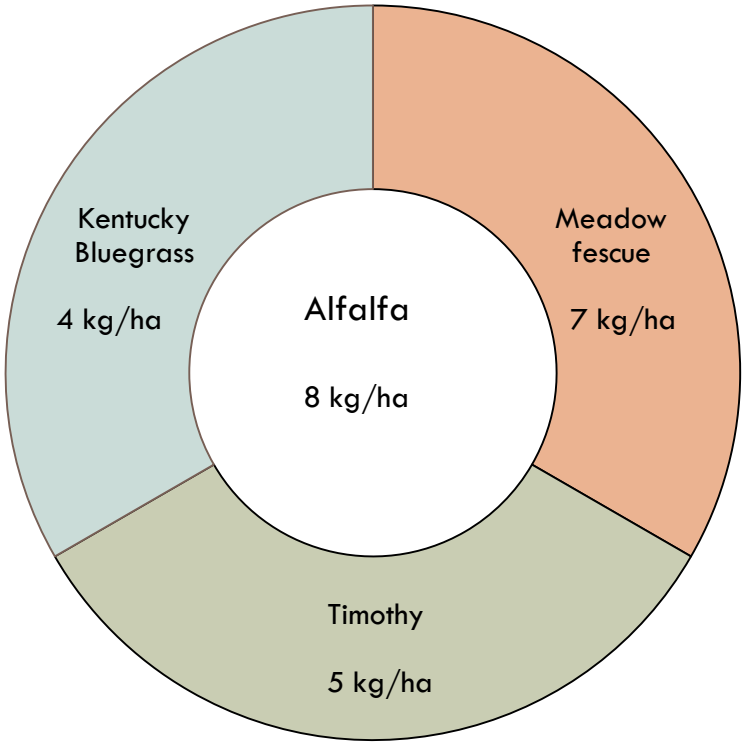
- Alfalfa – CRS1001

Grasses

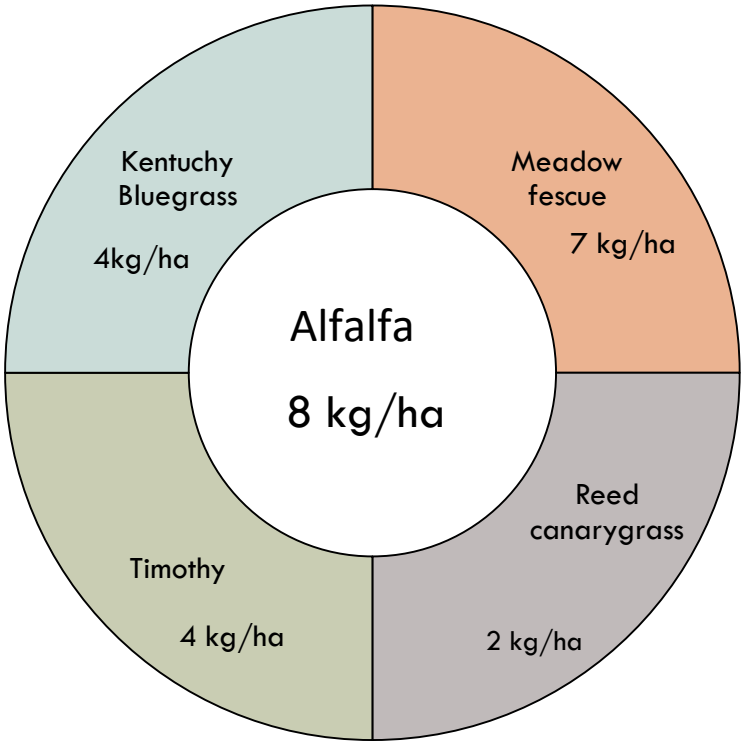
- Timothy - Ovation
- Meadow fescue - Laura
- Tall fescue - Barolex
- Orchardgrass - Bardiana
- Meadow brome - Fleet
- Kentucky bluegrass – Big Blue
- Reed canarygrass – Bellevue
- Red creeping fescue - Boreal

Forage Complex Mixtures and Seeding Rate

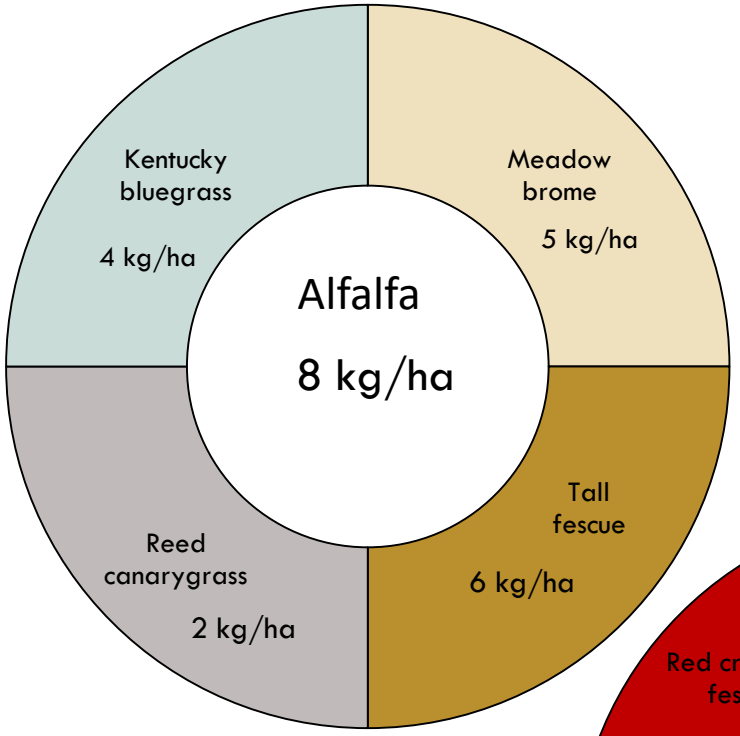
Mixture 1



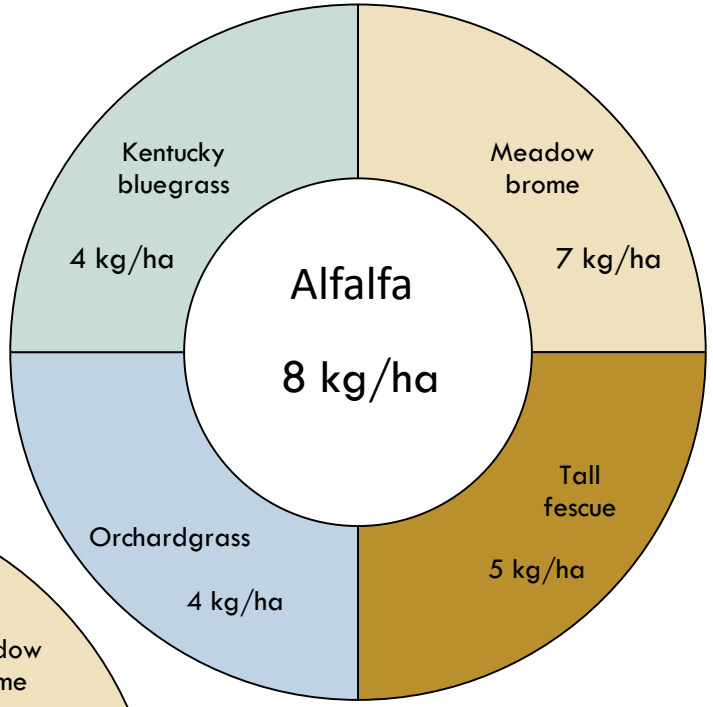
Mixture 2



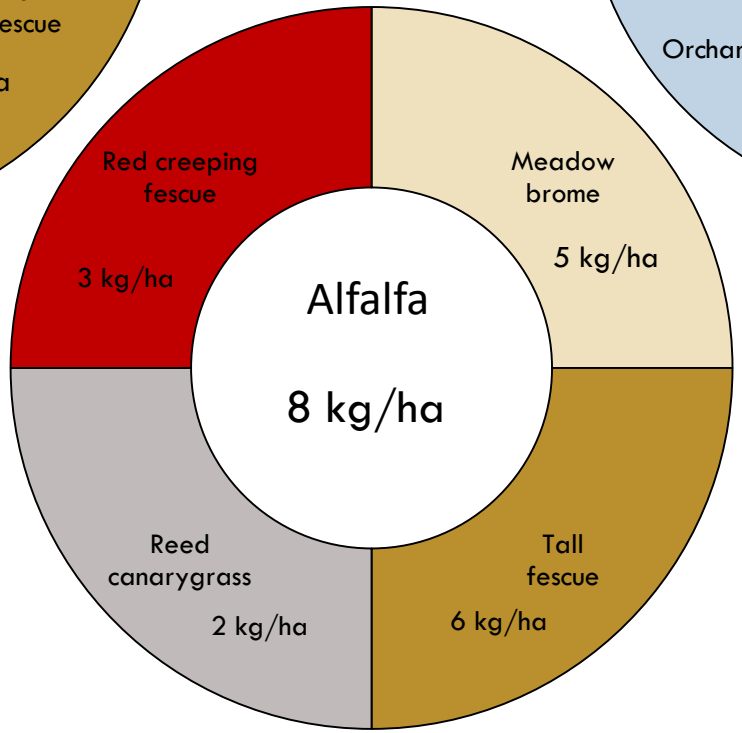
Mixture 3



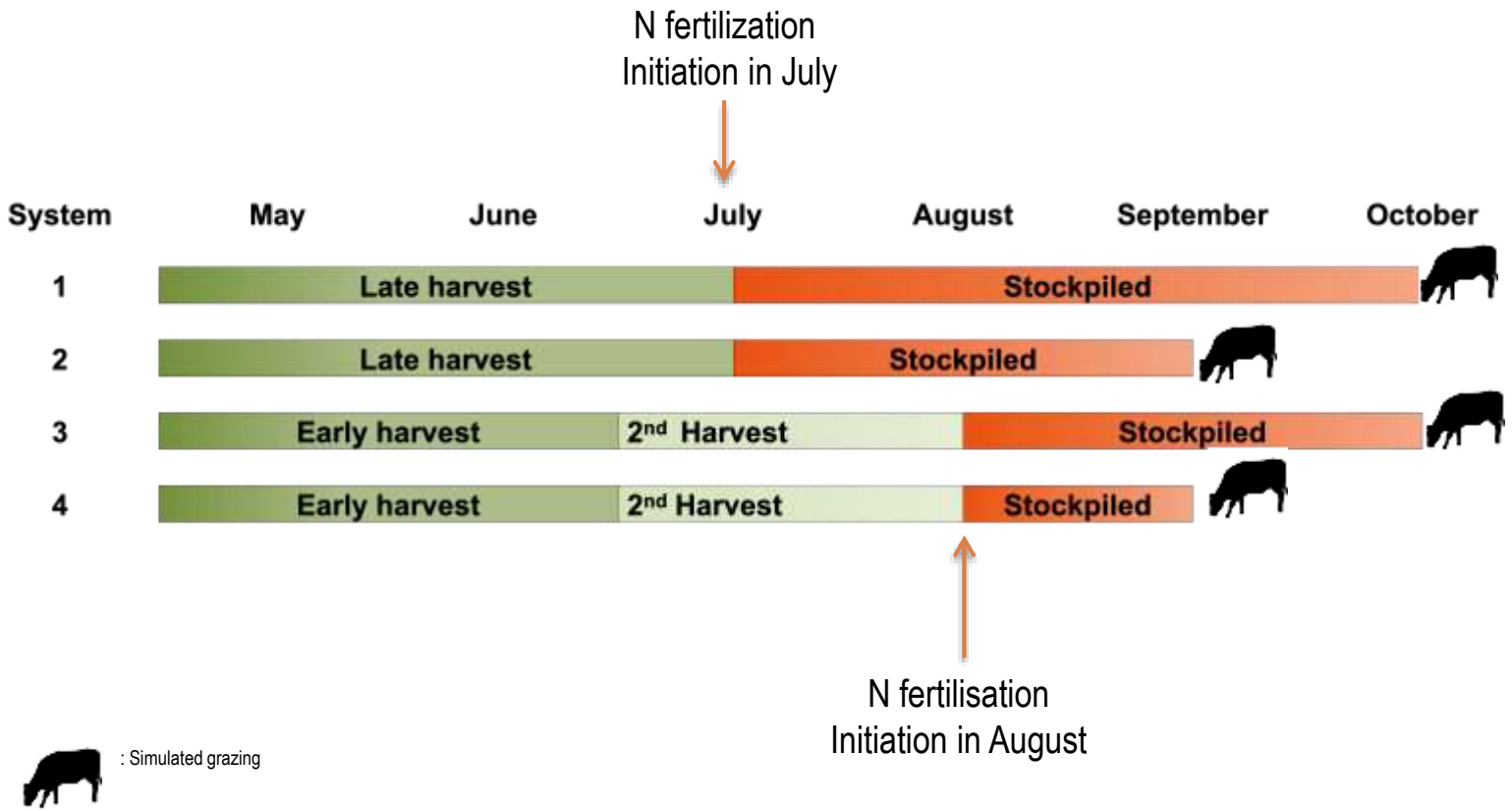
Mixture 4



Mixture 5



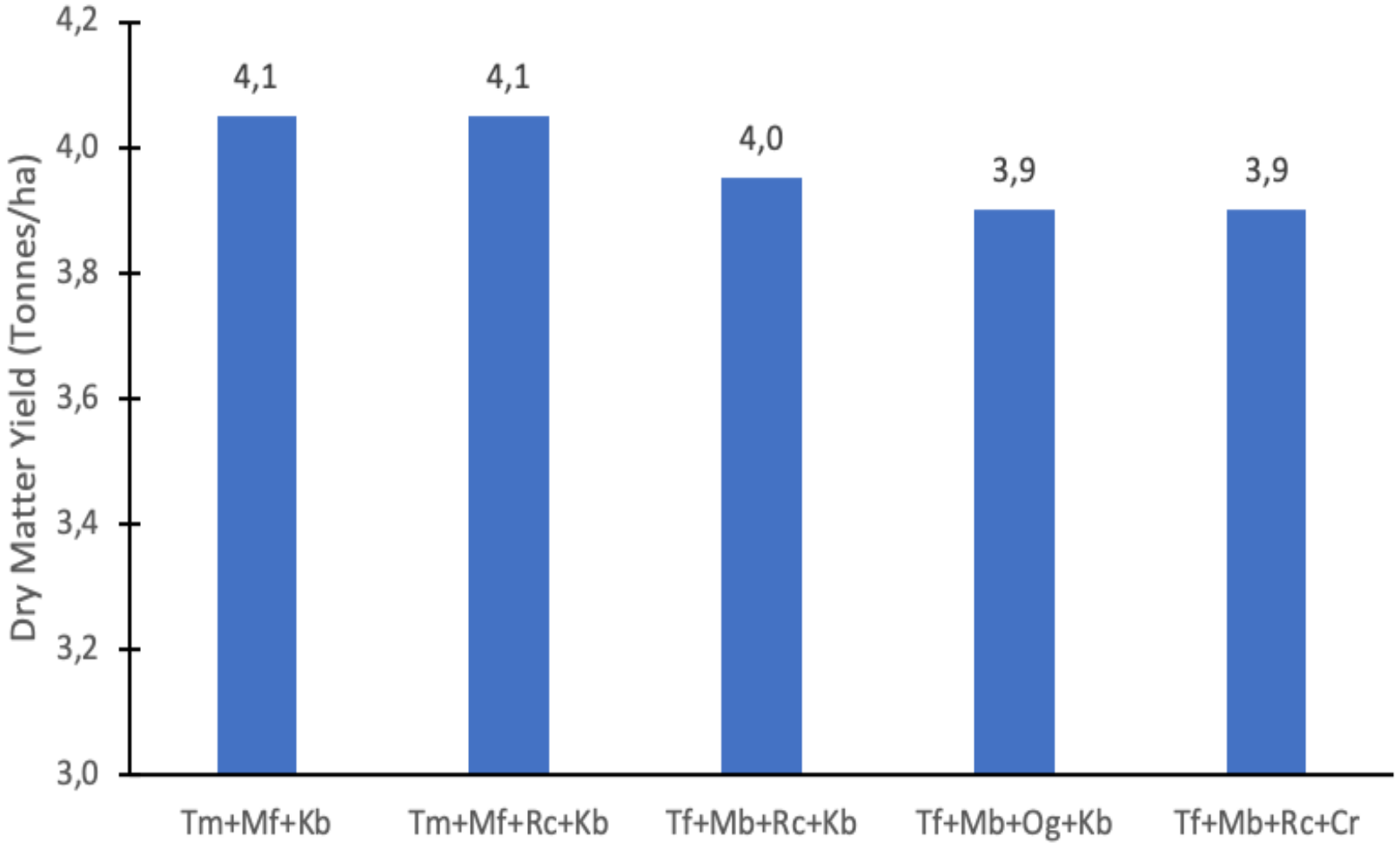
Forage System Trial



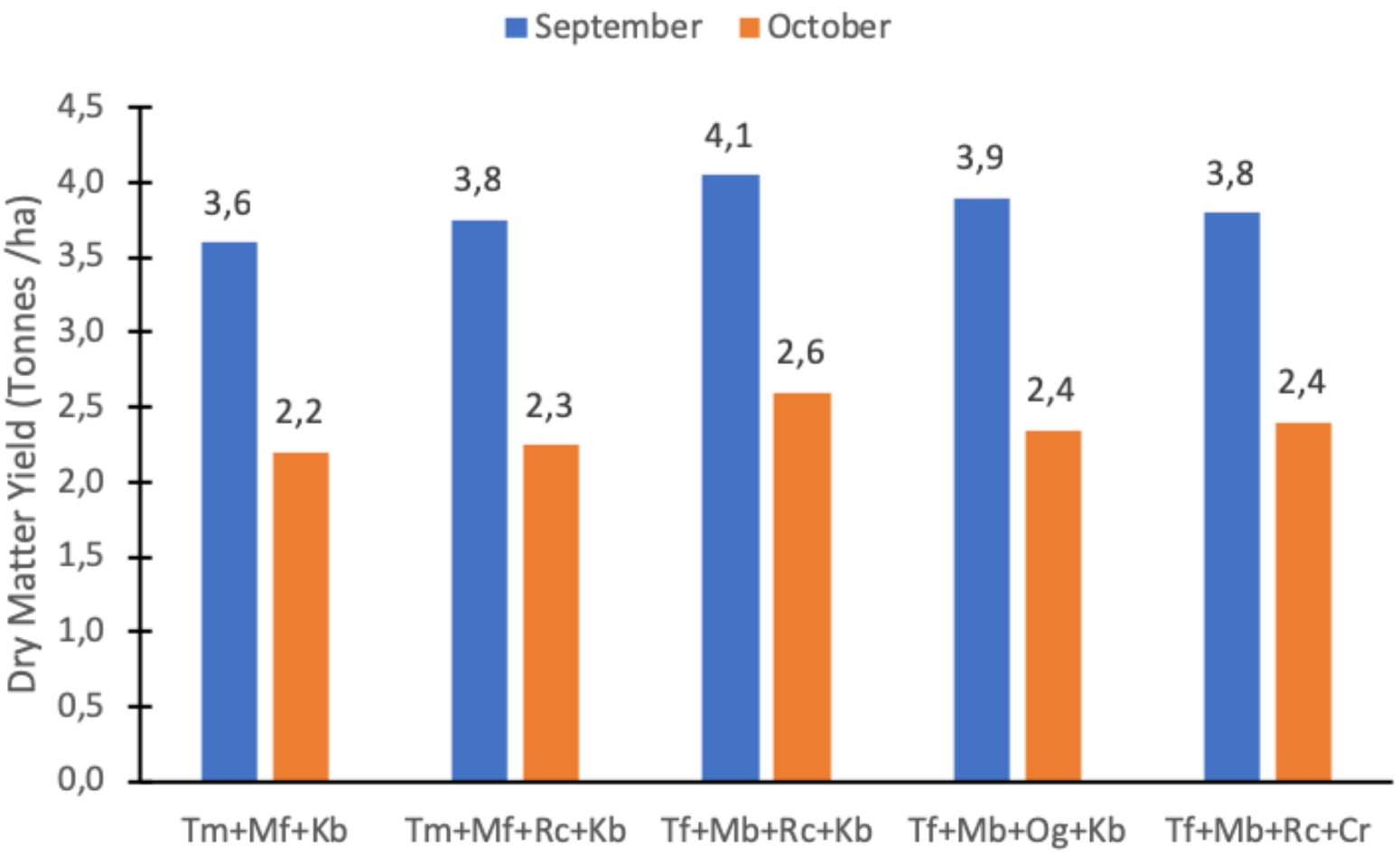
What was Measured ?

- Dry matter yield (DMY)
- Contribution of seeded species to DMY
- Total digestible nutrients content (TDN)
- Minerals (only on forages stockpiled in August)
  - Macronutrients (Ca, P, K, Mg, Na, S)
  - Micronutrients (Fe, Zn, Mn, Cu, Mo, Co, Cr)

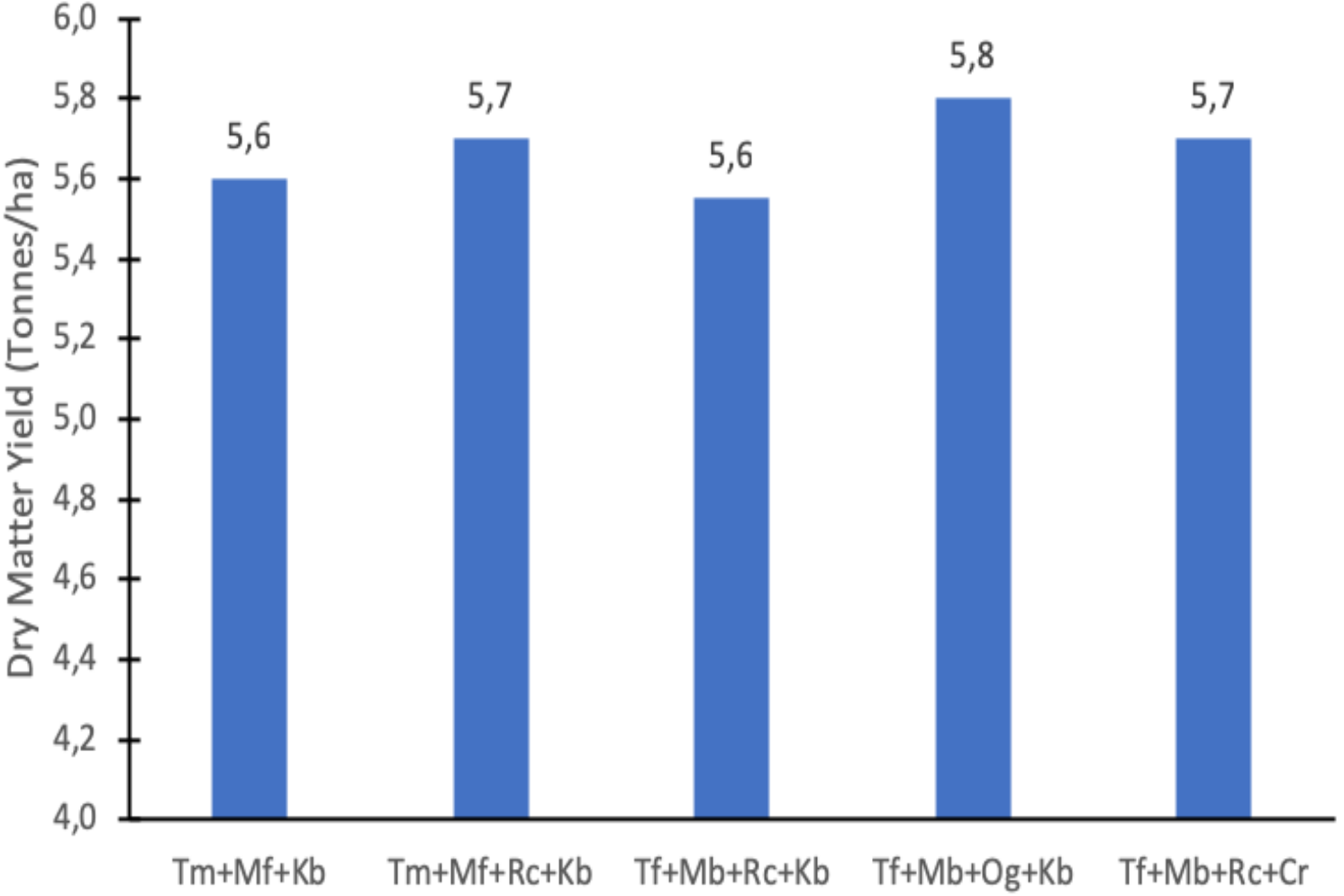
Late Cut – Growing Season
1 Harvest Before Stockpiled



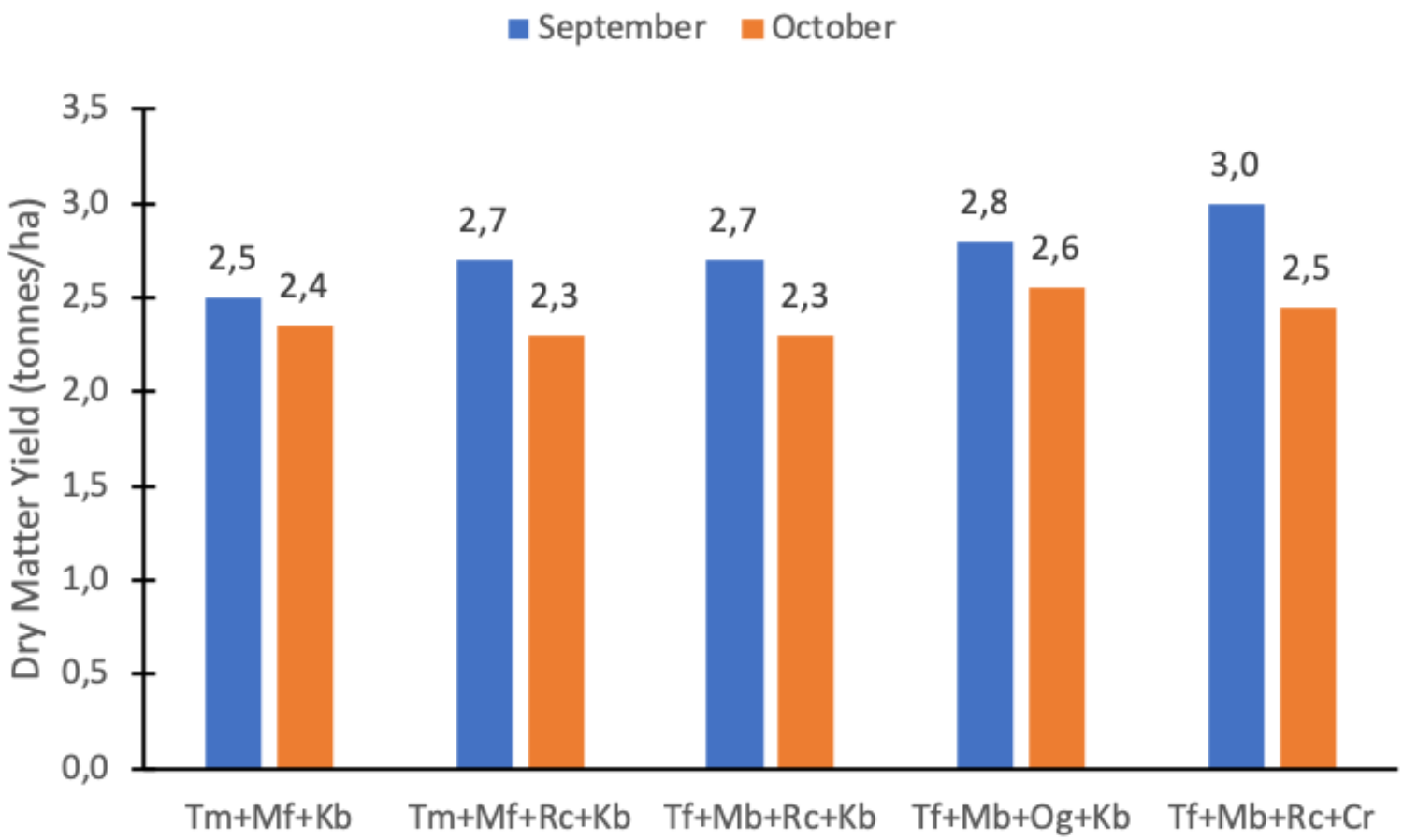
Late Cut – Stockpiled



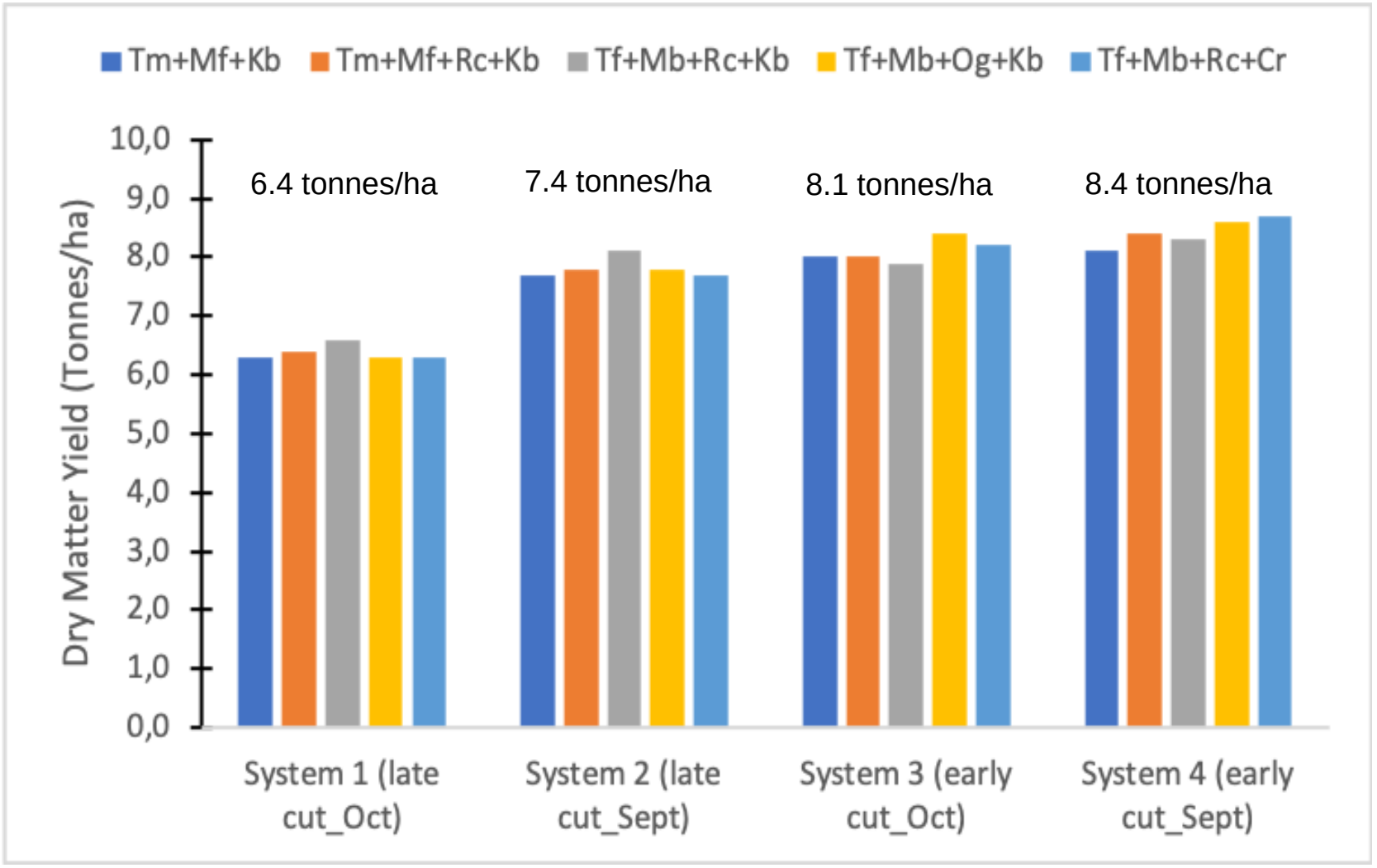
Early Cut – Growing Season
2 Harvests Before Stockpiling



Early Cut – Stockpiled



Forage production system: Harvest + Stockpiled



Nutritive Value:
TDN Content (% of DM)

Table 1. Forage capacity of beef cows[a].

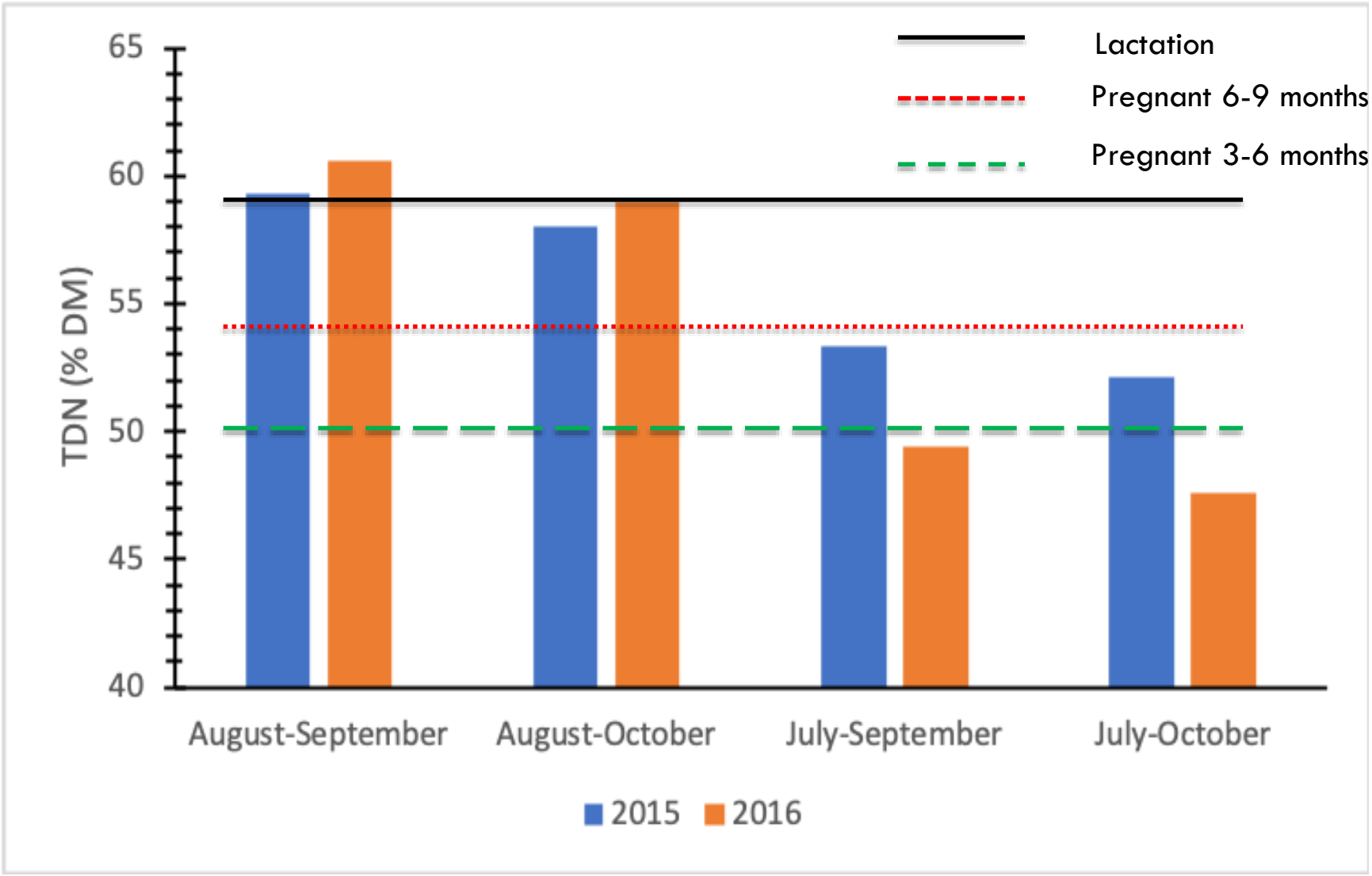
Forage Type and Maturity	*Stage of Production*	*Forage Dry Matter Intake Capacity, % of Body Weight*
Low quality forage (< 52% total digestible nutrients)	Dry	1.8
Dry winter forage, mature legume and grass hay, straw	Lactating	2.2
Average quality forage (52% to 59% total digestible nutrients)		
Dry summer pasture, dry pasture during fall, late-bloom	Dry	2.2
legume hay, boot stage and early-bloom grass hay	Lactating	2.5
High quality forage (> 59% total digestible nutrients)		
Mid-bloom, early-bloom, and prebloom legume hay,	Dry	2.5
preboot stage grass hay	Lactating	2.7
Lush, growing pasture	Dry	2.5
	Lactating	2.7
Silages	Dry	2.5
	Lactating	2.7

[a] Intake estimates assume protein requirements are met by the forage or through supplementation when forage protein is not adequate. When protein requirements are not met, forage intake will be lower than the values shown in the table.
Source: Hibbard and Thrift.

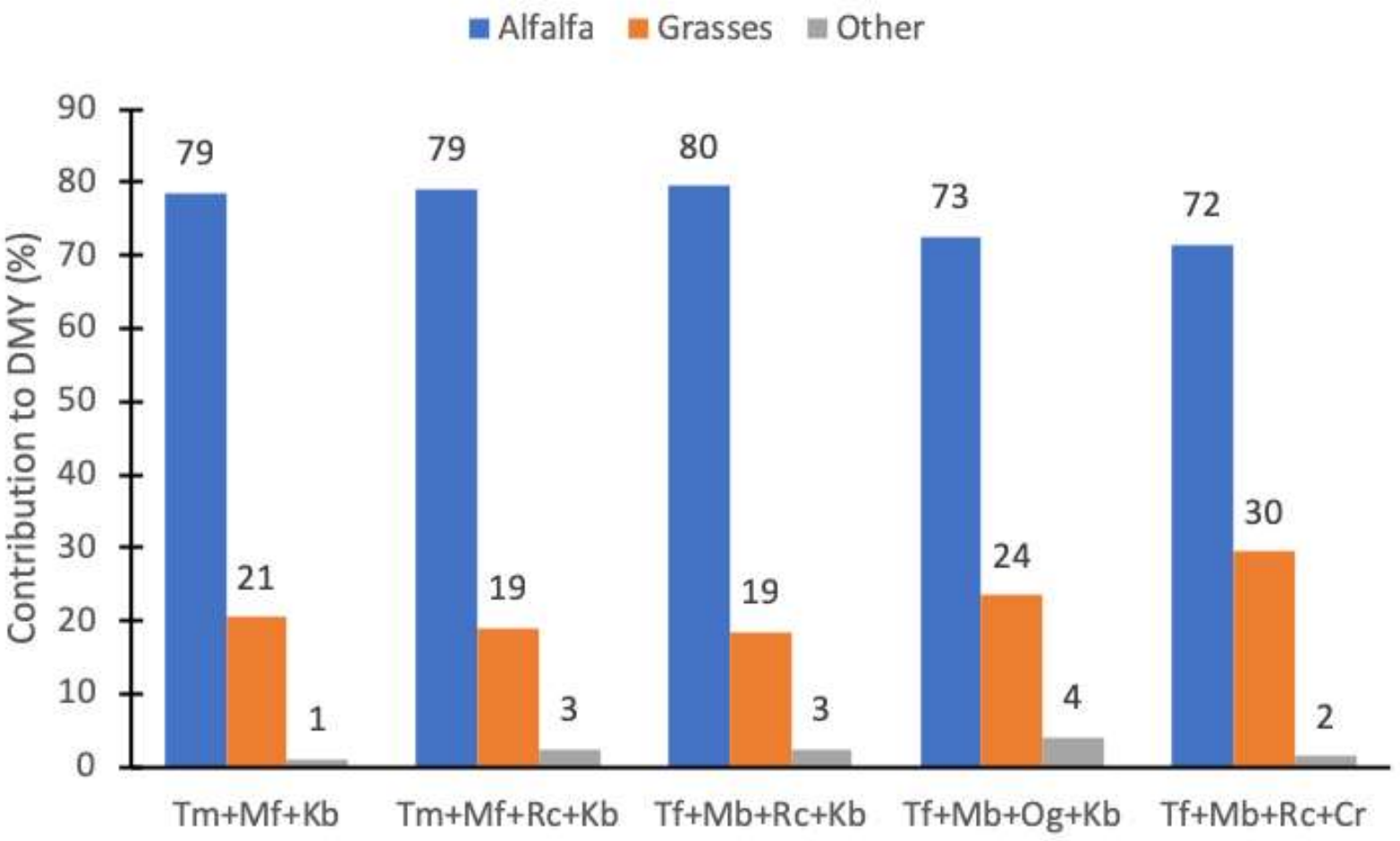
Source : Lalman and Richards, 2004

Weight cow: 545 kg

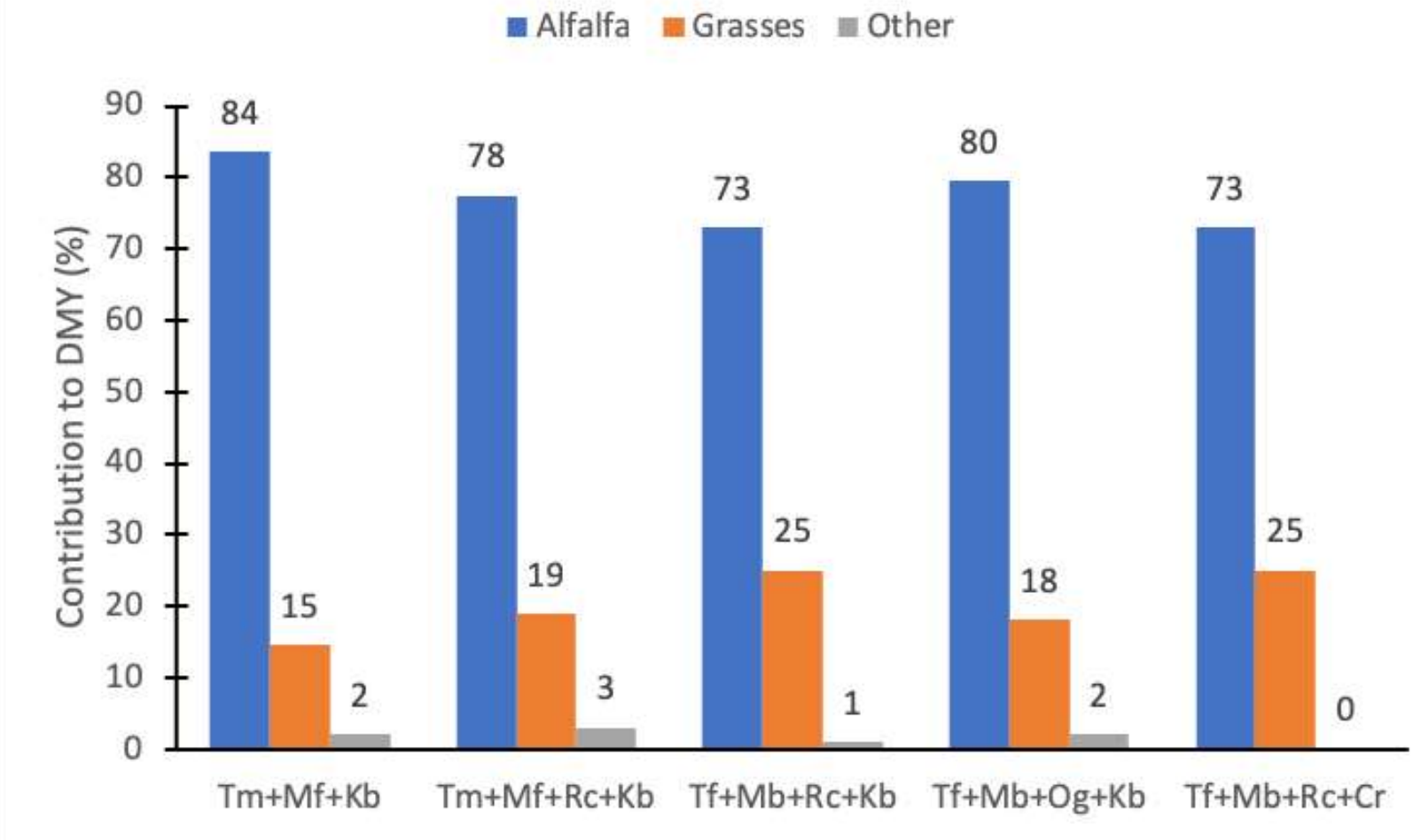
TDN Content: New Liskeard



Contribution to DMY: September



Contribution to DMY: October



Minerals: Macronutrients
Fall Period

	P		K		Ca		Mg		S	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
New Liskeard	---------- %DM ----------									
September	0.29[a]	0.28[a]	2.87[a]	2.69[a]	1.37	2.13[b]	0.24	0.28	0.19[a]	0.28[a]
October	0.26[b]	0.26[b]	2.45[b]	2.30[b]	1.32	2.31[a]	0.21	0.26	0.17[b]	0.25[b]

Minerals: Micronutrients
Fall Period

	Fe		Mn		Mo		Zn	
	2015	2016	2015	2016	2015	2016	2015	2016
New Liskeard	---------- PPM ----------							
September	100,47	488,87	22,93	26,13	1,82	2,12	21,93[a]	23,53[a]
October	79,87	450,00	19,80	27,80	1,89	2,39	18,60[b]	21,73[b]

Cow Needs to Evaluate Forage Complex Mixtures

- Minerals needs were evaluated for a specific cow (NRC 2016)
  - 5 years, 650 kg
  - Breeding: Charolais Angus-Simmental
  - 155 days from calving
  - Weight of calf at birth: 39 kg
  - Pregnant since 95 days
  - Average milk production/day 9 kg
  - Graze at least 15 kg DM/day

Minerals:
To Be Added to the Diet

- Macronutrients: Sodium
- Micronutrients: Manganese, Zinc, Cobalt, Chrome

Take-home Message:

- Forage complex mixtures are productive.
- In the North, forage complex mixtures stockpiled beginning of August have nutritive value varying from average to high quality forage.
- High management might be needed if contribution of alfalfa to DMY is too high.
- Birdsfoot trefoil should be considered to replace alfalfa.
- Forage analysis is highly recommended to evaluate mineral content.

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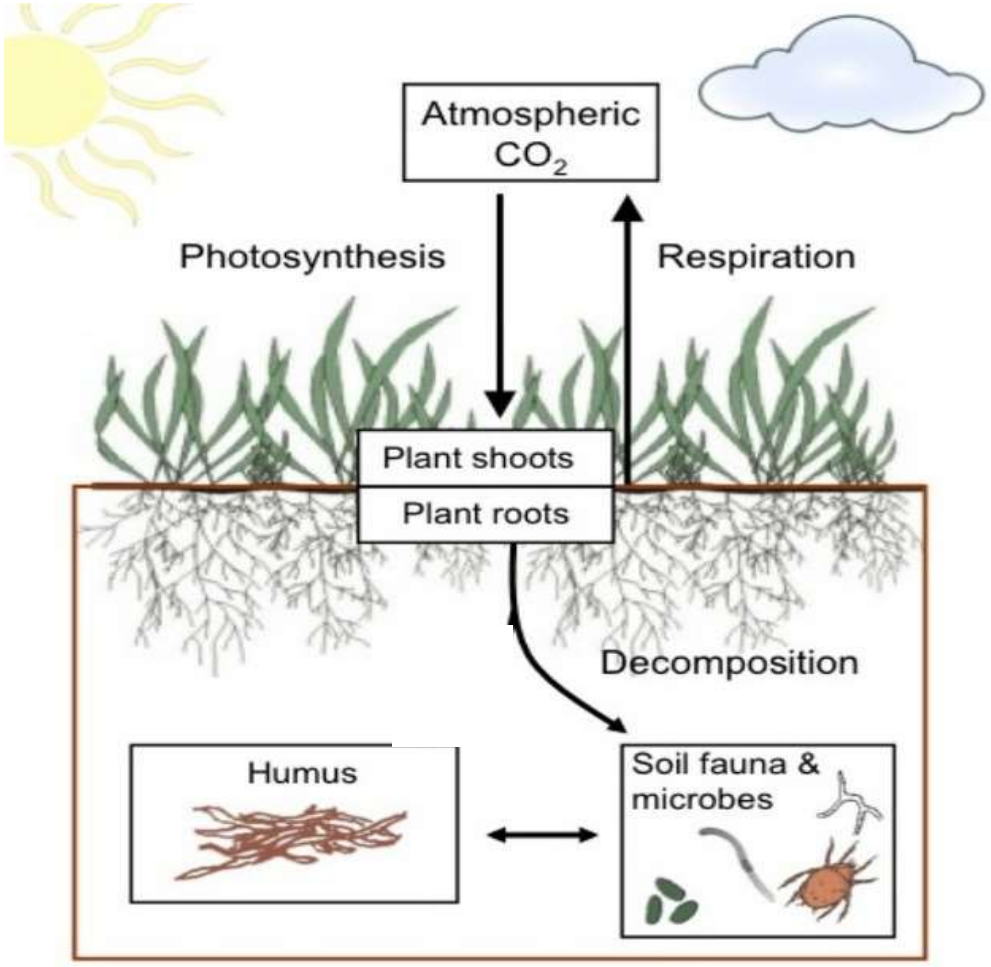
Carbon Sequestration with Complex Mixtures



Carbon Sequestration with Complex Mixtures: Research Team

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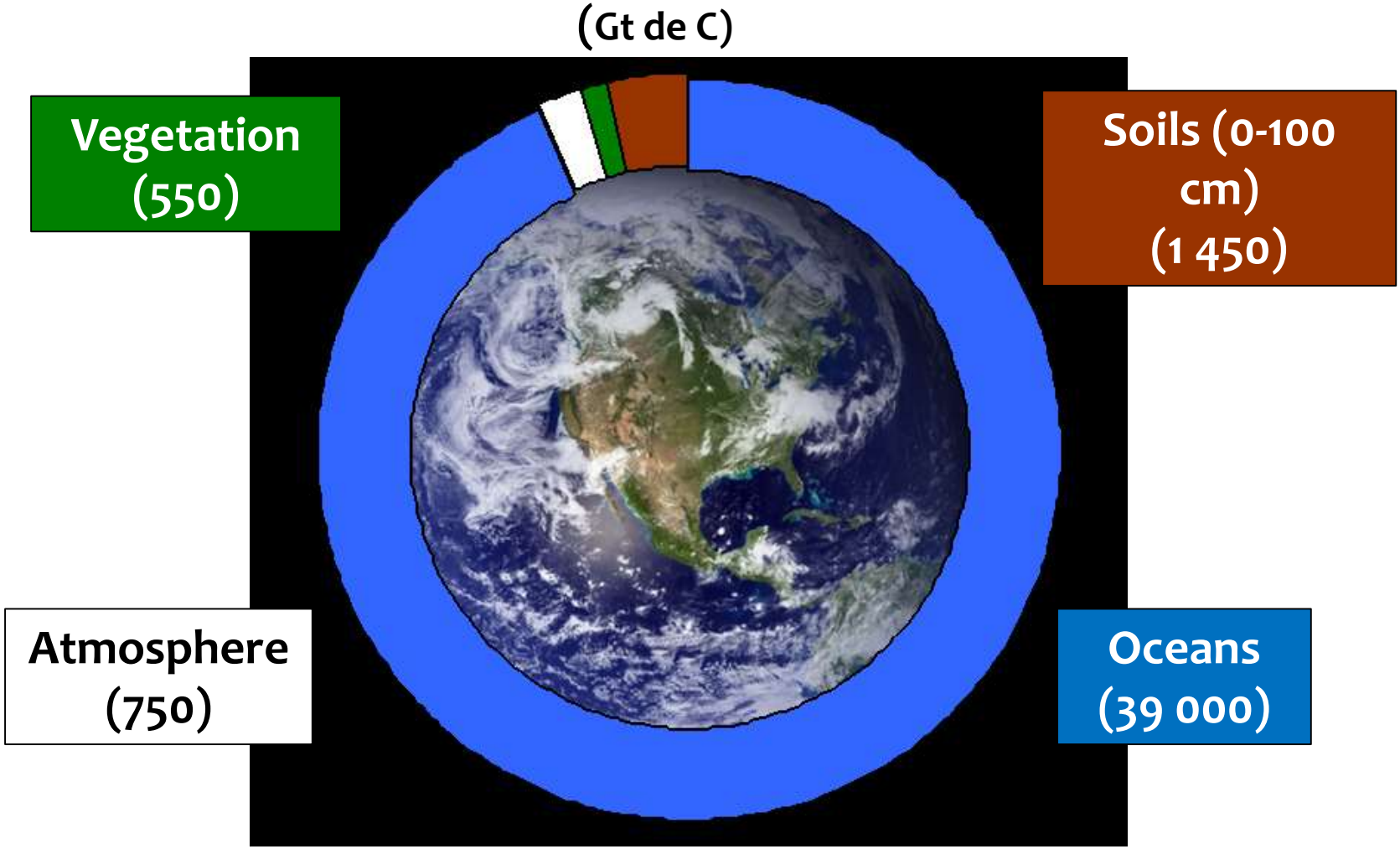
- Julie Lajeunesse (AAFC)
- Jean Lafond (AAFC)
- Carole Lafrenière (UQAT)
- Hiba Benmohamed (UQAT graduate student)

Soil : 2nd Reservoir of C in the Biosphere



Carbon Sequestration: Objectives

- Compare C-sequestration of 2 stocking methods: continuous vs rotational
- Compare 3 selected mixtures with these 2 stocking methods

Carbon Sequestration: Methodology

- Plots established for the forage system trial were used
- 1 site: Normandin
- Same mixtures as Complex mixtures to stockpile

  Grass mixtures 2, 3, and 4 + Legume = Alfalfa

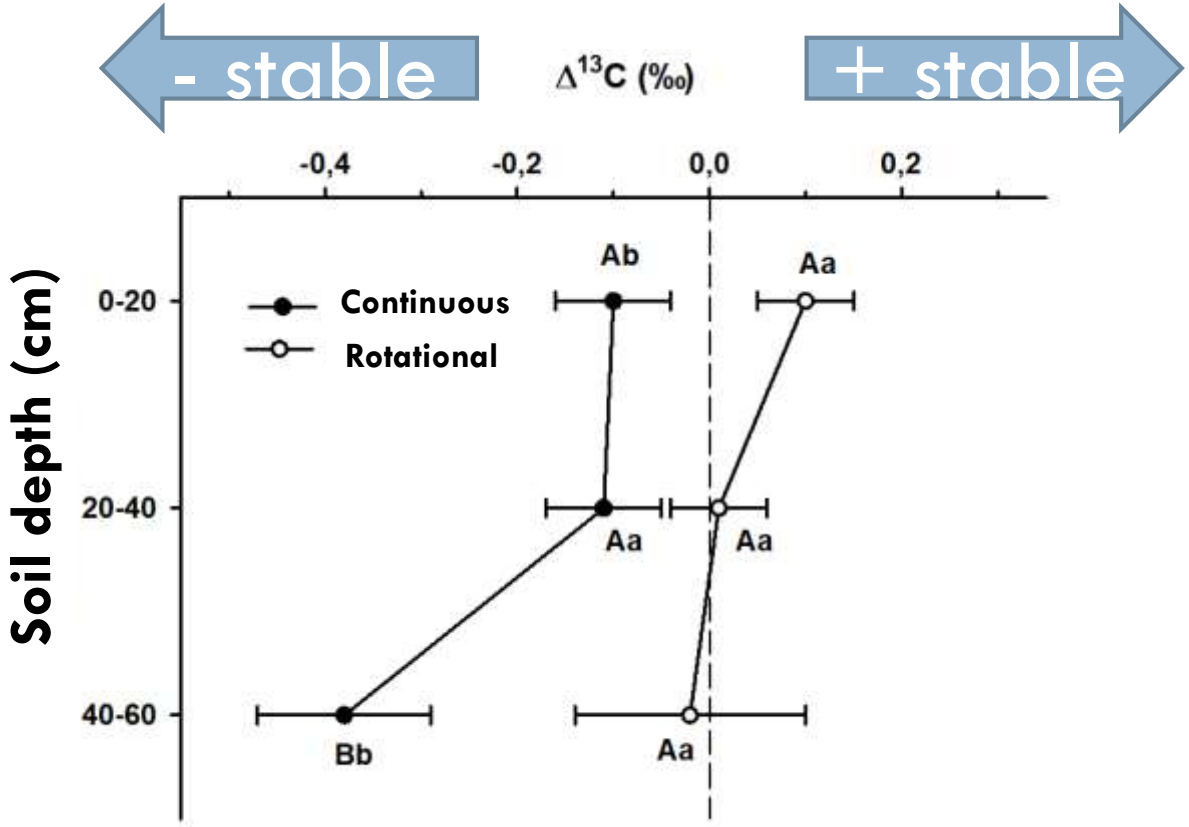
  - *Mixture 2*: **Timothy, Meadow fescue,** Reed canarygrass, Kentucky bluegrass
  - *Mixture 3*: **Tall fescue, Meadow brome,** reed canarygrass, Kentucky bluegrass
  - *Mixture 4*: **Tall fescue, Meadow brome,** Orchardgrass, Kentucky bluegrass

Carbon Sequestration: Methodology

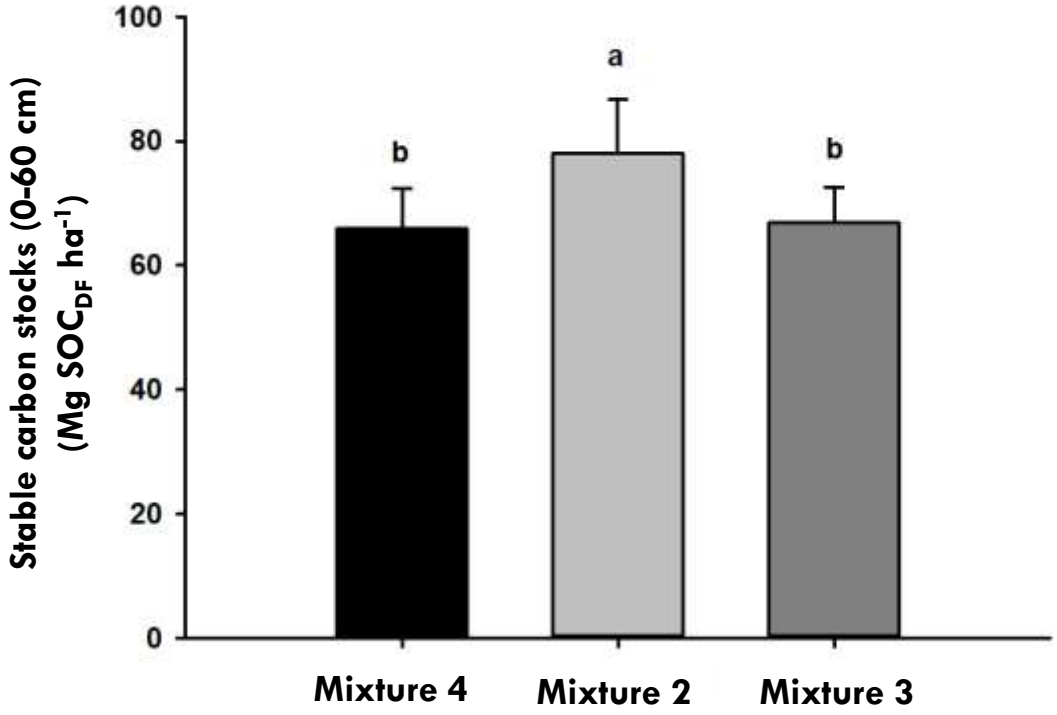
- Grazing approach by simulated grazing
  - Continuous: Cut each time 15 cm is reached
  - Rotational: Cut each time 25 cm is reached

- Soil is sampled in September at 3 depths:
  - 0-20 cm
  - 20-40 cm
  - 40-60 cm

C-Sequestration:
Effect of Stocking Method



C-Sequestration:
Effect of Complex Mixtures




Good Pasture
Better Productivity
Better Soils

Thank you for your attention!
Questions?