Forage Production of Grass-Legume Mixes in Three Ratios with Tall Fescue, Orchardgrass, Meadow Brome, Alfalfa, Birdsfoot Trefoil, and Cicer Milkvetch

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Introduction

- Limited by
  - Fertility (N)
  - Water
  - Species
- Expenditures
  - Establishment
  - Irrigation
  - **Fertility**
    - $114 per hectare in 2012
    - $5,084 for 44.6 ha or 100 acre
- Legumes
  - Fix atmospheric N
  - Compensate for “summer slump” cool season grass
  - Increase nutritive value

Objectives

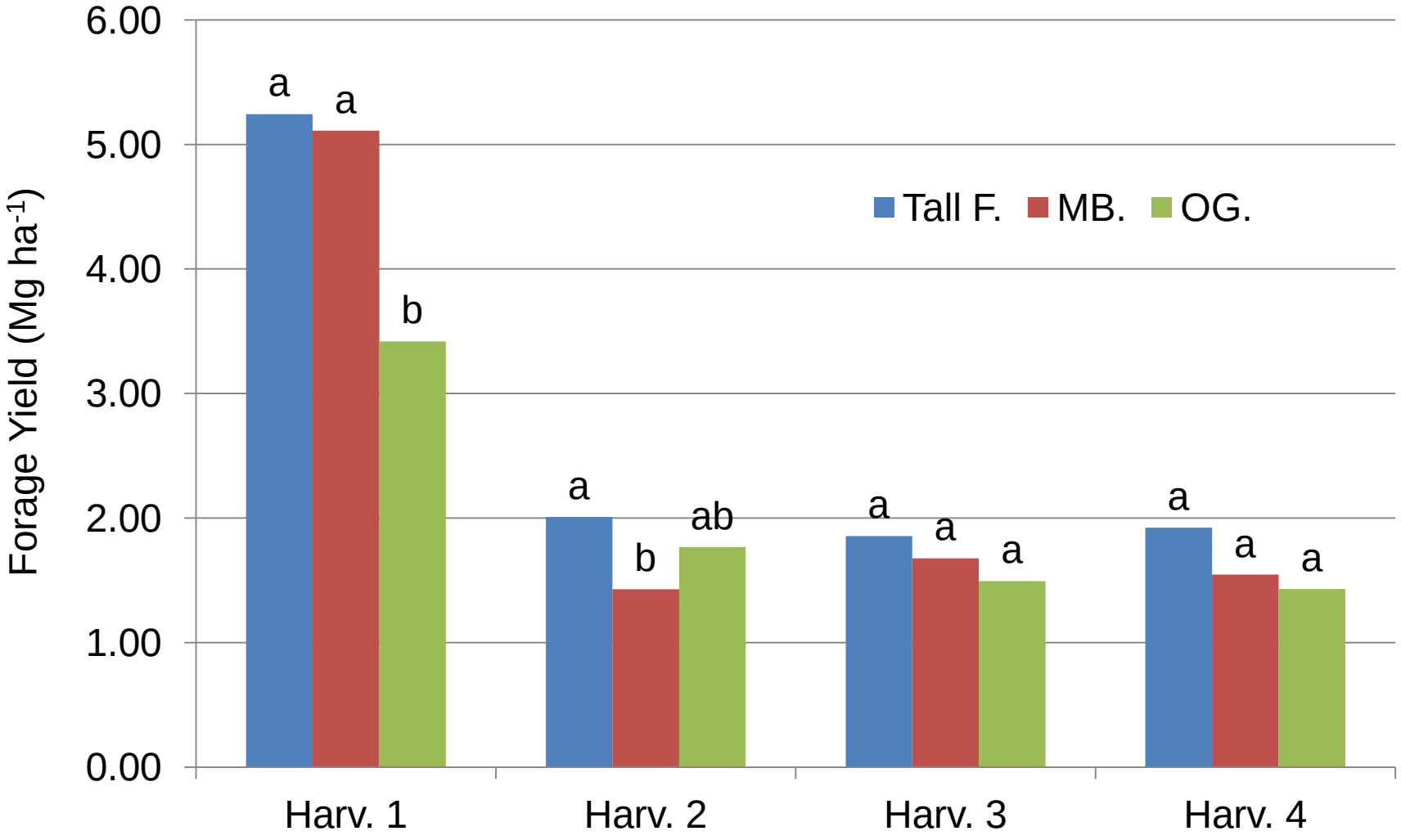
Our objective was to determine optimal species combinations of binary grass-legume mixtures to maximize forage production of irrigated pastures in the Intermountain Western United States

Materials and Methods

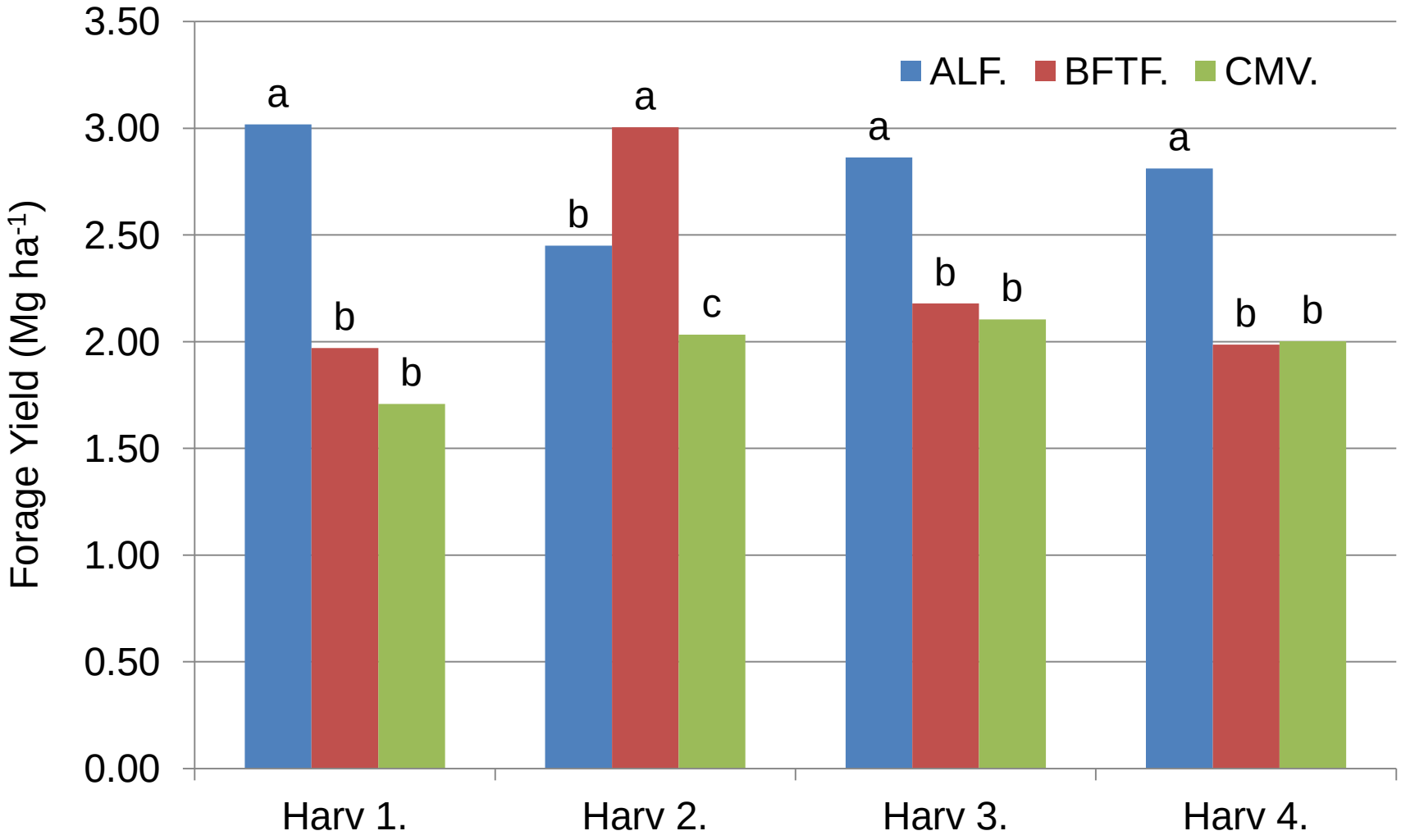
- Planted August 2010, at USU Intermountain Irrigated Pasture Facility near Lewiston, UT
- Forage species
  - Tall Fescue, Meadow Brome, and Orchardgrass
  - Alfalfa, Birdsfoot Trefoil, and Cicer Milkvetch
- Planted to achieve grass/legume ratios:
  - 0/100, 25/75, 50/50, 75/25, and 100/0
- Three monocultures of each grass with 0, 67, and 134 Kg ha^{-1} of N (33-0-0) applied.
  - Split into three applications
    - Prior to the initiation of spring growth (April)
    - Following 2nd and 3rd harvests

Data collection

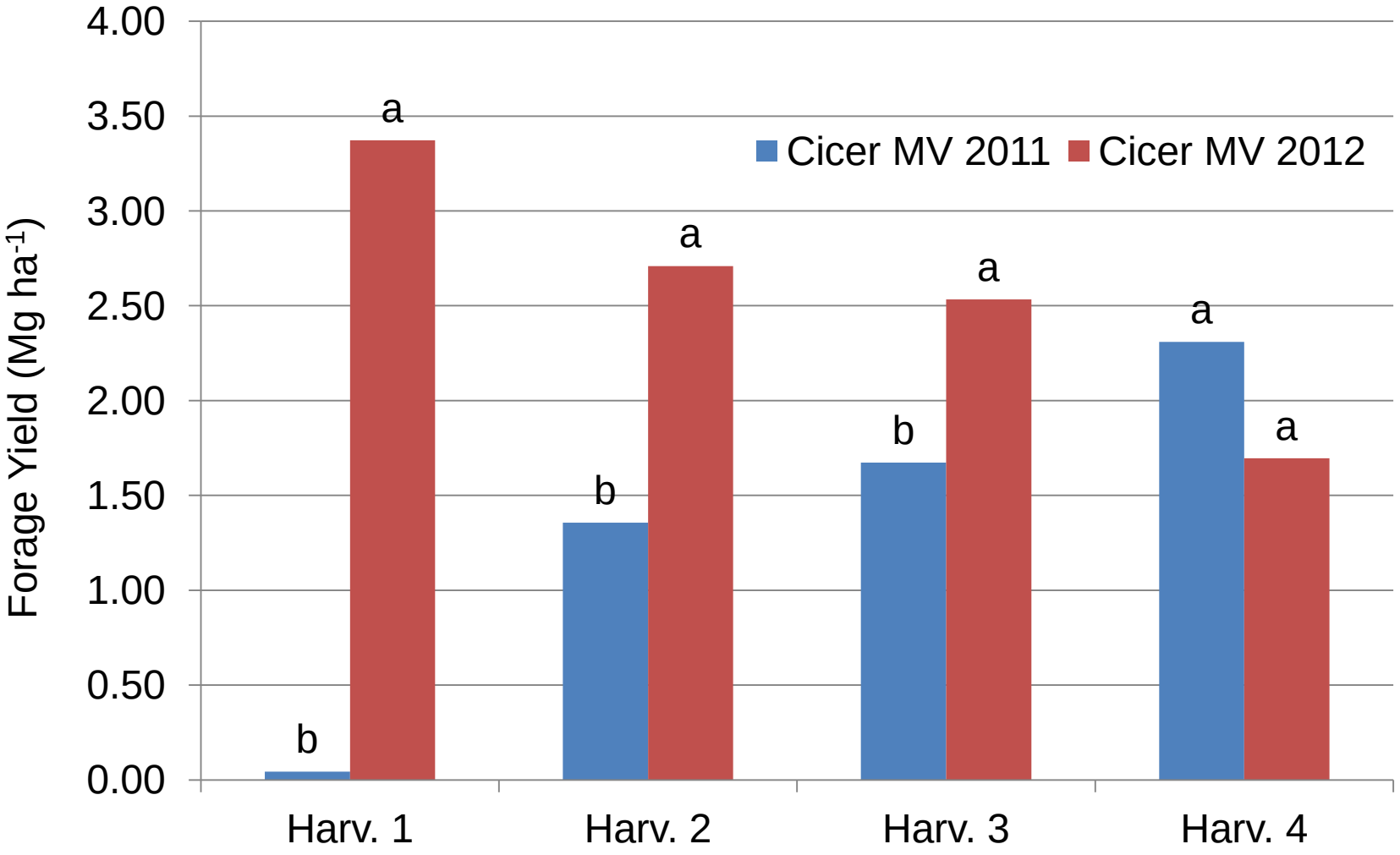
- Forage production
  - Four harvests to simulate a 28-day grazing rotation
    - June 3, July 8, Aug 8, and Sept 14 (2011)
    - May 25, July 2, Aug 6, and Sept 13 (2012)
  - Harvested using a Swift Current sickle-bar harvester
- Sub-samples obtained from each plot
  - Used to determine dry weight
  - Forage quality
- Mortality
  - Grid count, species presence/absence



Two year average of forage yield seasonal distribution of three cool season grasses



Forage yield seasonal distribution for three legumes averaged over two growing seasons


4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Forage Yield (Mg ha-1)
Cicer MV 2011
Cicer MV 2012
b
a
b
a
b
a
a
a
Harv. 1
Harv. 2
Harv. 3
Harv. 4

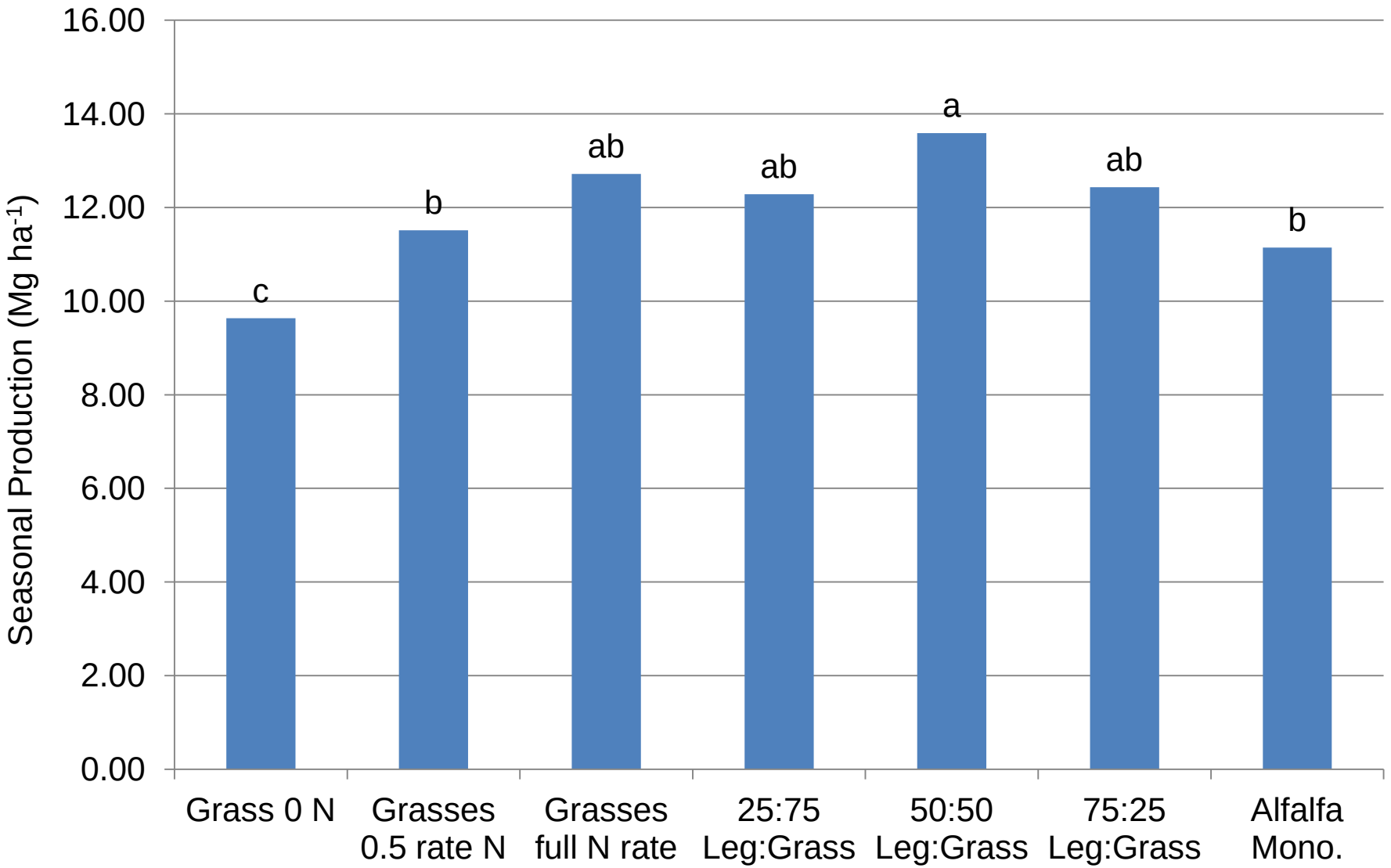

May 2012

Seasonal forage production of tall fescue, meadow brome, and orchardgrass with and without ‘N’.

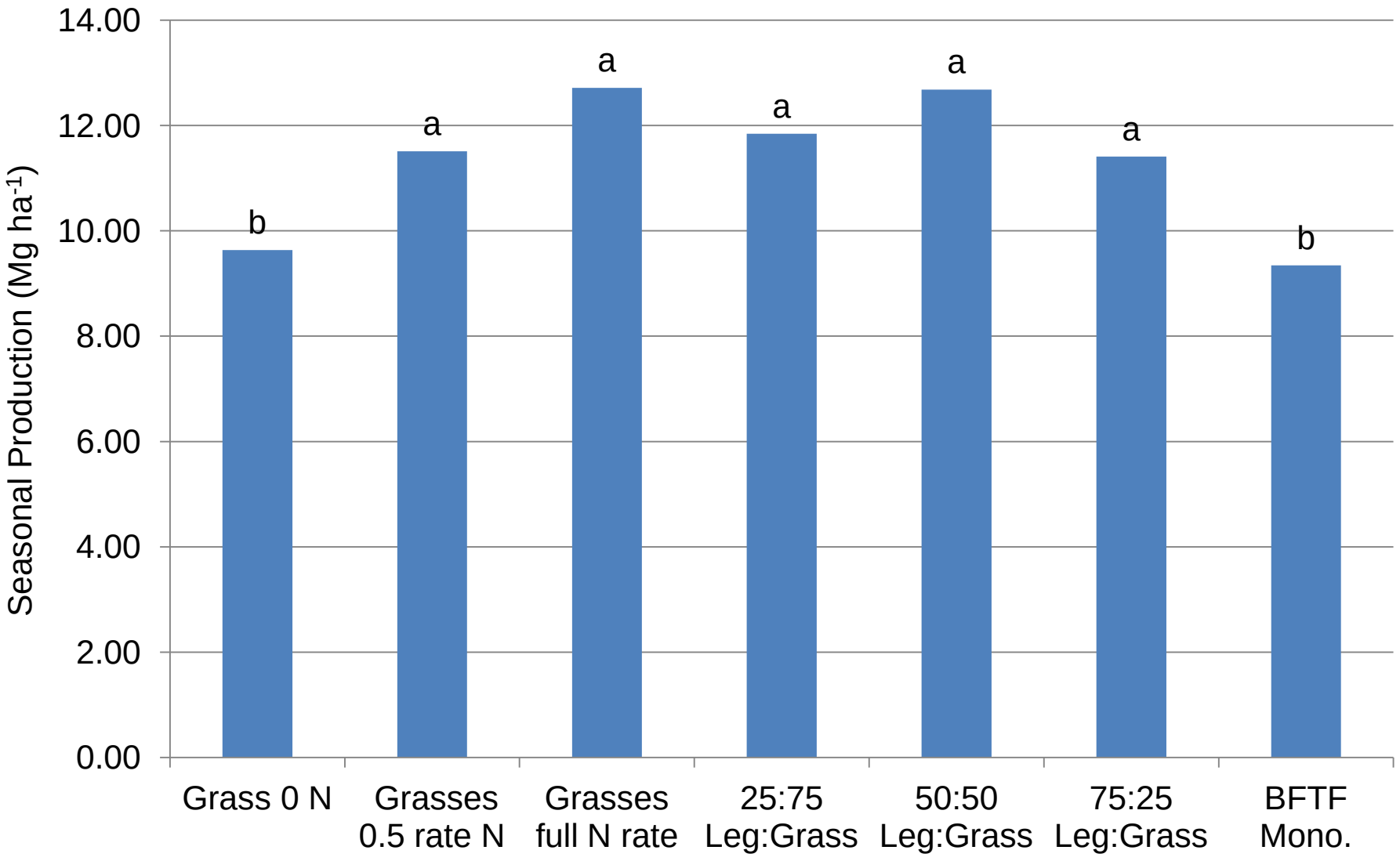
N Level	TF	MB	OG	$LSD_{(0.05)}$
	---------- Mg ha^{-1} ----------			
0	11.03	9.76	8.11	1.67
62 Kg ha^{-1}	13.17	11.75	9.61	1.87
134 Kg ha^{-1}	14.20	12.86	11.09	1.45
$LSD_{(0.05)}$	2.11	1.19	1.84	--

Seasonal forage production of grass/legume mixtures containing tall fescue, meadow brome, orchardgrass, alfalfa, birdsfoot trefoil, and cicer milkvetch (2 years).

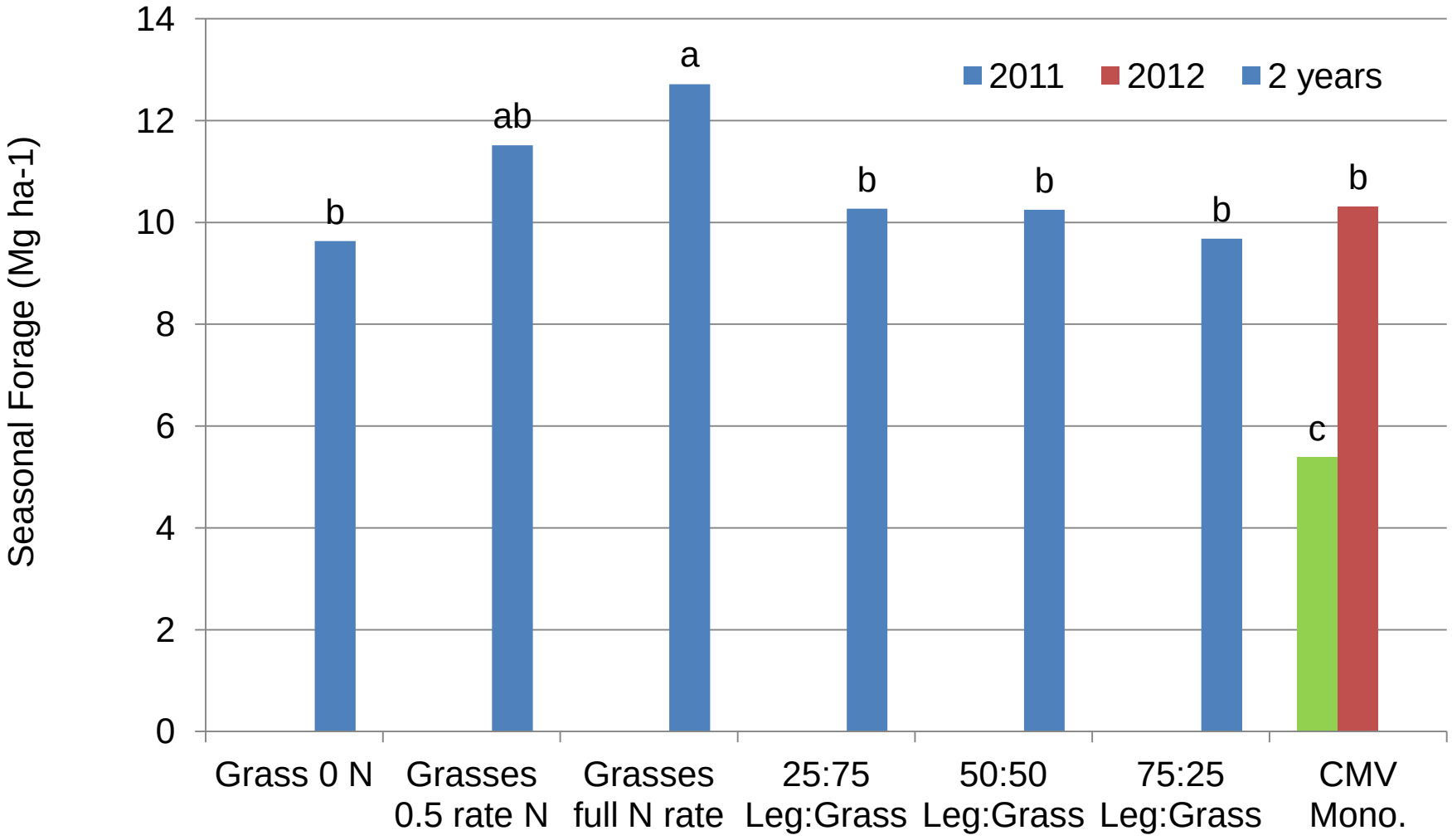
	ALF	BFTF	Cicer M.	$LSD_{(0.05)}$
	---------- Mg ha^{-1} ----------			
Tall F.	13.70	13.12	11.38	1.92
MB	13.21	12.32	10.49	1.14
OG	11.39	10.49	8.33	1.23
$LSD_{(0.05)}$	1.43	1.61	2.12	--



Forage production of grass:alfalfa mixtures at three planting ratios



Forage production of grass:birdsfoot trefoil mixtures at three planting ratios



Forage production of grass:cicer milkvetch mixtures at three planting ratios

Conclusion

- Tall fescue-based mixtures had the highest season-long production
- Generally, legume:grass mixtures produced more than the unfertilized grass monocultures
- Most of legume mixtures produced equal to the grass monocultures fertilized with the lowest rate of N
- Those mixtures with alfalfa were highest producing overall,
- Birdsfoot trefoil had higher midsummer production
- Cicer milkvetch takes longer to establish

Questions?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