

Plant and Animal Performance in Mixed Grass/Legume Pastures

TJ Bingham, Earl Creech, Blair Waldron,
Dale Zobell, and Rhonda Miller

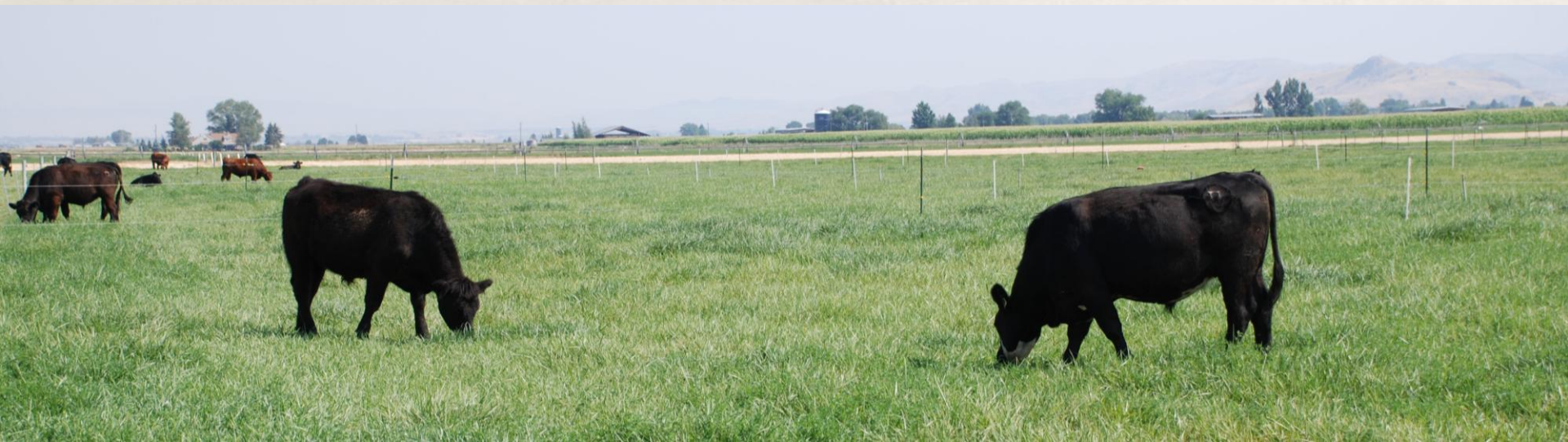
Pasture Management Challenges

- Species selection
- Fertilizer cost
- Environmental effect
- Weed control
- Livestock rotation
- Forage quantity & quality



Legume vs non-Legume

- * Fertilizer cost
 - * Eliminated in grass/legume mixture
- * Feed quantity
 - * Lauriault et al. showed that DM yields of grass/legume mixtures were higher than non-fertilized tall fescue
- * Livestock average daily gains (ADG)
 - * Wen et al. shows that ADG on TF+BFT pastures are higher than TF monoculture



Objectives

- * Compare grass/legume pastures to grass monocultures pastures
 - * Dry matter and nutrient content
 - * Livestock performance and carcass characteristics
- * **Hypothesis**
 - * TF+ALF and TF+BFT will yield = TF+N
 - * TF+ALF and TF+BFT will increase ADG
 - * Forage quality will be higher in grass/legume mixtures than grass monocultures

Materials & Methods

- * Fall 2010 – Fall 2013
- * Study Site:
 - * Lewiston Research Farm: Lewiston, UT
 - * Lewiston Fine Sandy Loam
 - * Elevation 1400 m



Treatments

- * Fall 2010 planted pastures with a drill seeder

Planting Rates

- **Monoculture**

- Tall Fescue 18 kg/ha

- **Bi-mixtures**

- Tall Fescue 11 kg/ha
- Alfalfa 7 kg/ha
- BFT 7 kg/ha

- * 2011-2013

- * Applied 100 kg/ha of N to TF+N plots
- * split equally over 3 applications

	D1	Tall Fescue Unfertilized			
	D2	Tall Fescue +Fertilizer			
	D3	Tall Fescue + Birdsfoot Trefoil			
	D4	Tall Fescue + Alfalfa			

Livestock

- * 2012-2013
 - * Grazed from May to September (112 days)
 - * 3 angus-cross steers, average starting weight 381 kg in 2012 and 304 kg in 2013
 - * Moved Steers every 7 days on a 21 day rotation

* Put and take method

* Stocking rate

* Used mother cow for forage

D1	Tall Fescue Unfertilized
D2	Tall Fescue + Birdsfoot Trefoil
D3	Tall Fescue + Fertilizer
D4	Tall Fescue + Alfalfa

er weight)

help graze



Data Collection

- * Livestock
 - * Every 28 days
 - * Cattle weight
 - * Rumen fluid extraction
 - * Year End
 - * Carcass characteristics

- * Forage
 - * Weekly
 - * Hand harvest .5 meter square (4 per paddock)
 - * DM yields
 - * ADF, NDF, IVTD, and CP
 - * Total digestible nutrients
 - * % legume in sample
 - * Frequency count (legumes present)

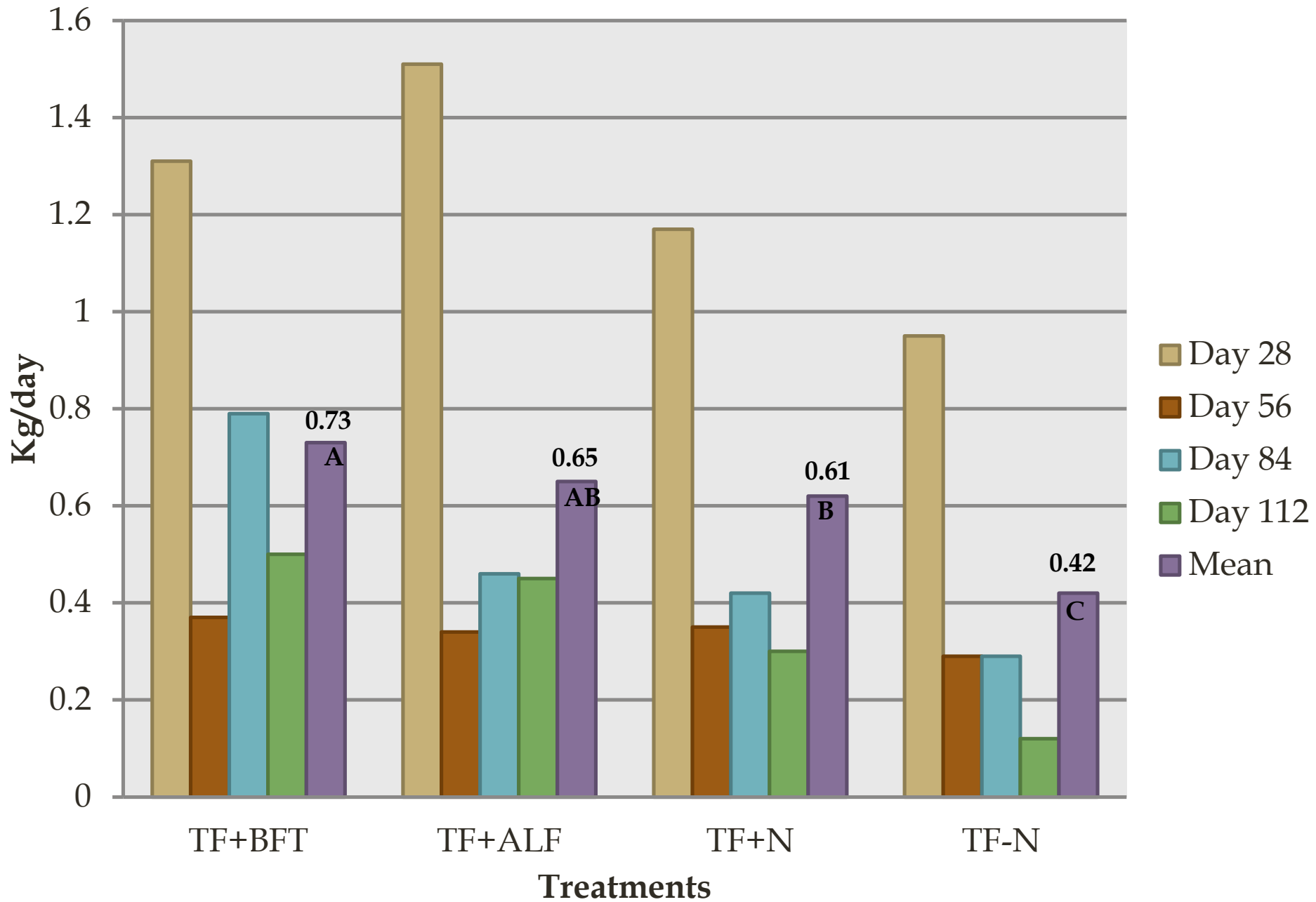




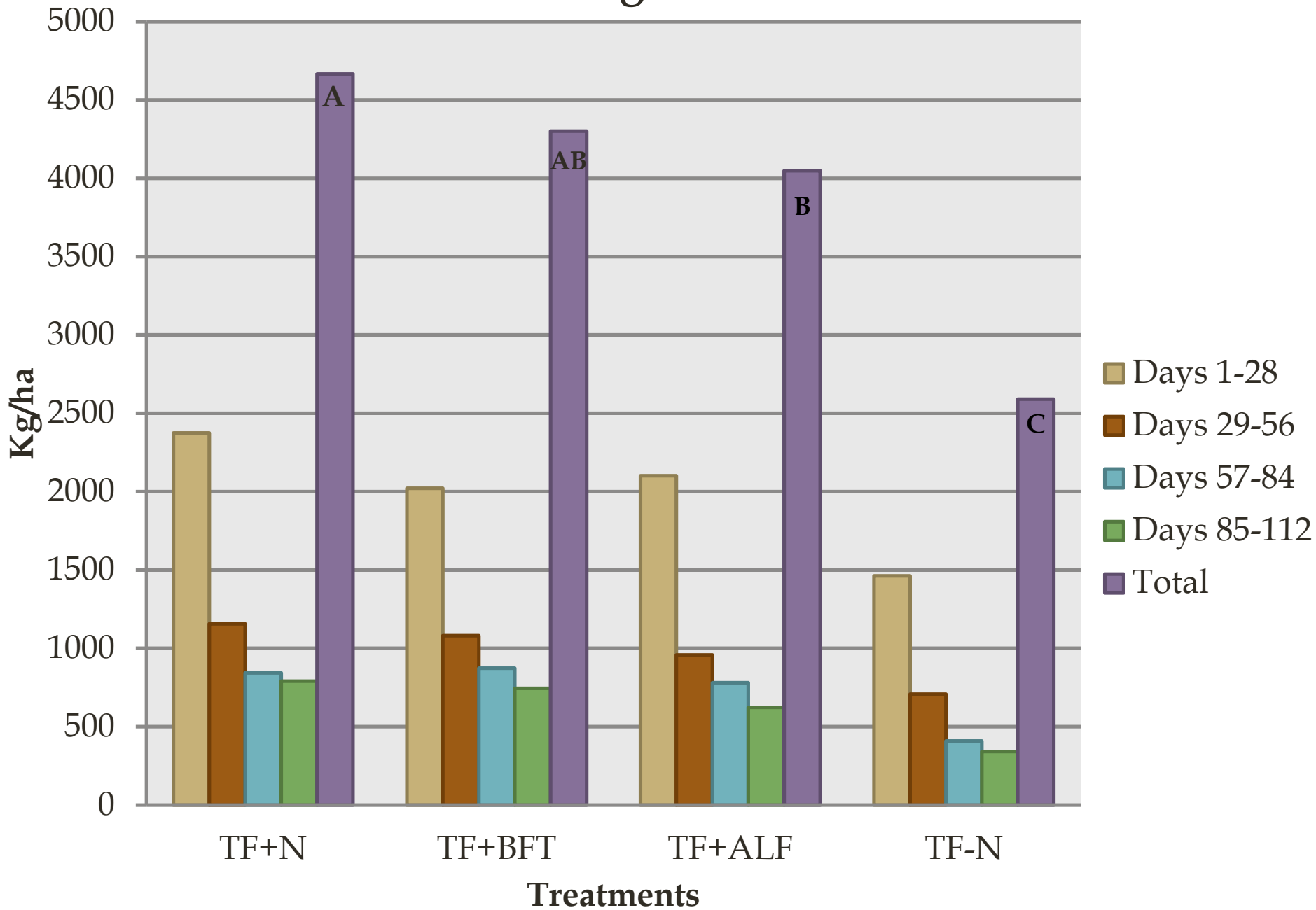
Analysis

- * Randomized complete block design with four replications
- * ANOVA was performed using PROC MIXED in SAS
- * Means were separated using a series of pairwise contrasts at the 0.05 level of probability

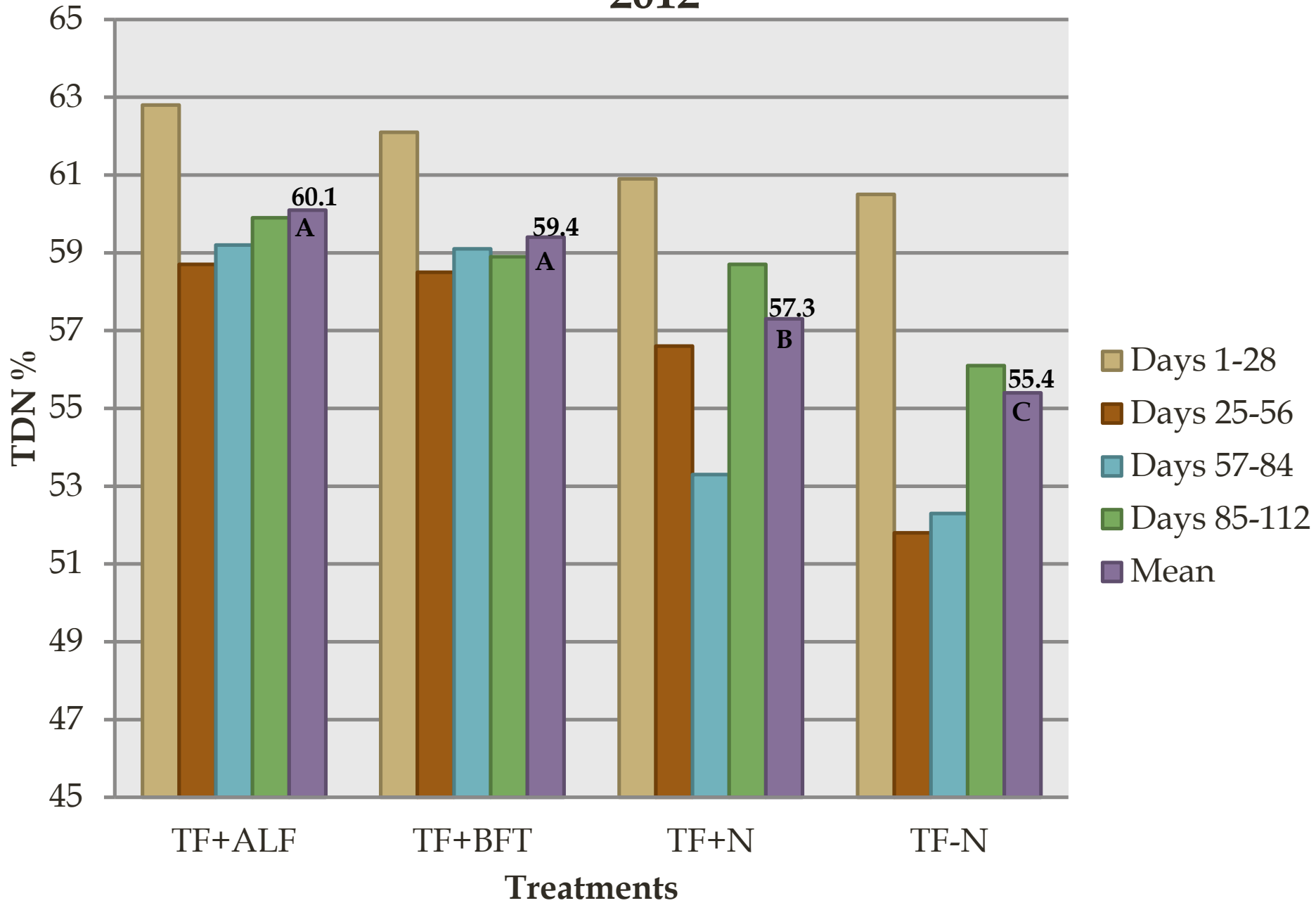
Livestock ADG



Forage Yield



Total Digestible Nutrients (TDN) 2012





Take Home

- * In this study, adding N via fertilization or legume increases steer ADG, forage yield, and forage quality.
- * Legumes can increase ADG equal to or greater than TF+N
- * TF+N yields higher than TF+ALF but not TF+BFT, all three yield higher than TF-N.
- * Grass/legume mixtures are more economical and environmentally sustainable

Questions

