

# INTEGRATED SYSTEM CROP & LIVESTOCK SYSTEMS

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Winter Workshop - Research Update  
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# Soil Health Principles



Crop Diversity and  
Livestock Integration



Maintaining a Living root &  
Keeping Soil Covered with  
Residue

# CROP ROTATION

Spring Wheat – Rotation  
Cash Crop

Cover Crop:  
Cows Graze  
After Weaning

Diversity

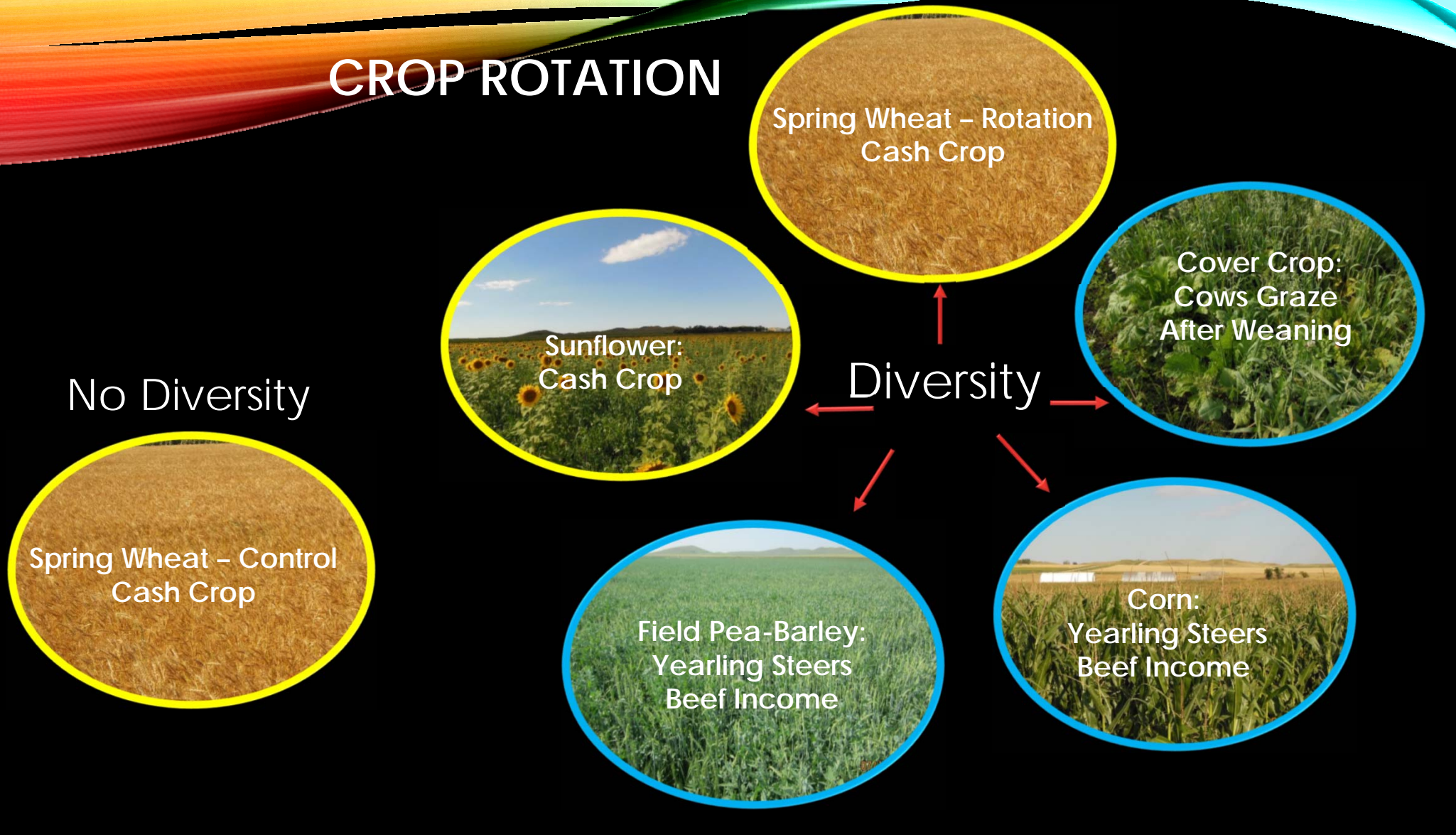
Sunflower:  
Cash Crop

Corn:  
Yearling Steers  
Beef Income

Field Pea-Barley:  
Yearling Steers  
Beef Income

No Diversity

Spring Wheat – Control  
Cash Crop

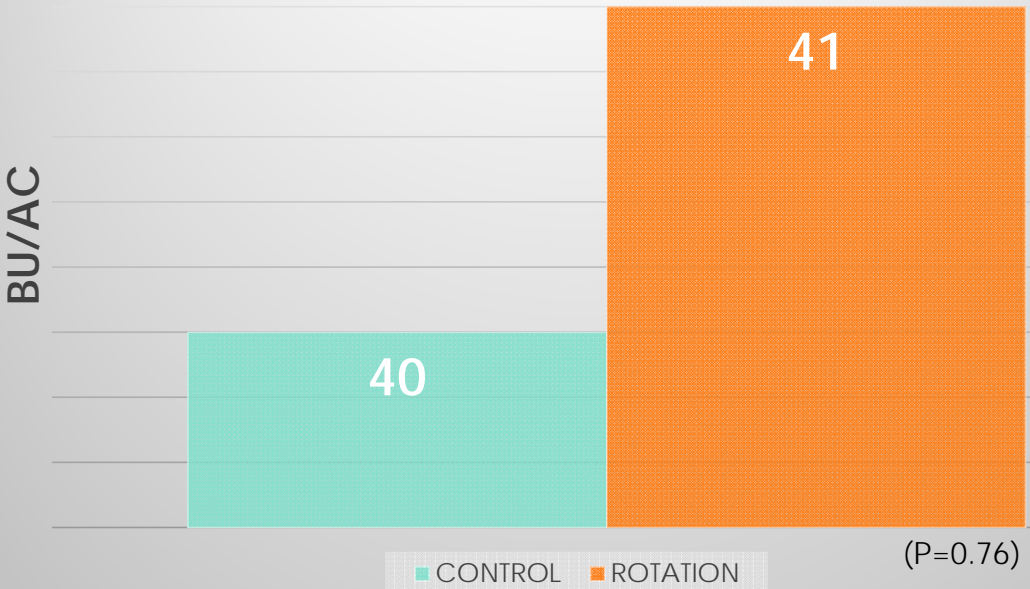




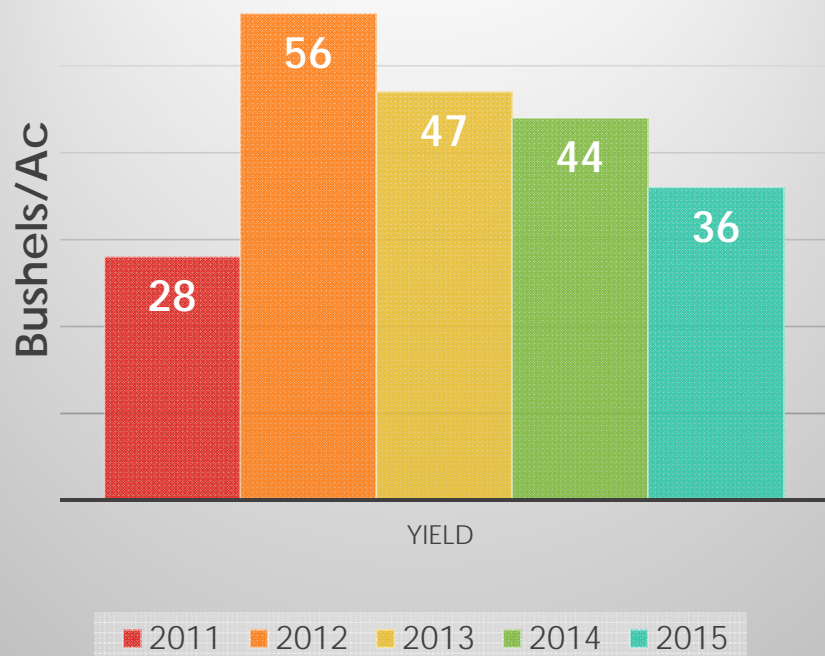
## 5-year crop rotation (2011-2015) SYSTEMS INCOME & SAVINGS SOURCES

- ▶ **Cropping system income:**
  - ▶ HRSW and Sunflowers
- ▶ **Livestock Income:**
  - ▶ Yearling Steers: Graze Native Range, then Pea-Barley & Corn
- ▶ **Livestock Savings:**
  - ▶ Cows Graze Cover Crop & Crop Residues

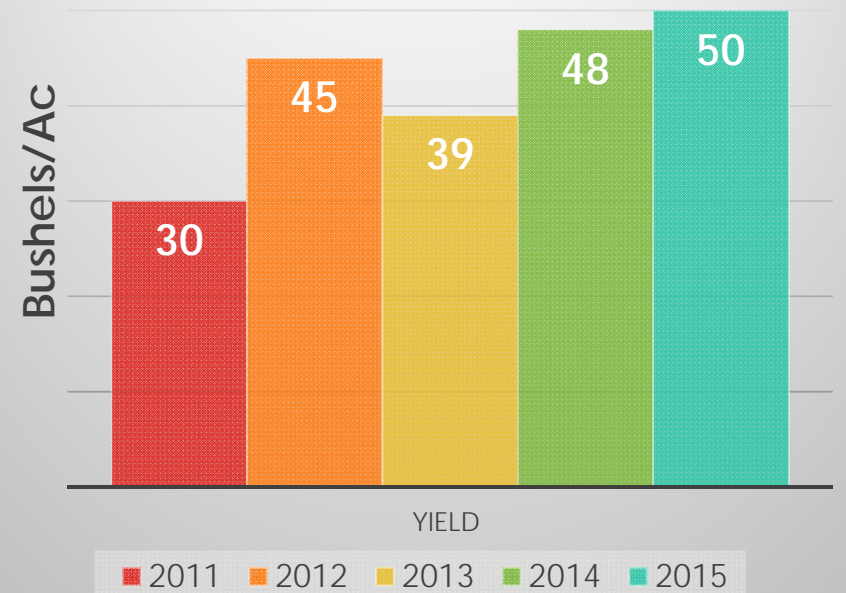
### HARD RED SPRING WHEAT 5 YR AVERAGE: CONTINUOUS vs ROTATION



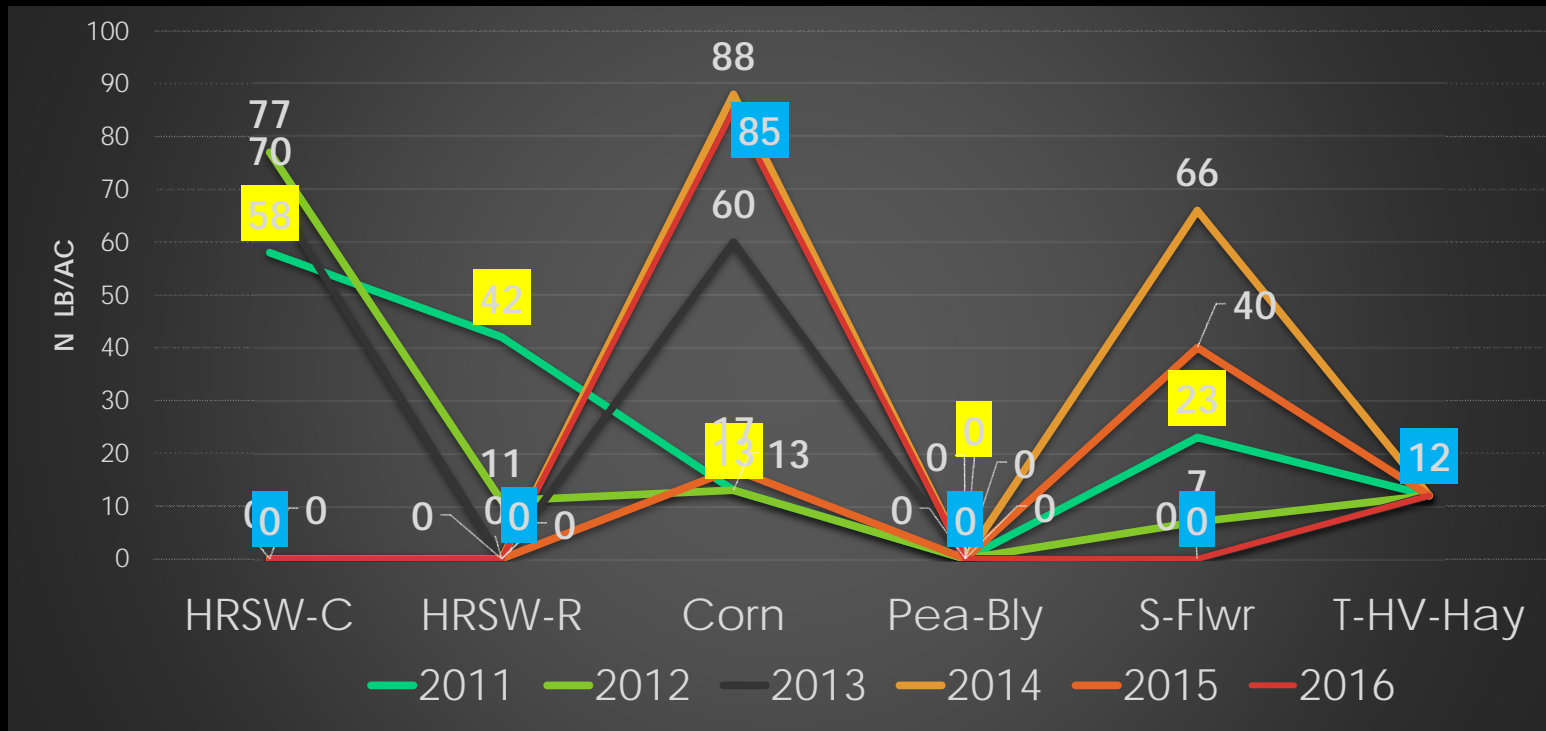
### Spring Wheat - Control



### Spring Wheat - Rotation

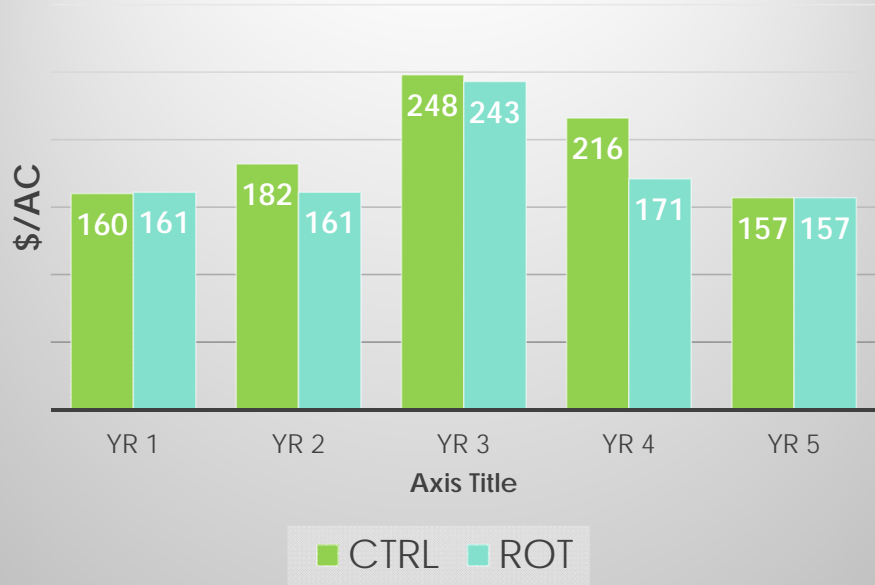


# NO<sub>3</sub>-N FERTILIZER APPLICATION (2011-2015)

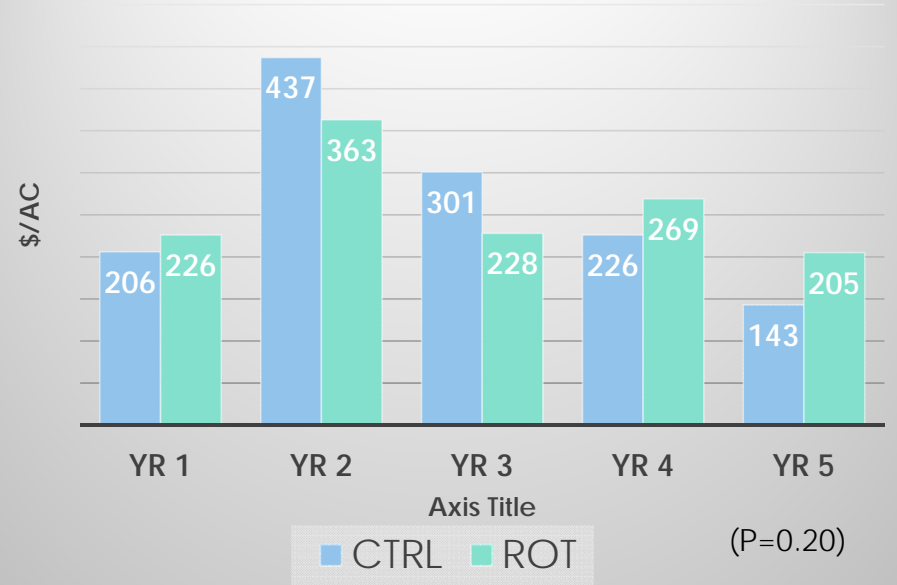




### INPUT COST/AC

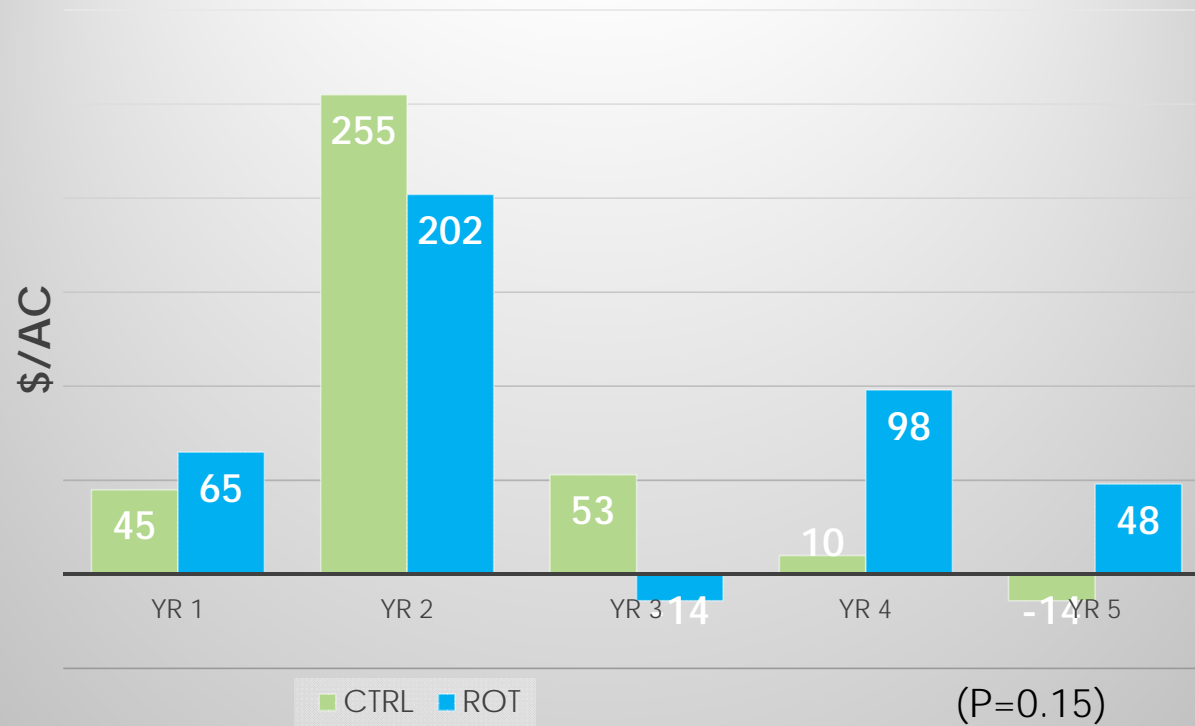


### GROSS RETURN

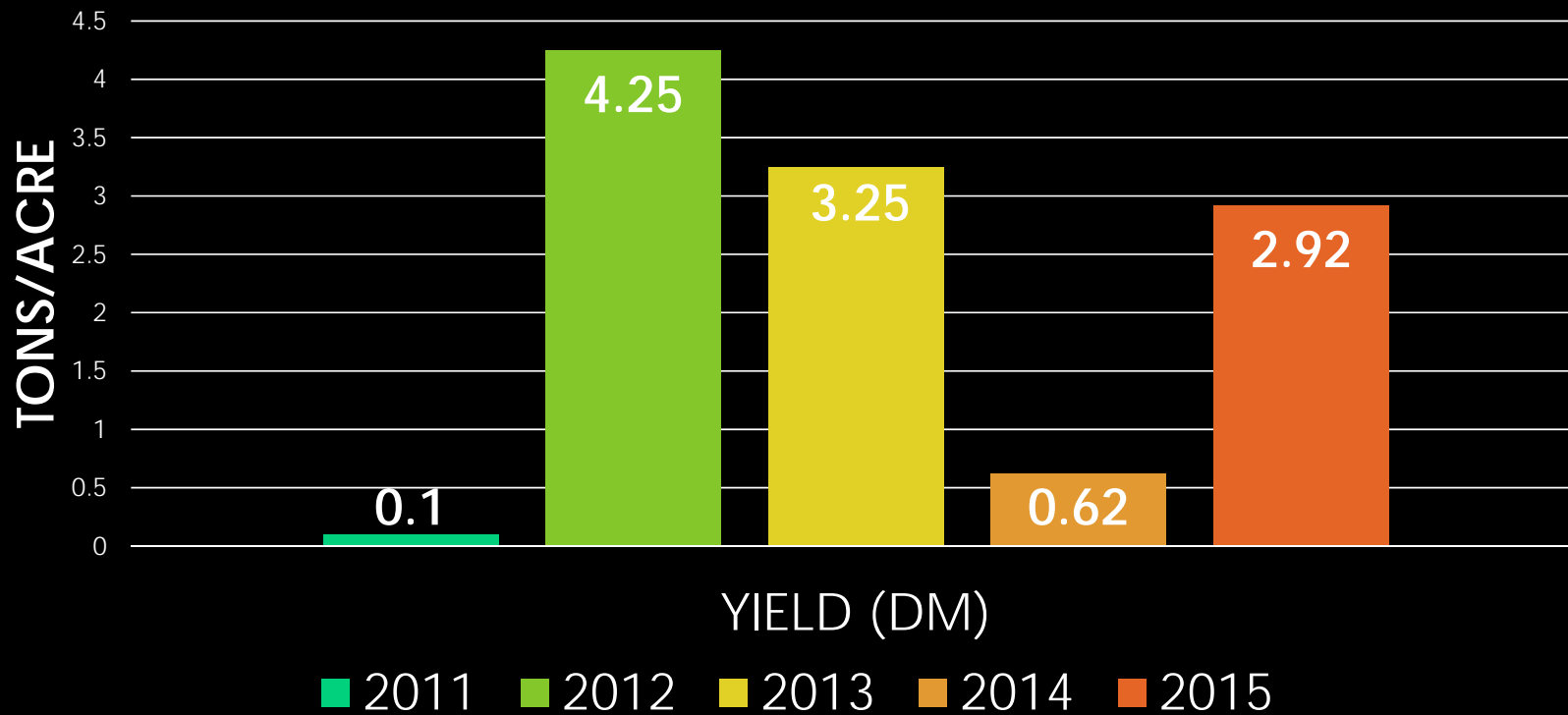


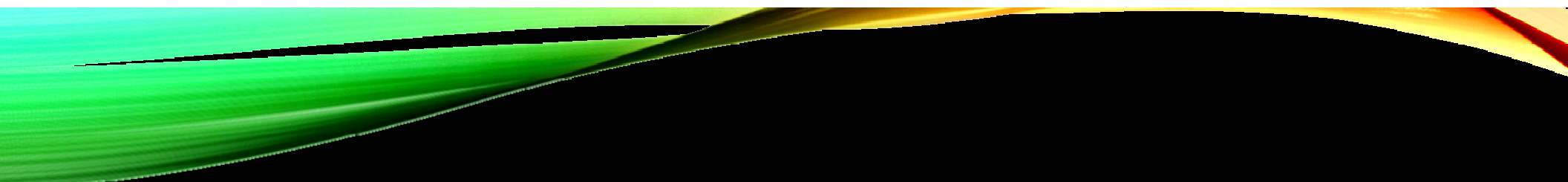


## NET RETURN

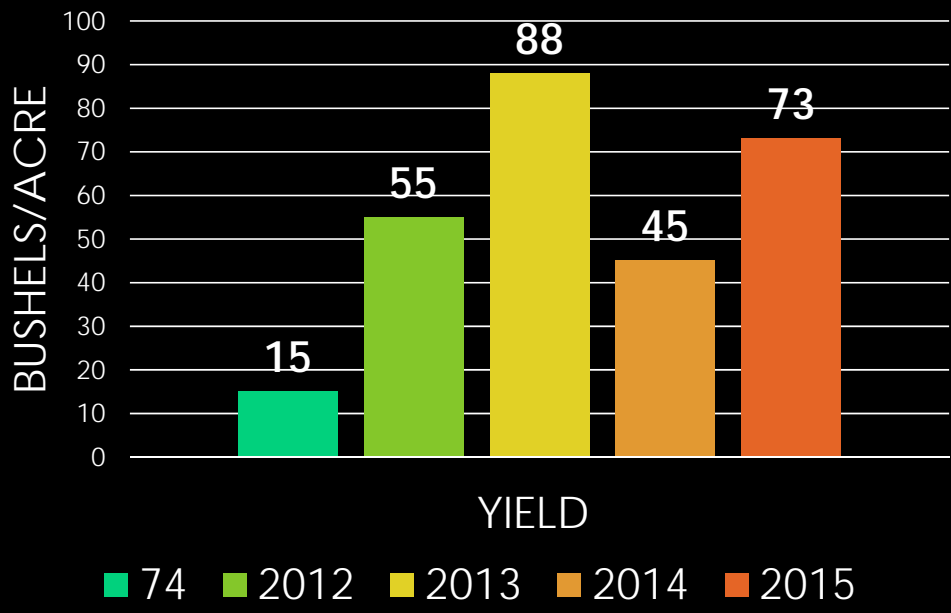


## MULTI-SPECIES COVER CROP

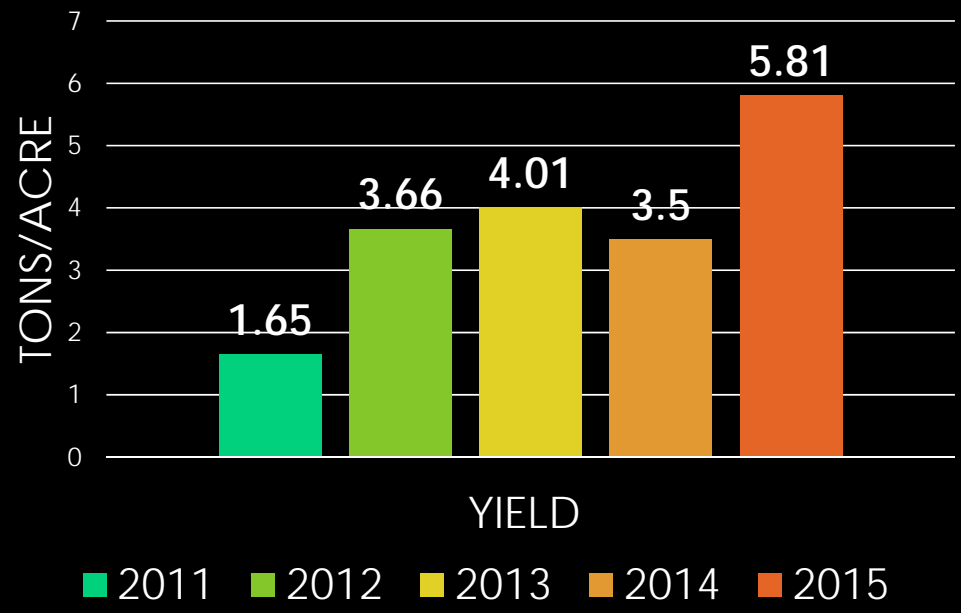




### CORN - GRAIN



### CORN - SILAGE

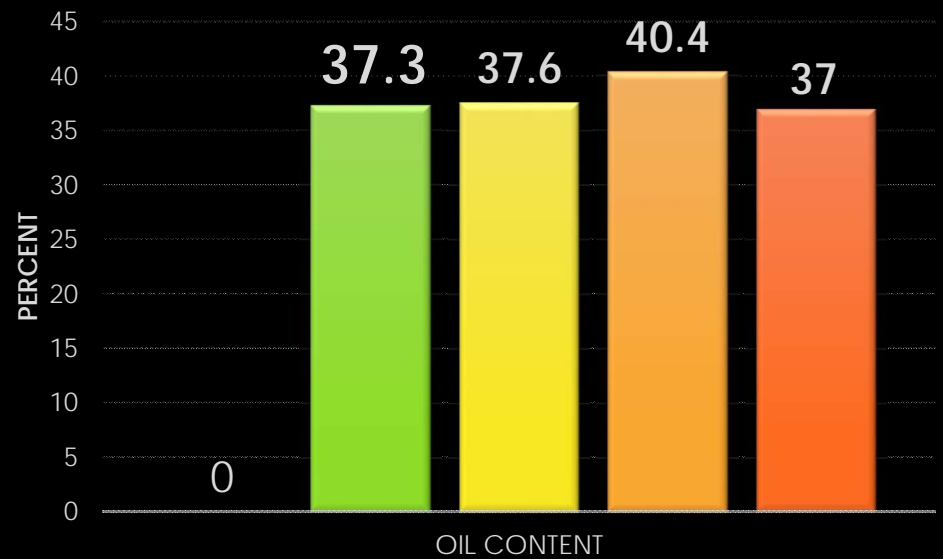


## SUNFLOWER



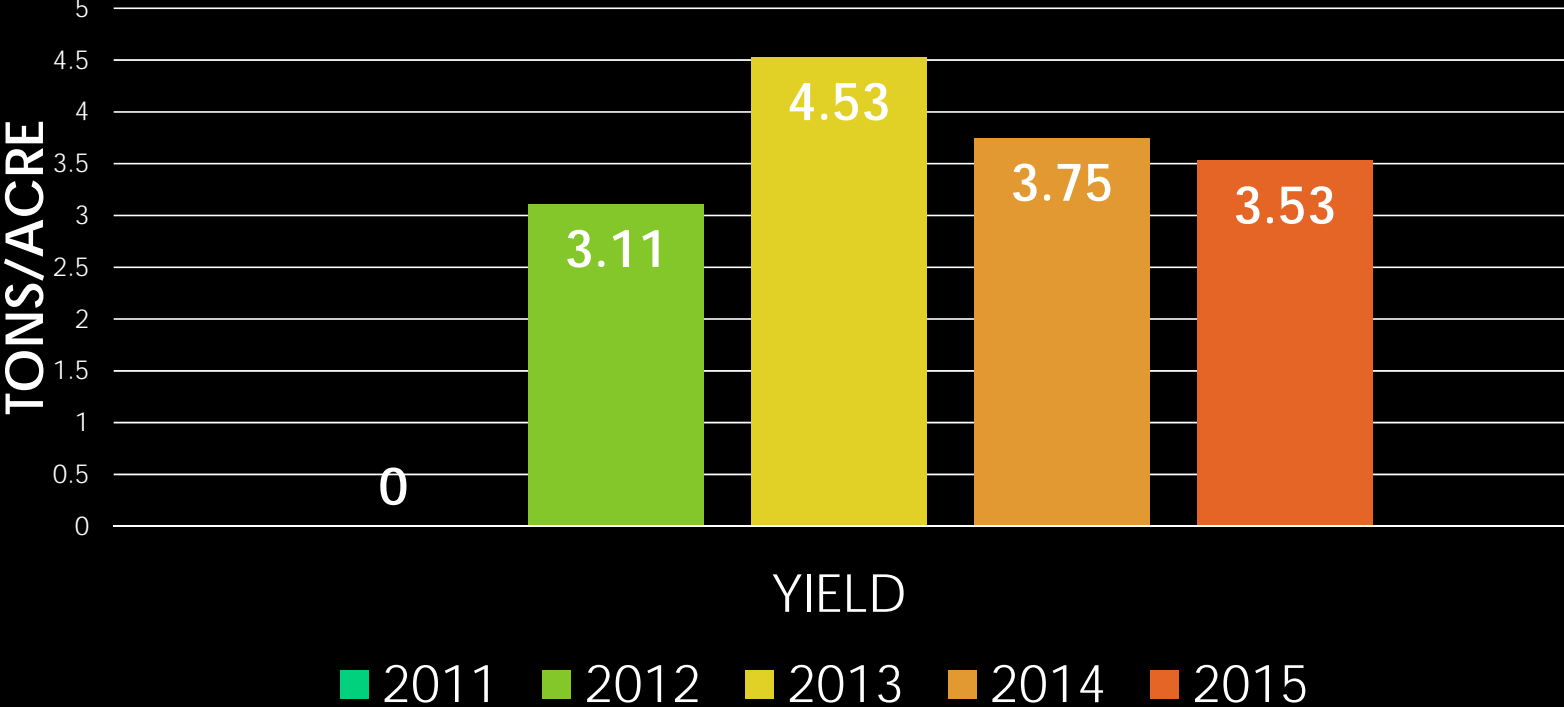
2011 2012 2013 2014 2015

## SUNFLOWER

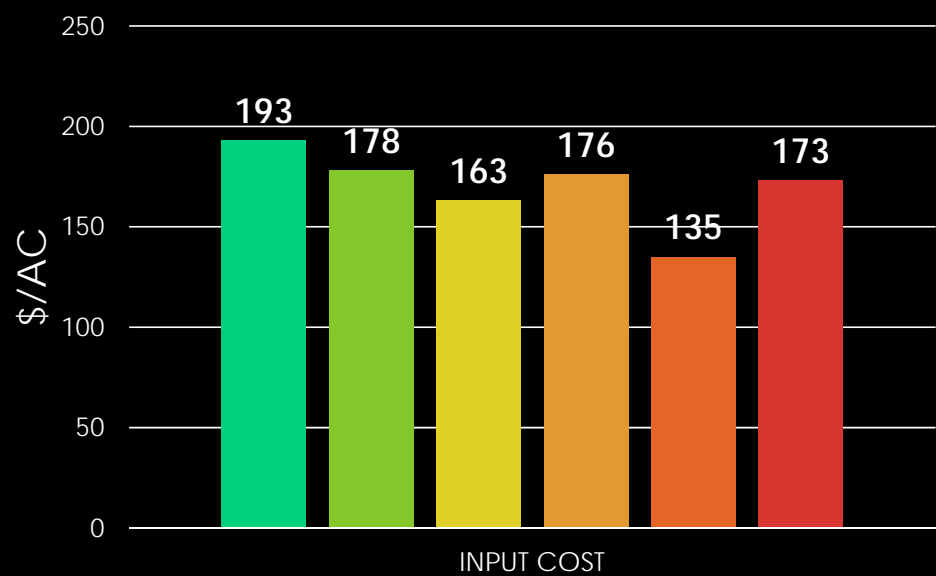


2011 2012 2013 2014 2015

# FIELD PEA-BARLEY FORAGE



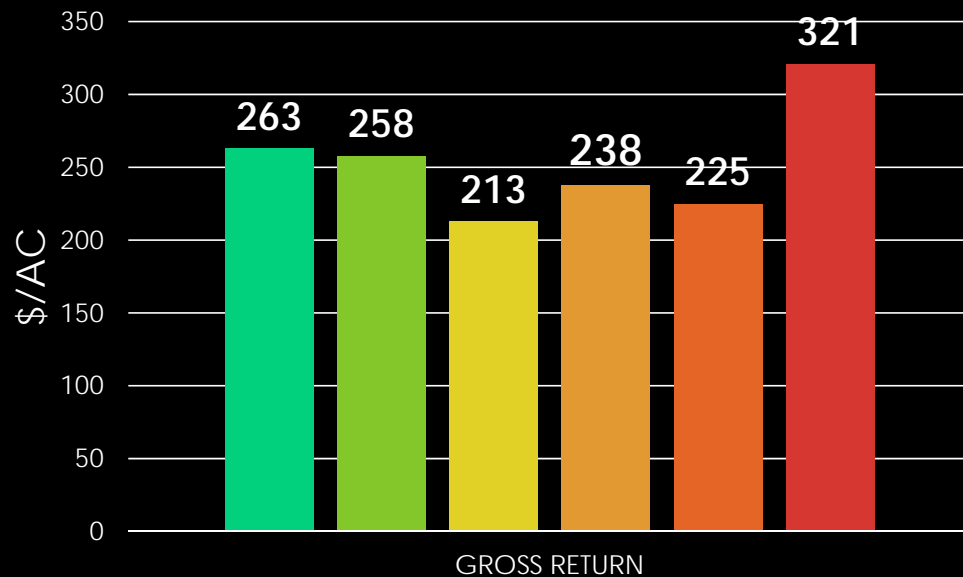
### CROP ROTATION: 5-YR INPUT COST



■ HRSW-CTRL   ■ HRSW-ROT   ■ CVR CROP  
■ CORN FORAGE   ■ PEA-BARLEY   ■ SUNFLOWER

(P=0.0001)

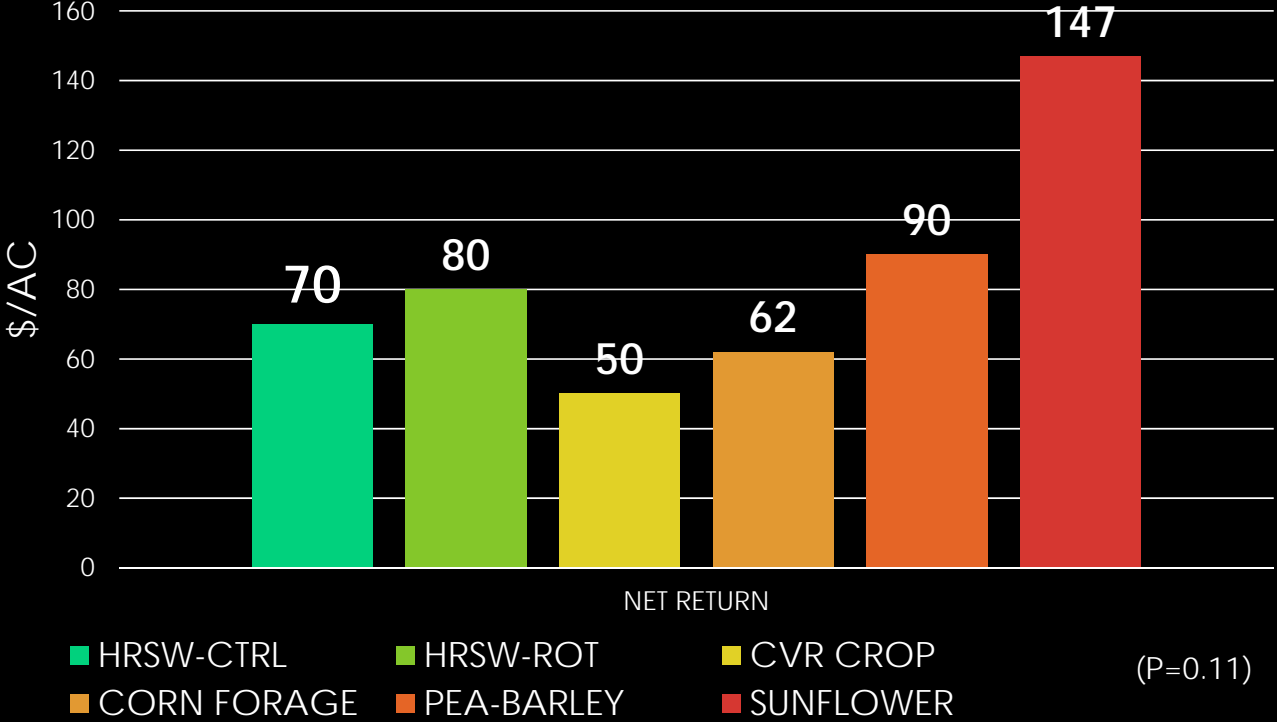
### CROP ROTATION: 5-YR GROSS RETURN



■ HRSW-CTRL   ■ HRSW-ROT   ■ CVR CROP   ■ CORN FORAGE

(P=0.02)

### CROP ROTATION: 5-YR NET RETURN



## Control Wheat

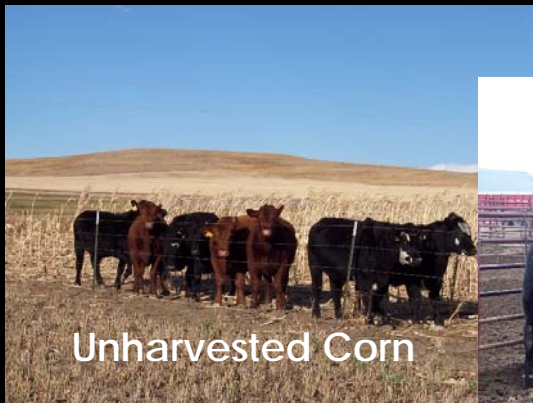


## Rotation Wheat



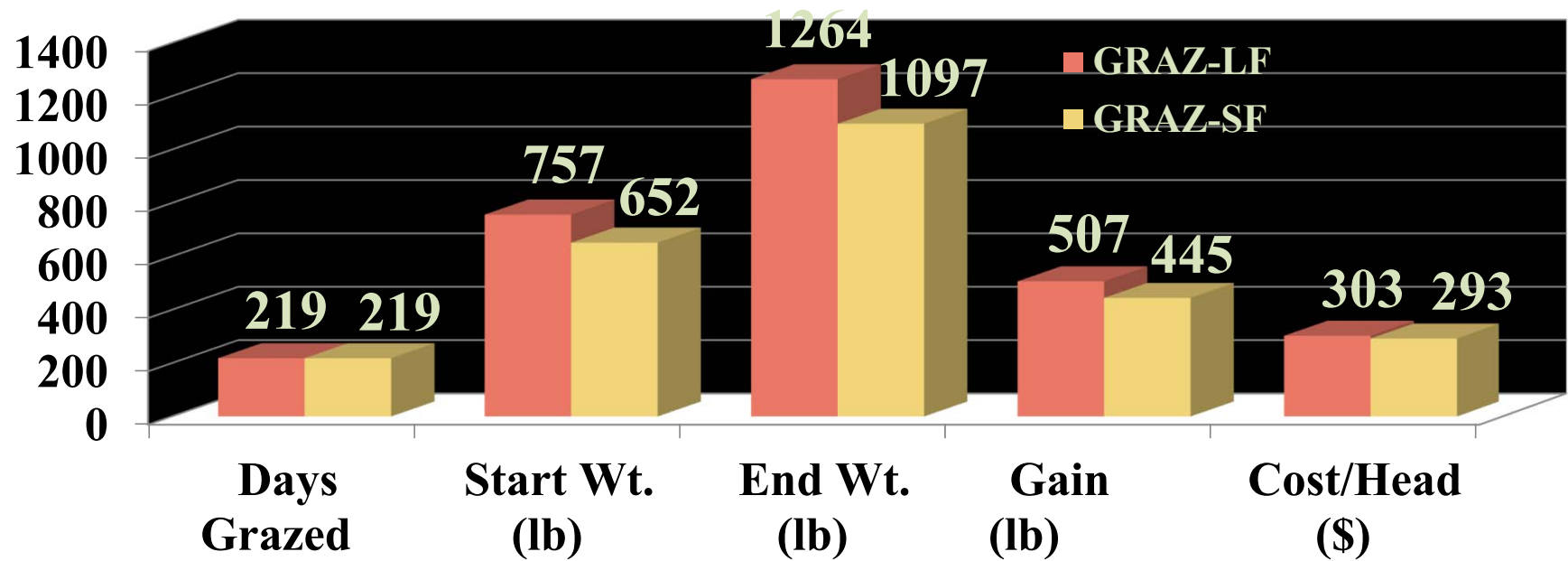


# GRAZE TO SLAUGHTER FORAGE SEQUENCE

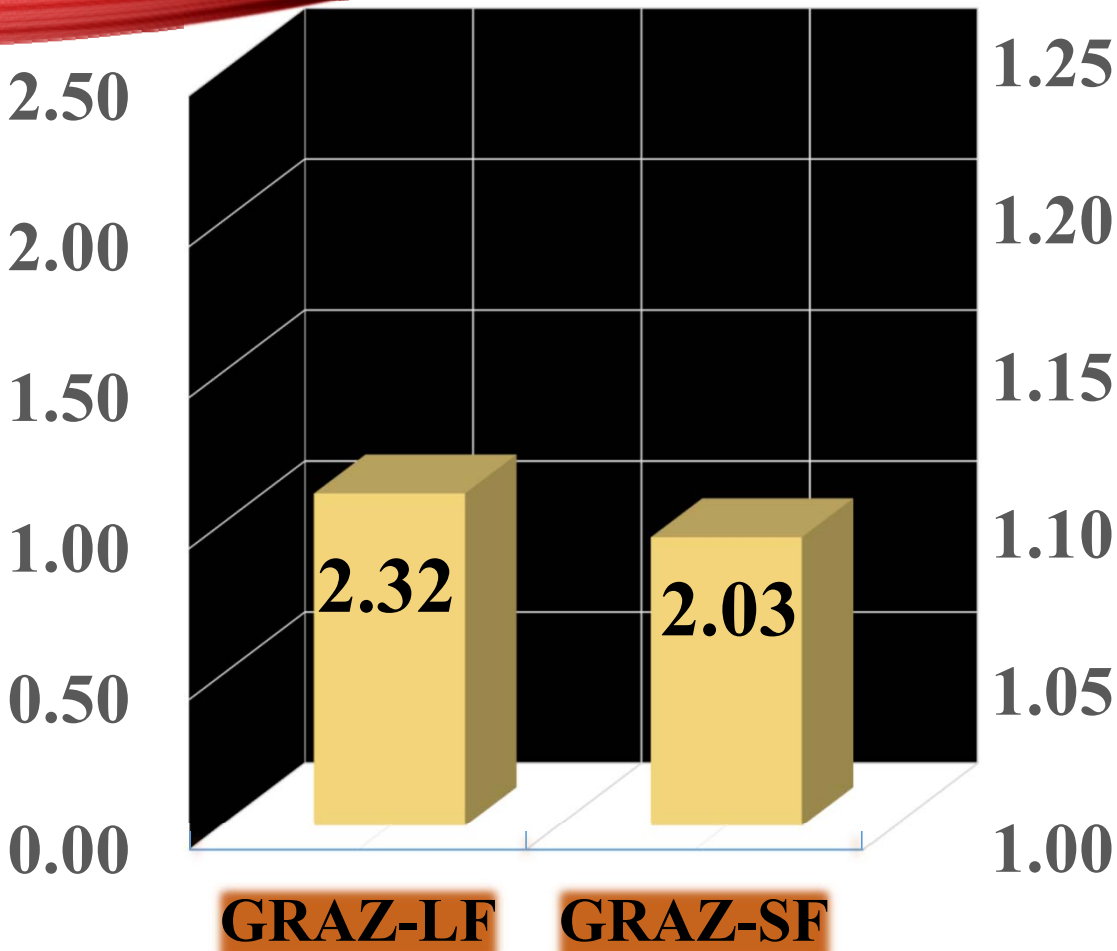




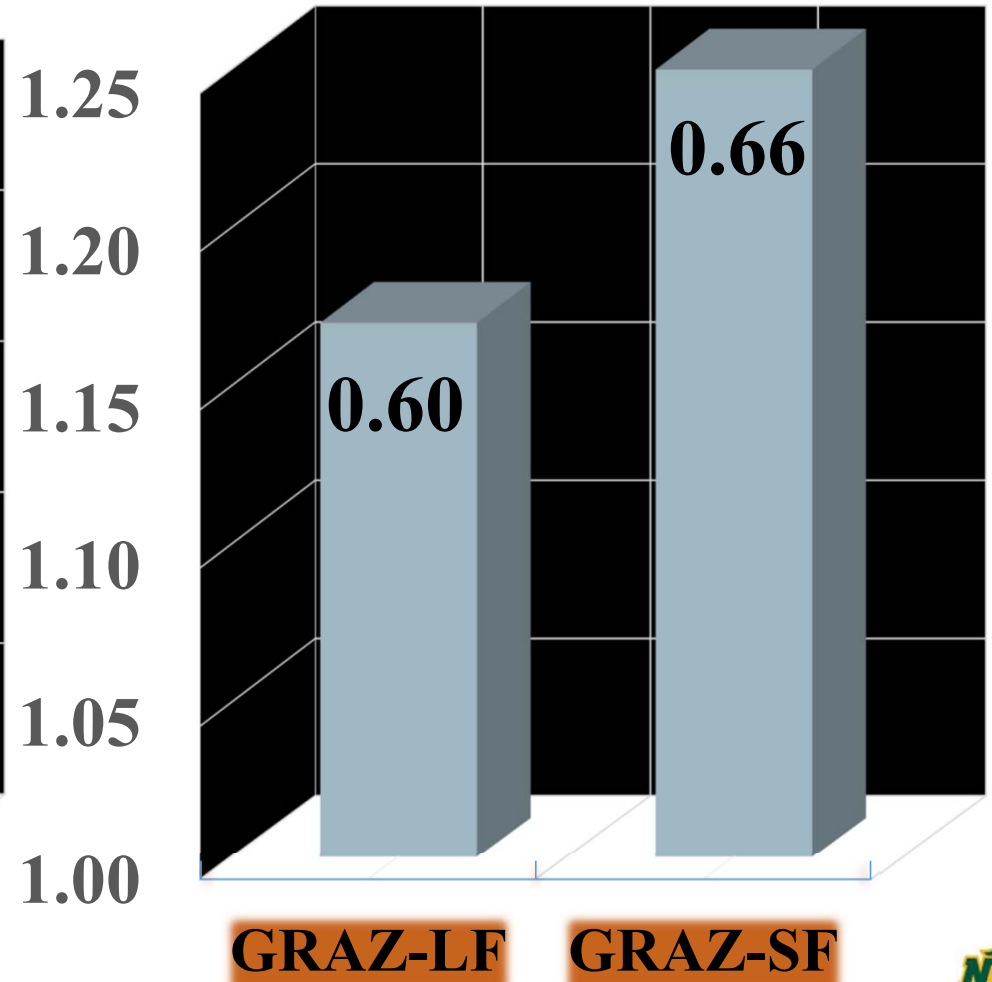
# YEARLING STEER GRAZING PERFORMANCE



**Steer Grazing ADG, (lb)**



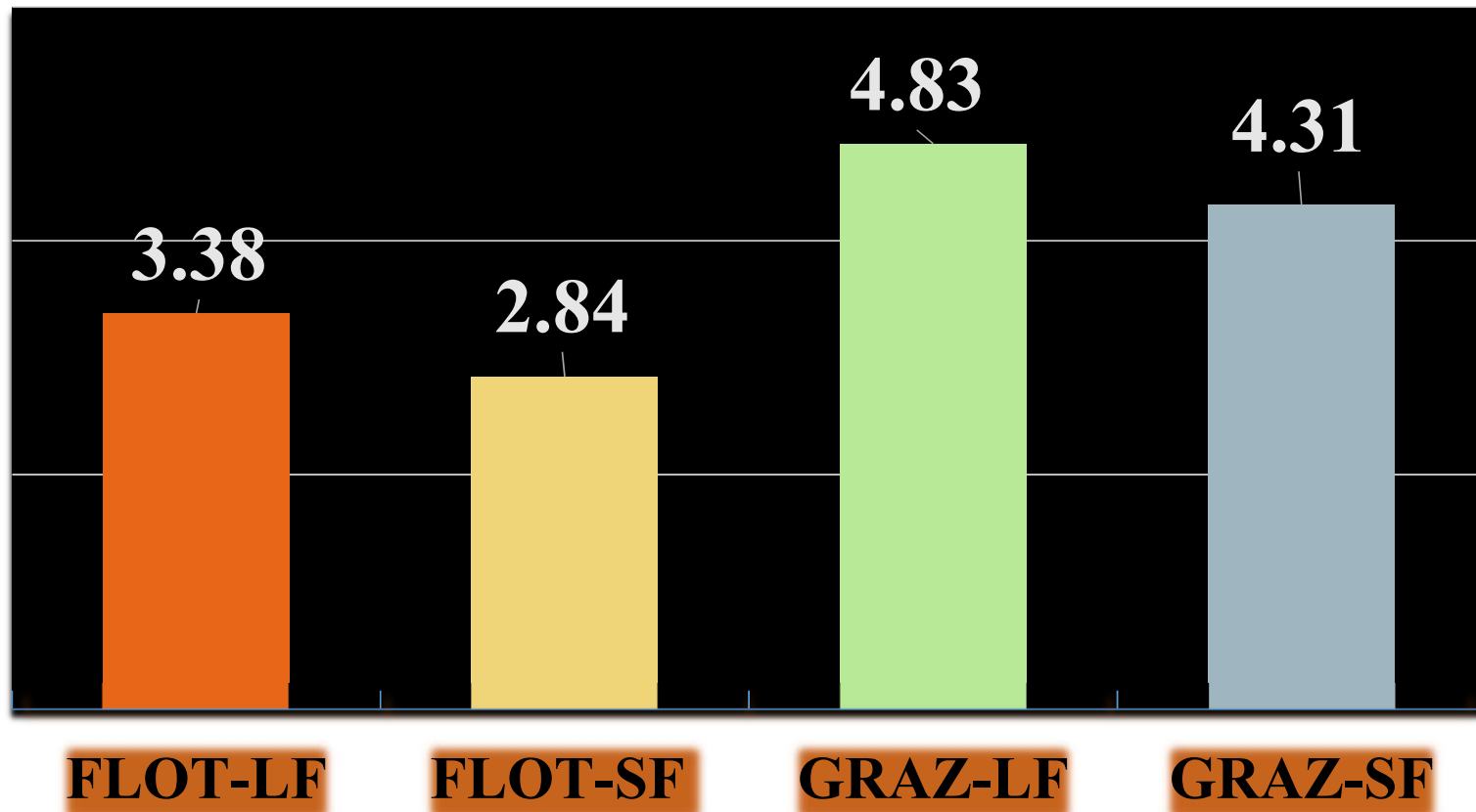
**Grazing Cost/lb of Gain**

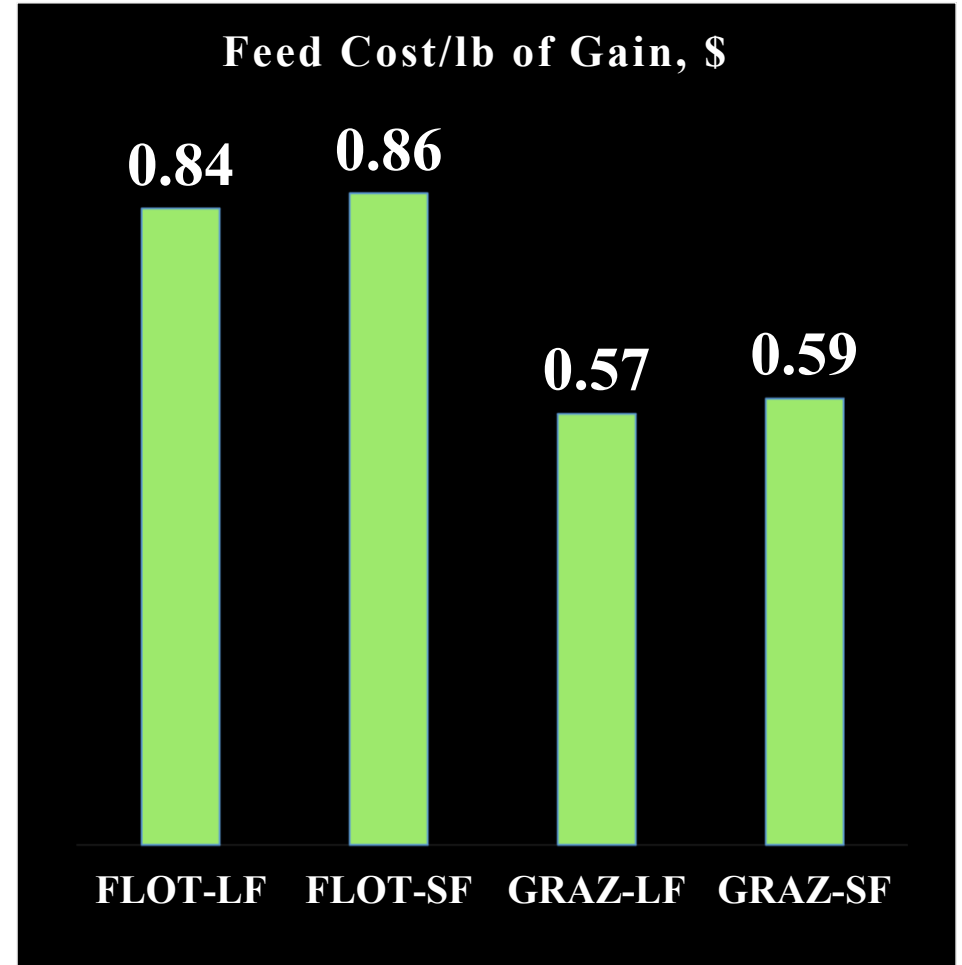
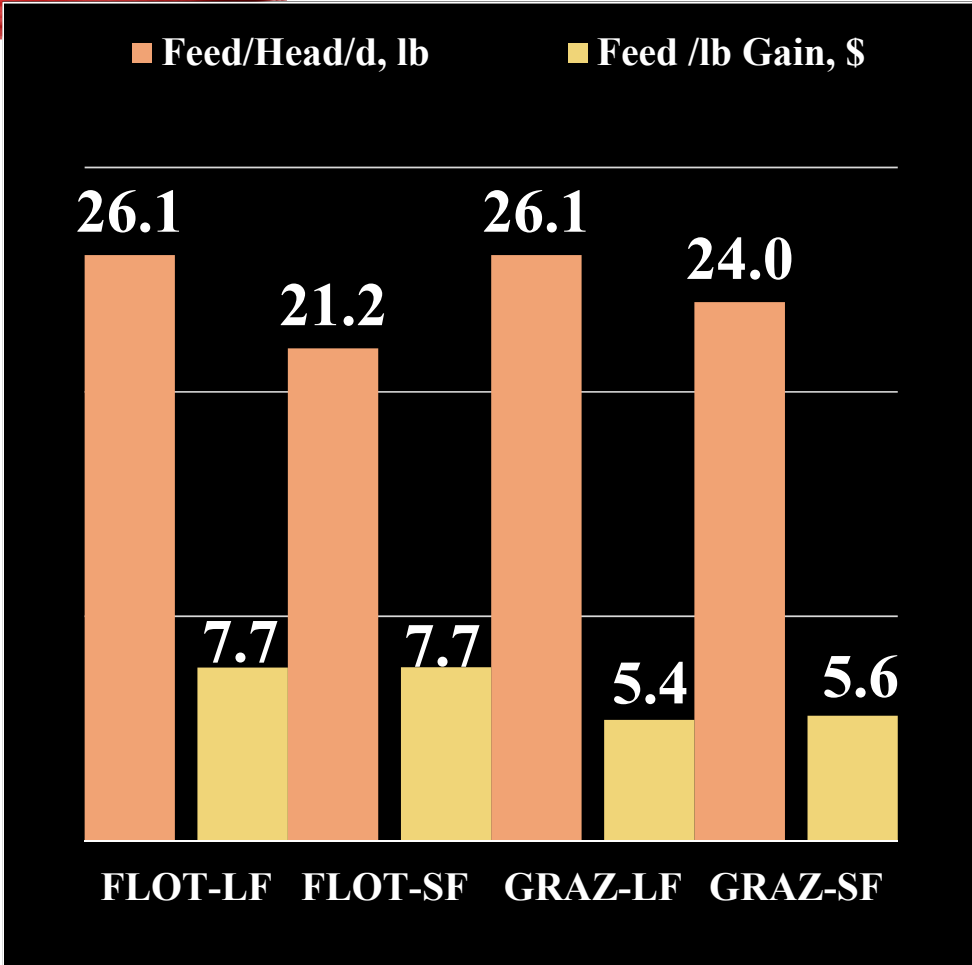




	End Graze Weight	Price/ Cwt	End Graze Value
GRAZ-SF	1097	\$1.42	\$1,558
GRAZ-LF	1264	\$1.30	\$1,643

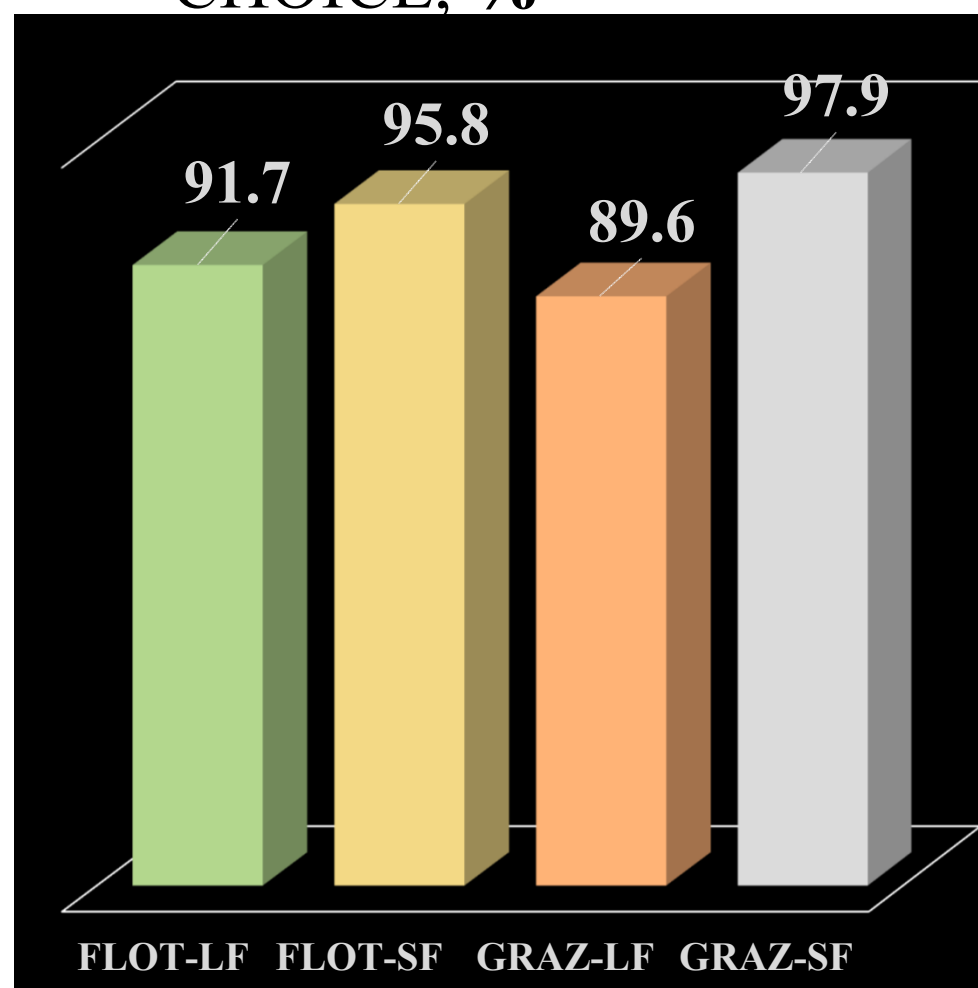
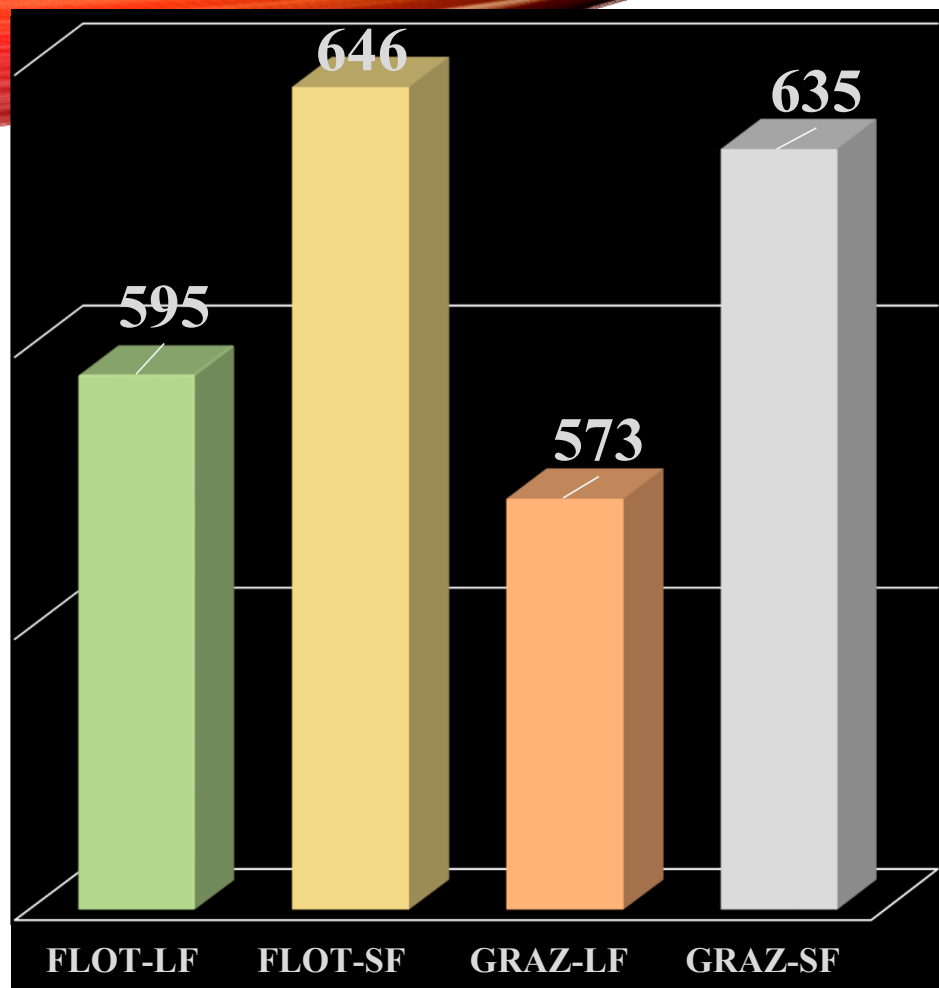
## Yearling Steer Feedlot ADG, (lb)



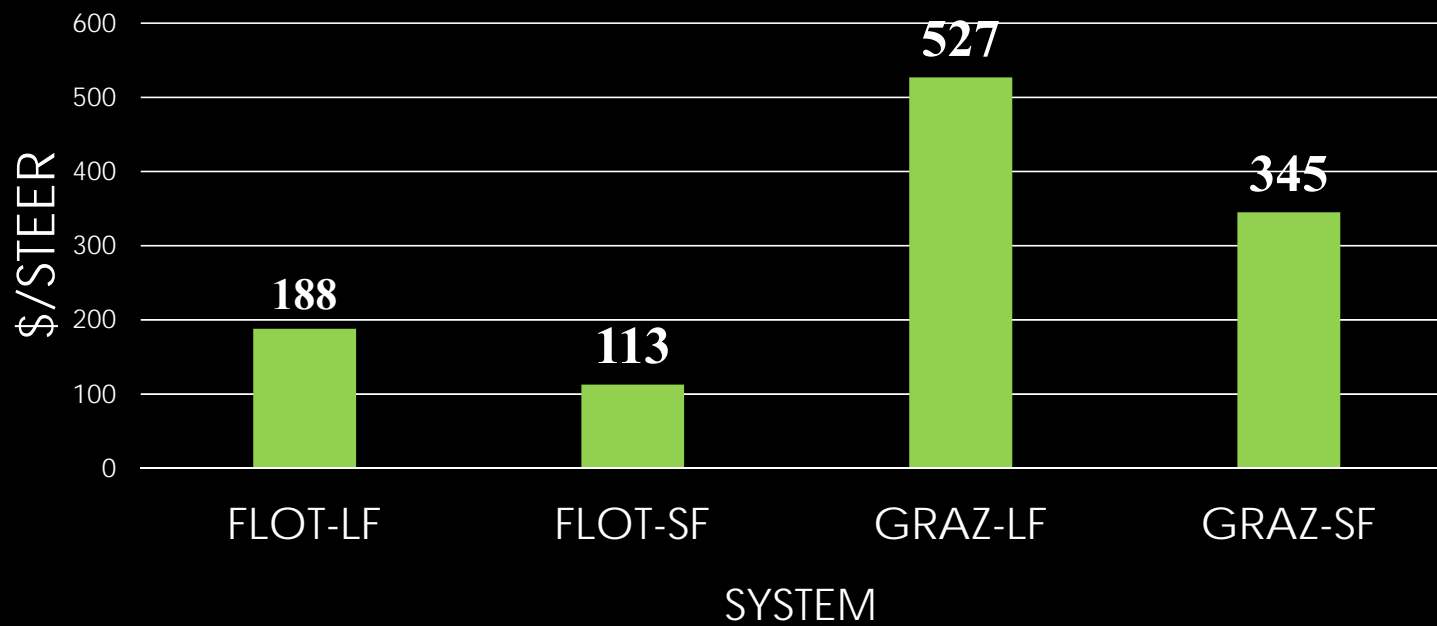


# MARBLING SCORE

# PERCENT CHOICE, %

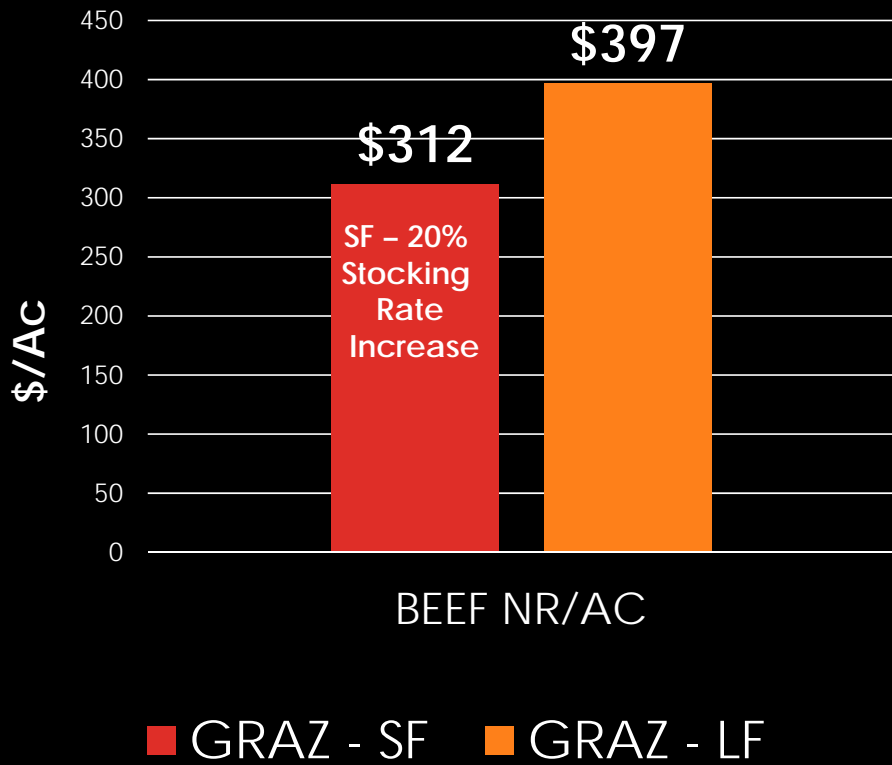


## Net Return/Steer





# Beef Net Return/Ac



# COMPARISON OF WINTER FEEDING METHODS

1. HAY CONTROL – HAY AND SUPPLEMENT
2. GRAZE COVER CROP, CORN AND SUNFLOWER RESIDUES
3. GRAZE STOCKPILED GRASS PASTURES AND CORN RESIDUE

- 2-Year Study
- 144 May-June Calving Cows
- 48 Cows/Treatment
- Wintering Period – 134 Days (November – April)
- Owned Land

- Supplement:  
2.0 Lb/Cow/Day  
(32% CP); \$339.25/T
- Hay Cost: \$65/T
- Breeding Started August 10
- Farming Cost Charged to the First Enterprise

# COWS: EXTENDED GRAZING SEASON

- Cover Crop
- Corn and Sunflower Residue



## Cows: Extended Grazing Season

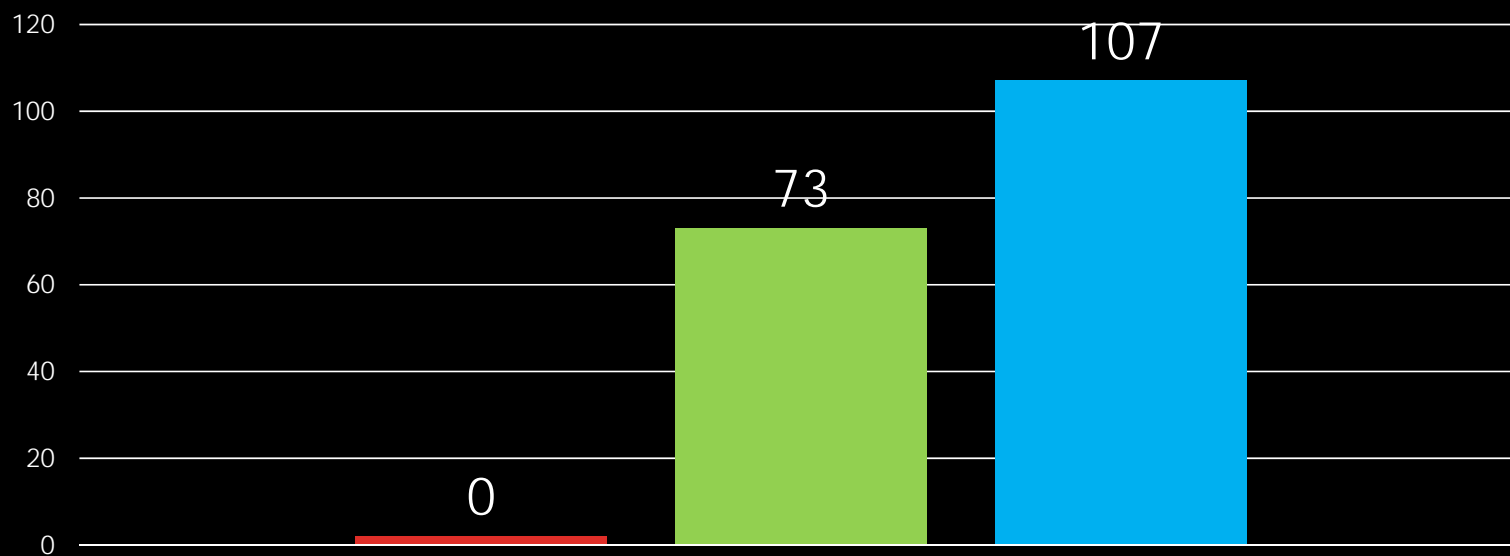


- ▶ Stockpiled tame pasture
- ▶ Corn stalk residue

# COVER CROP MIX AND COST

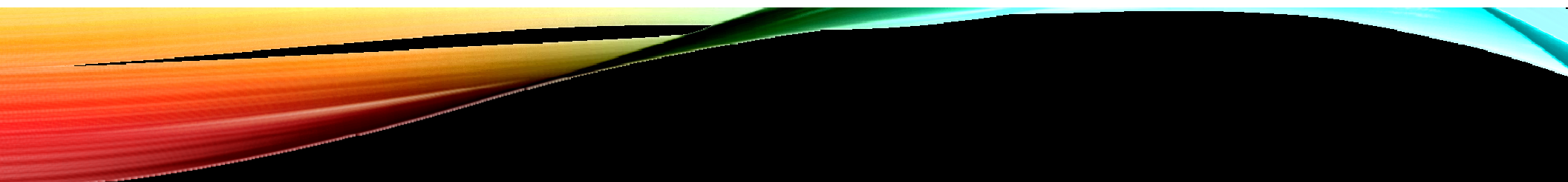
Crops	#/Acre	\$/#	Cost/Ac, \$
Sunflower	2	4.50	9.00
Everleaf Oat - 114	20	0.37	7.40
Flex Winter Pea	20	0.40	8.00
Hairy Vetch	5	1.75	8.75
Winfred Forage Rape	1	3.50	3.50
Ethiopian Cabbage	1	4.00	4.00
Hunter Leaf Turnip	1	3.50	3.50
Cost/Ac			44.15
Farming Cost & Property Tax/Ac			23.85
Cover Crop Cost/Ac			68.00
Cover Crop Grazing Cost/Cow, \$			<b>36.55</b>

## Days Cows Grazed

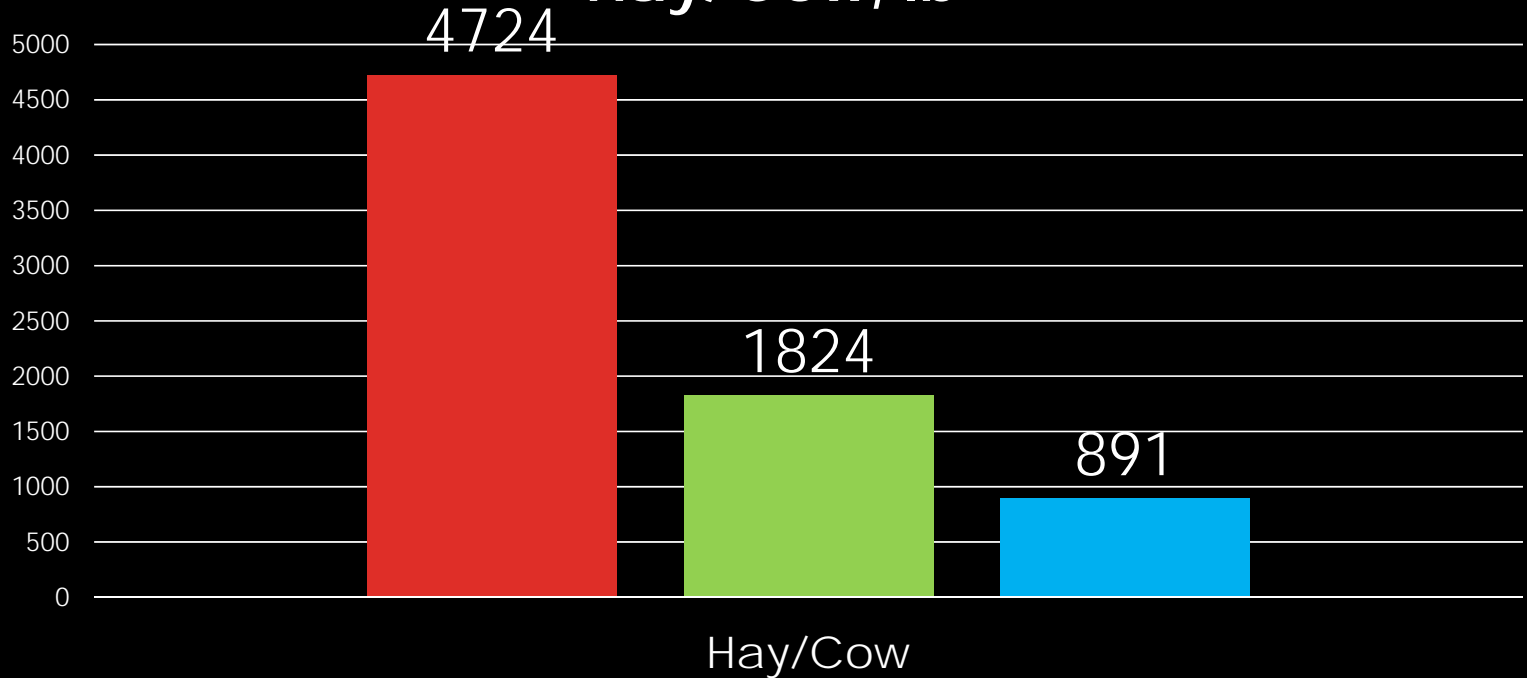


Days Grazed

■ Control ■ CC & Residue ■ Grass & Residue

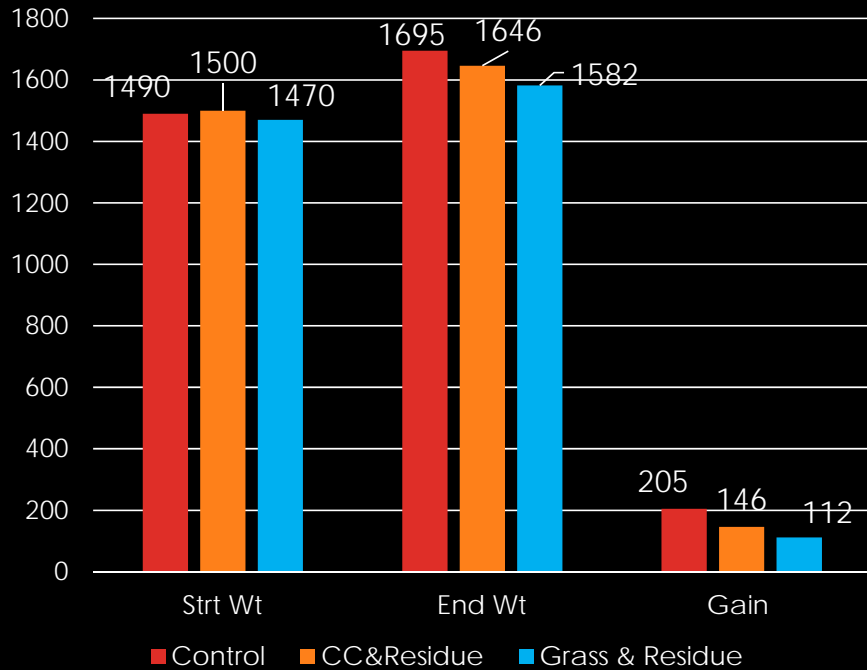


# Hay/Cow, lb

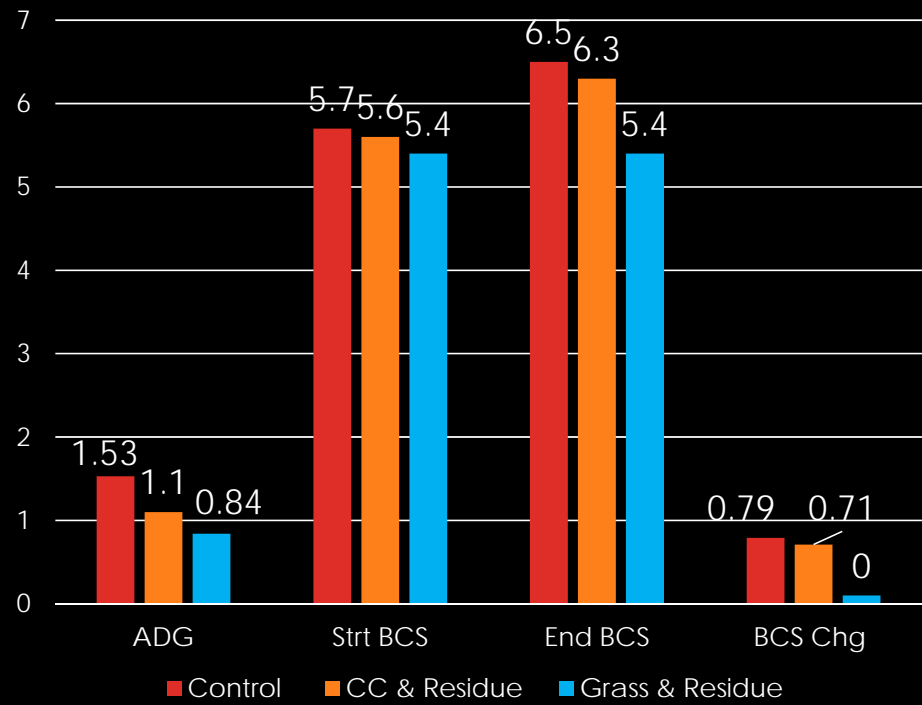


■ Control ■ CC& Residue ■ Grass & Residue

## Cow Wt. Gain, lb

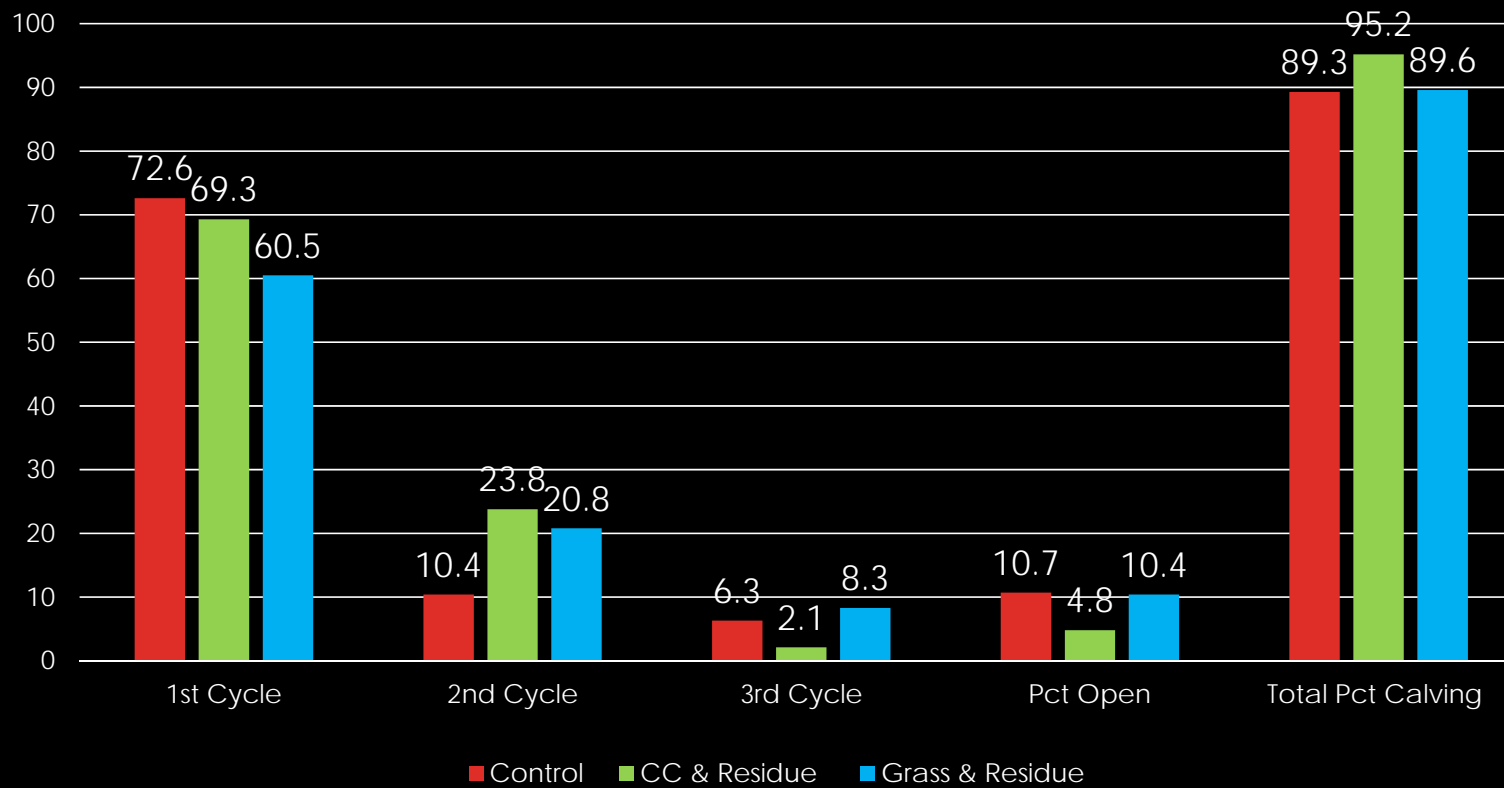


## BCS Change

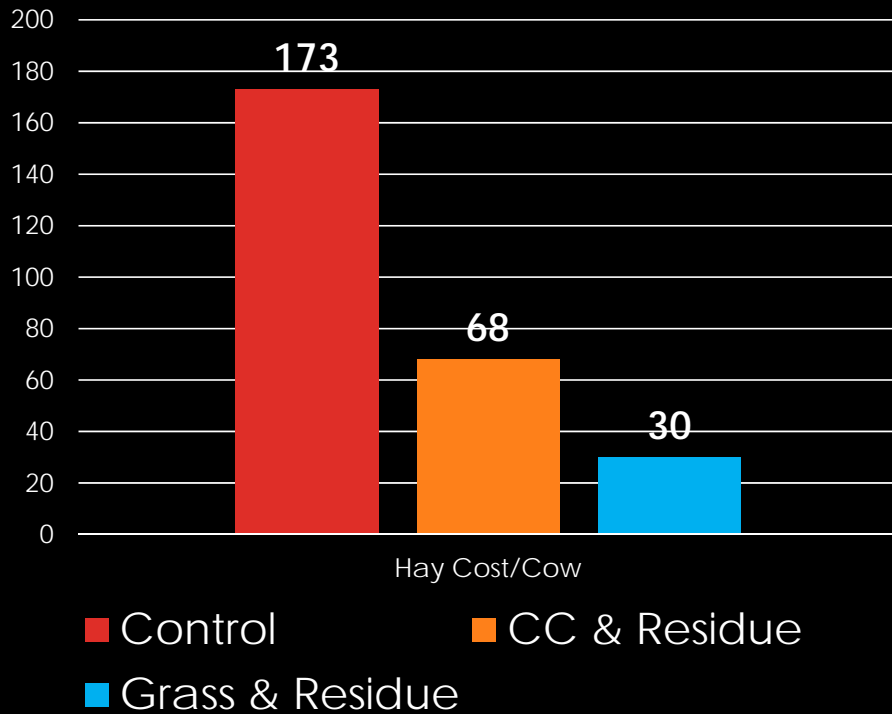




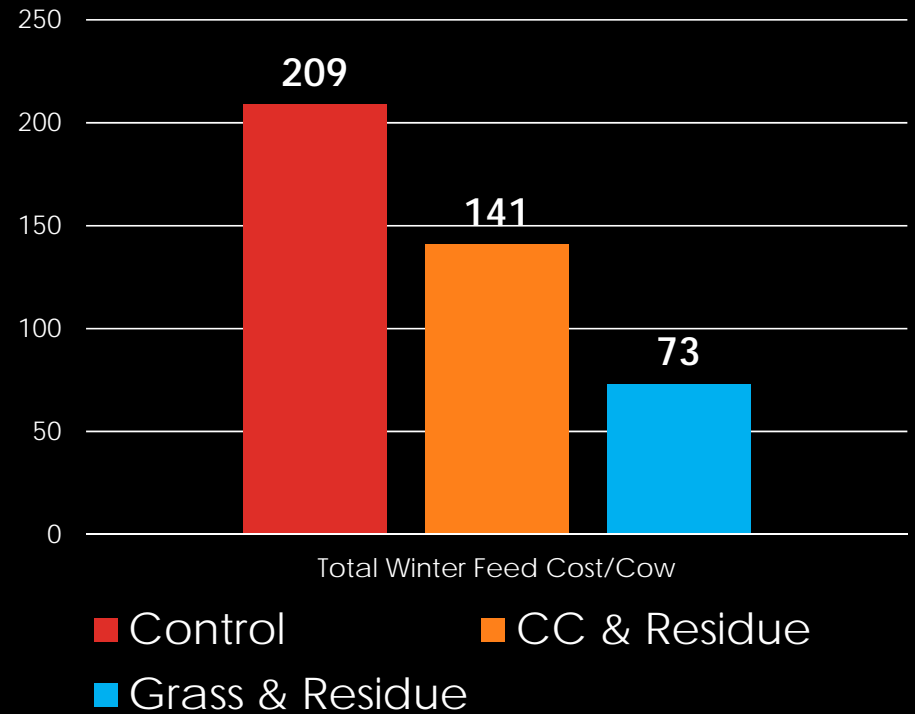
## Breeding Cycle Calving Percent



### Hay Cost/Cow, \$



### Total Winter Feed Cost/Cow



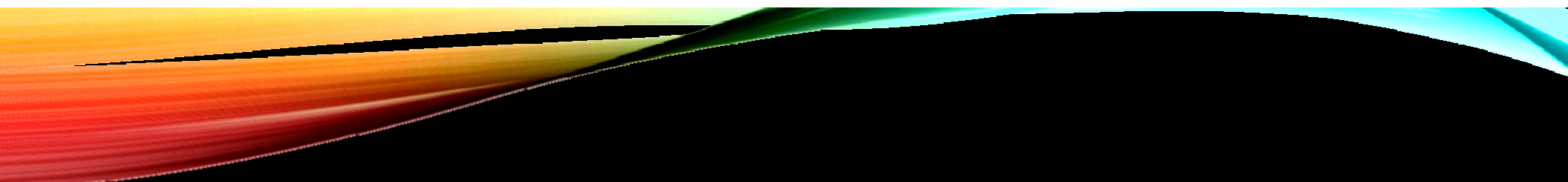


# FORAGE DEVELOPED REPLACEMENT HEIFERS

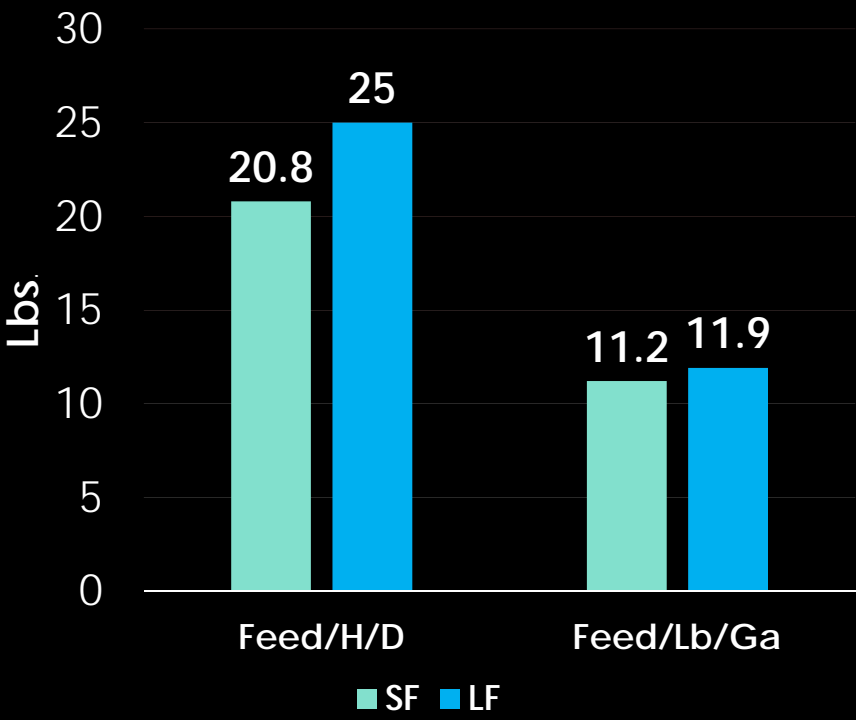
(EFFECT OF FRAME SCORE ON GROWTH, FERTILITY AND ECONOMICS)

- Frame Score Groups:
  - Small 3.5; Large 5.6
- 3 increasing gain growth phases:
  - **Phase 1** (209 days: Oct 13 – May 10)
  - Wintered at modest gain – 0.60 Lb/Day
  - Unharvested corn and hay
  - **Phase 2** (58 days: May 10 – July 6)
  - Grazed crested wheatgrass
  - ADG: SF – 1.03; LF – 1.33 Lb/day
  - **Phase 3** (85 days: July 6 – Sept 29)
  - Feedlot: TMR - 80% alfalfa and 20% (21% CP Supplement)
  - ADG: SF – 1.87; LF – 2.14

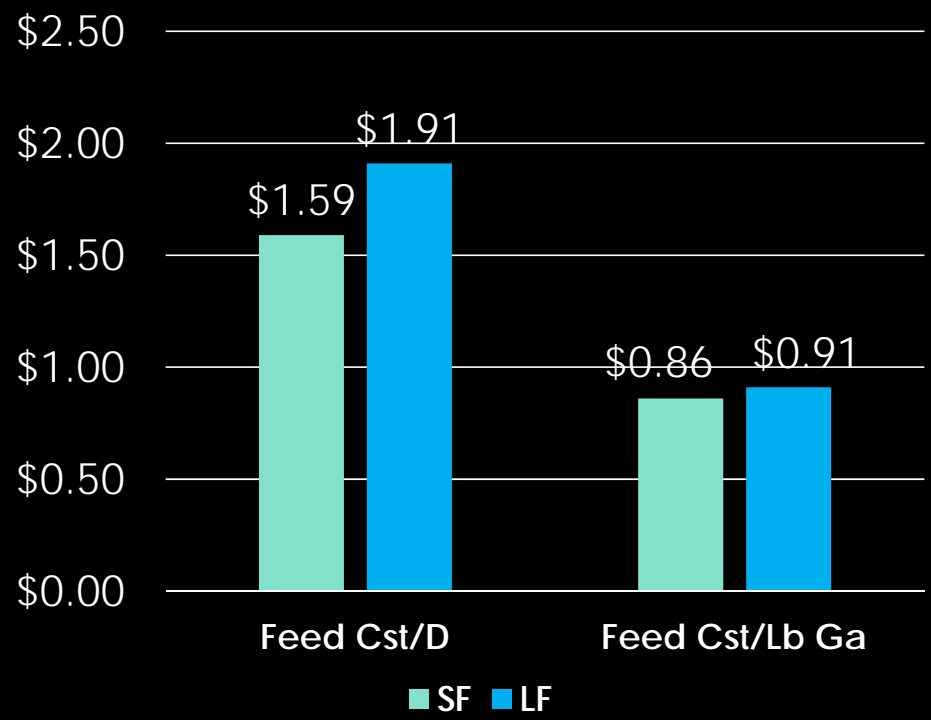




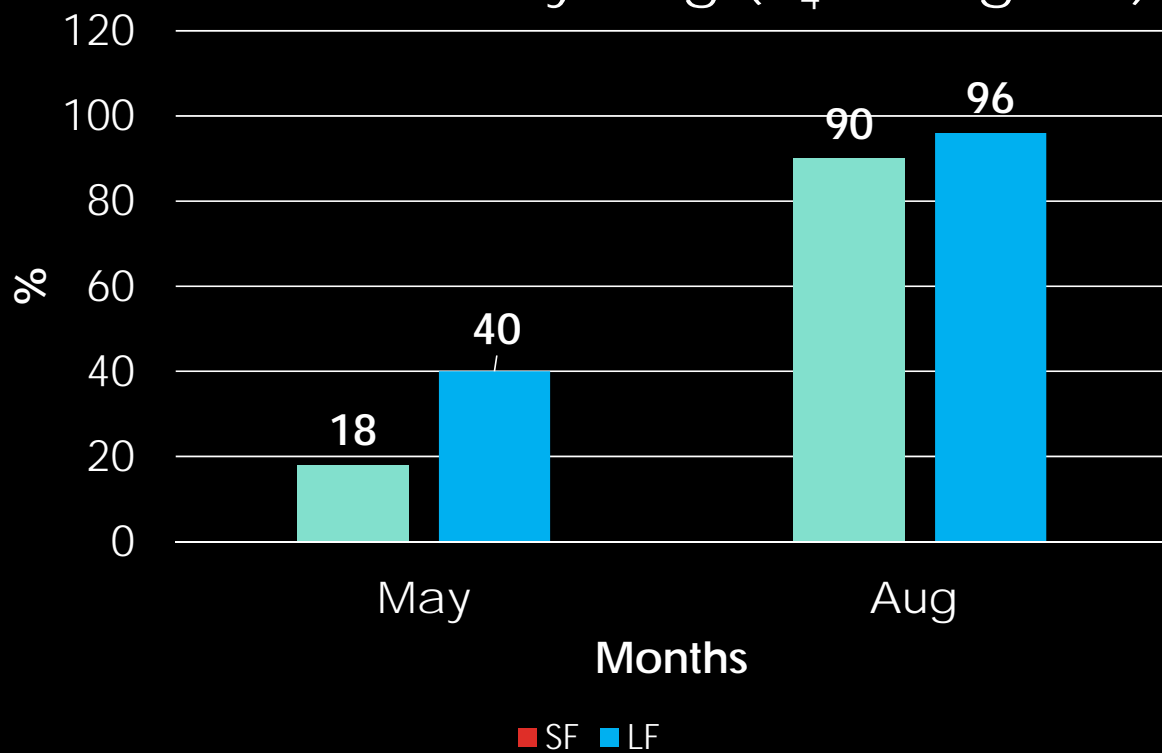
### Feed Intake & Efficiency



### Feed Cost & Cost Efficiency

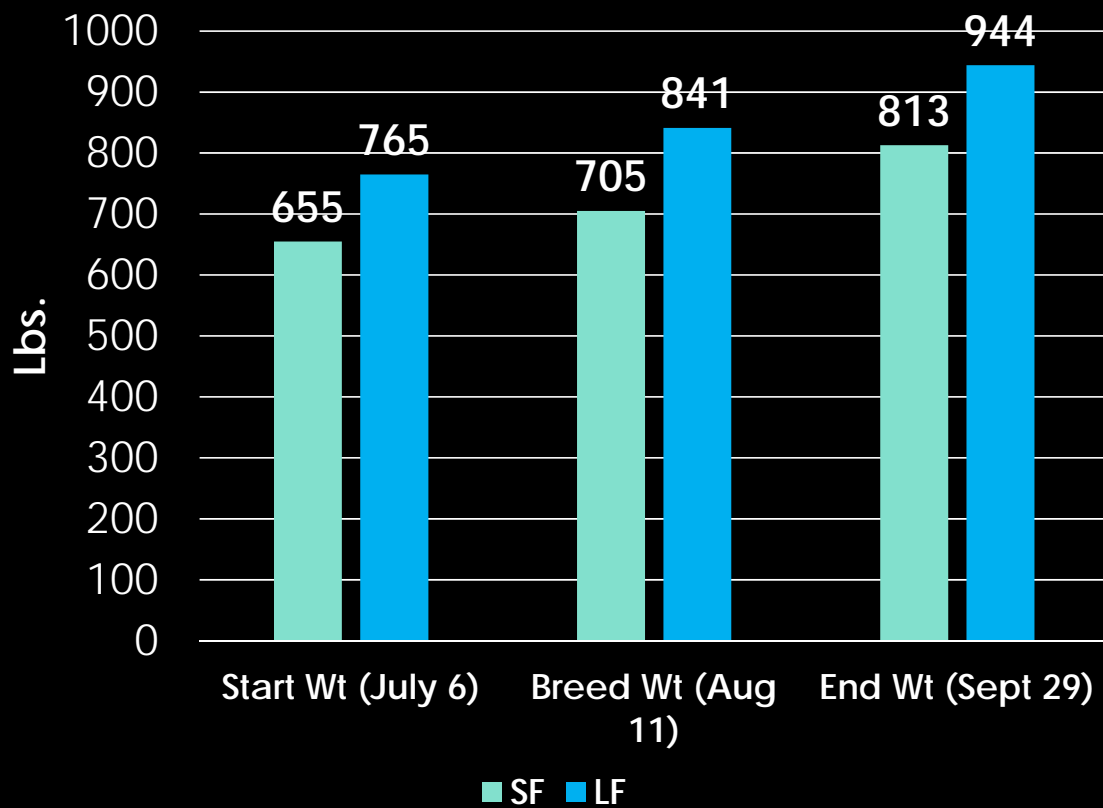


## Percent Cycling ( $P_4 > 1 \text{ ng/mL}$ )

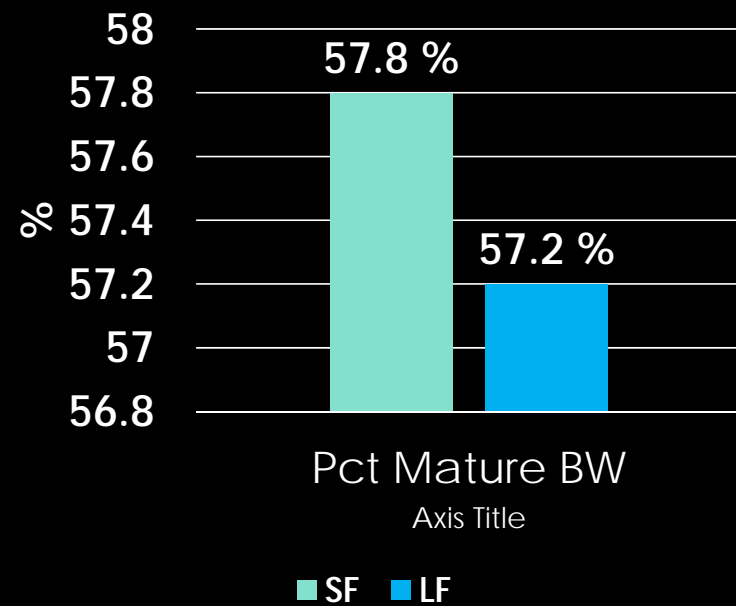




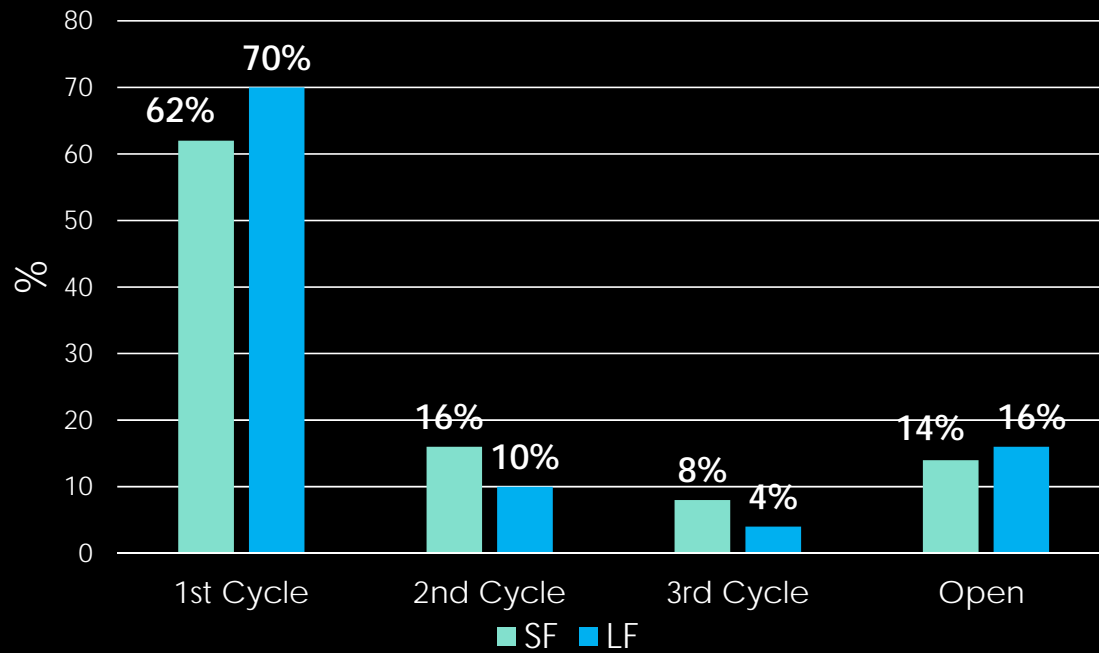
### Feedlot Breeding Weight Change



### Start Breeding: Heifer Percent of Mature Body Weight

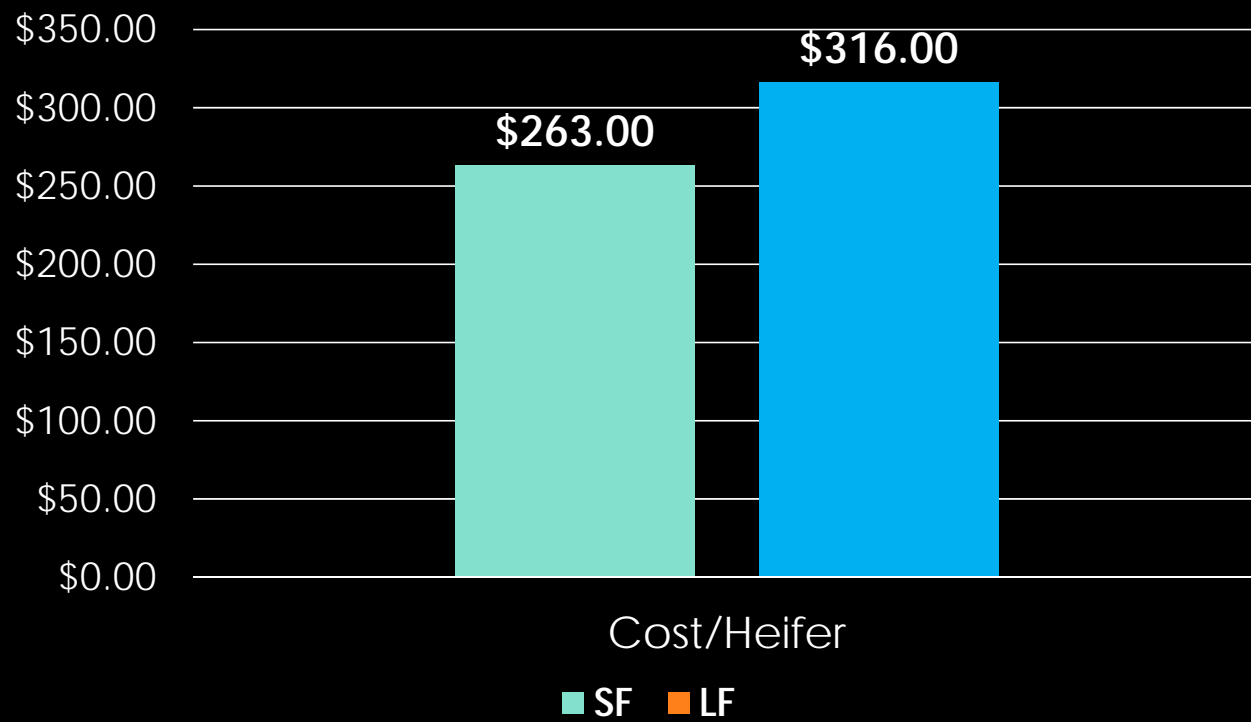


## Breeding Cycle Pregnancy Percent





## Grazing and Feed Cost/Heifer





Thank You

09.11.2013