

# Is Winter Feeding Beef Cows Beneficial for Everyone?

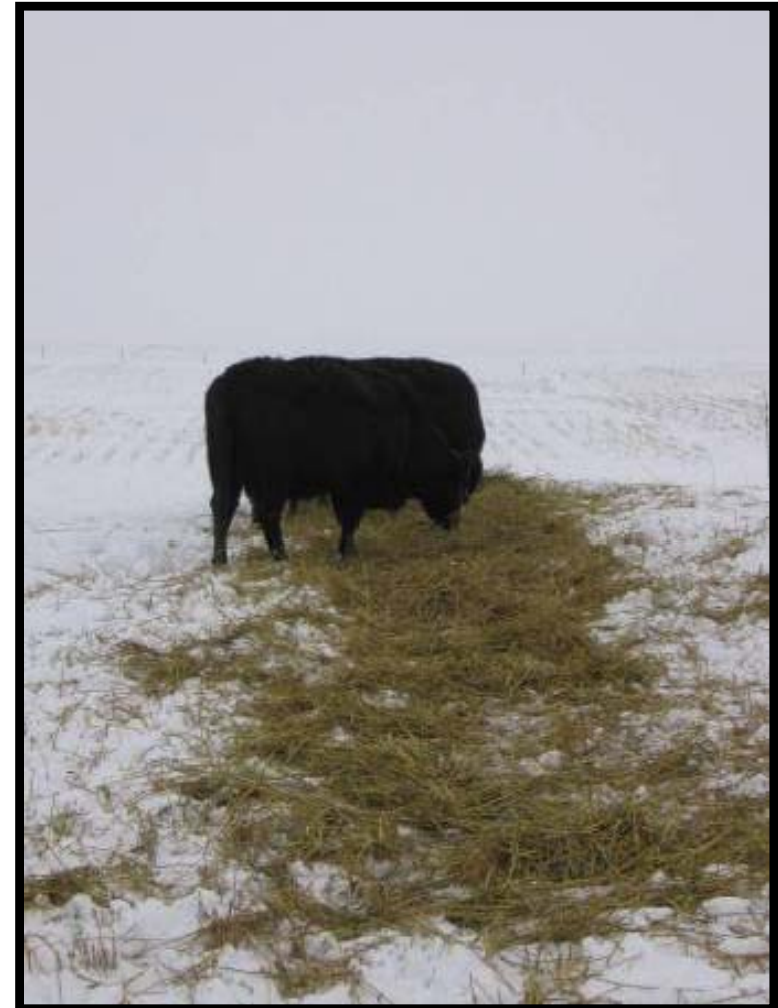


**B. Kelln, University of Saskatchewan**

**H.A. Lardner, Western Beef Development Centre**

# Background

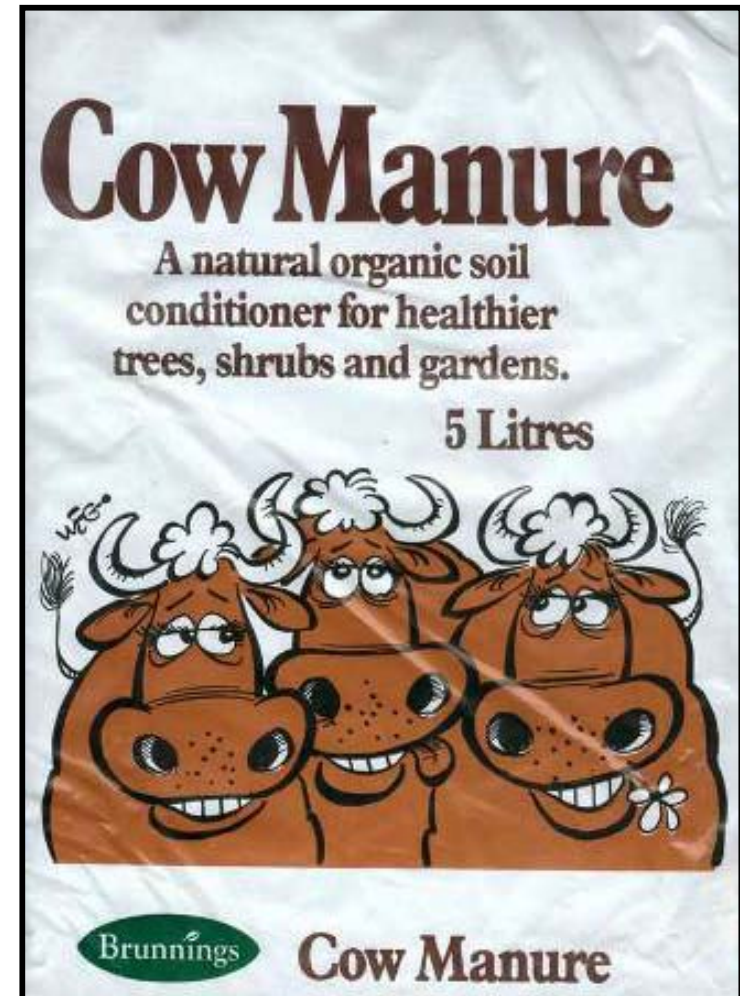
- Traditionally, beef cattle are fed preserved forages in drylot pens
  - Management of manure pack following spring
  - Facilities maintenance
  
- Winter feeding represents 60-65% of total cost of production (Kaliel and Kotowich 2002)
  
- Today, more cows are wintered in extensive field feeding systems
  - Searching for lower feeding costs
  - More efficient use of nutrients
  - Impact on cow performance?
  - Cost?



# Beef Manure as a Source of Nutrients

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- ❑ Beef cattle retain only 10-15% of consumed nutrients (Erickson and Klopfenstein, 2001)
- ❑ Organic matter derived from manure has a significant impact on eroded soils (Lardner 2002)
- ❑ Volatilization and leaching account for 50 to 60% of nitrogen loss in manure (Ball and Ryden, 1984)



# Saskatchewan Backgrounding Economics 2003-2004

**Yardage**

**fuel, utilities, repairs,  
custom work, paid/unpaid  
labor, depreciation, taxes,  
insurance**

**Past yardage cost**

**\$0.25/hd/day**

**Yardage cost (2003-04)**

**\$0.46/hd/day**

**Source: Highmoor 2005, WBDC Fact Sheet #2005-05**

# WBDC Cost of Production Program 2000 - 2005

**Consider cost of wintering cows in facilities**

**Yardage costs among producers were 25-30% of total enterprise COP**

**Yardage costs are significant; need to be reduced where possible**

**Source: Lang, K. WBDC Fact Sheet #2006-01**

# Background Research

- A study conducted at Termuende Research Farm, Lanigan SK.
- Compared bale processing vs. bale grazing on a perennial pasture (Lardner, Jungnitsch, and Schoenau, 2004)
  - Increased nutrient distribution
  - Increased soil N
  - Increased DMY
- Field systems reduced costs by up to **\$0.58 per cow** (Jungnitsch et al. 2004)



# Nutrient Distribution



**Bale Grazing**

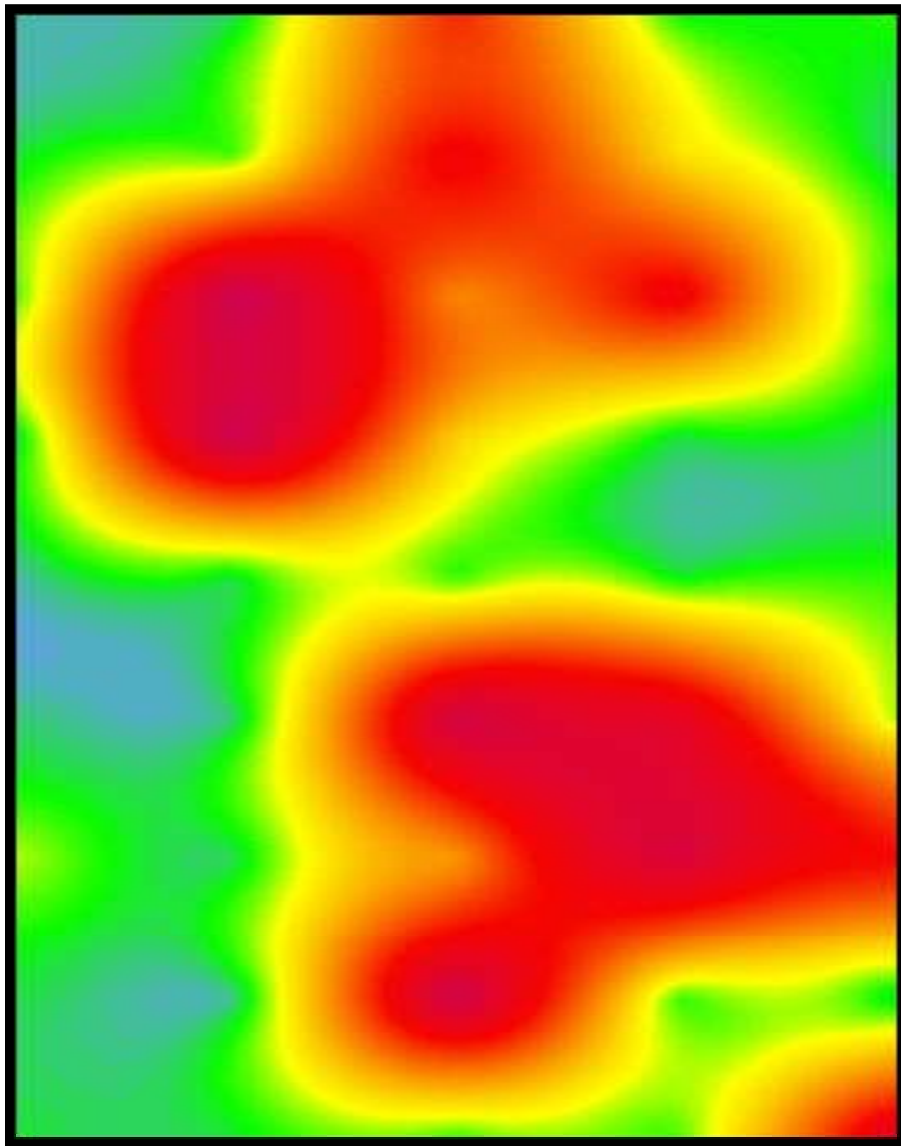


**Bale Processing**

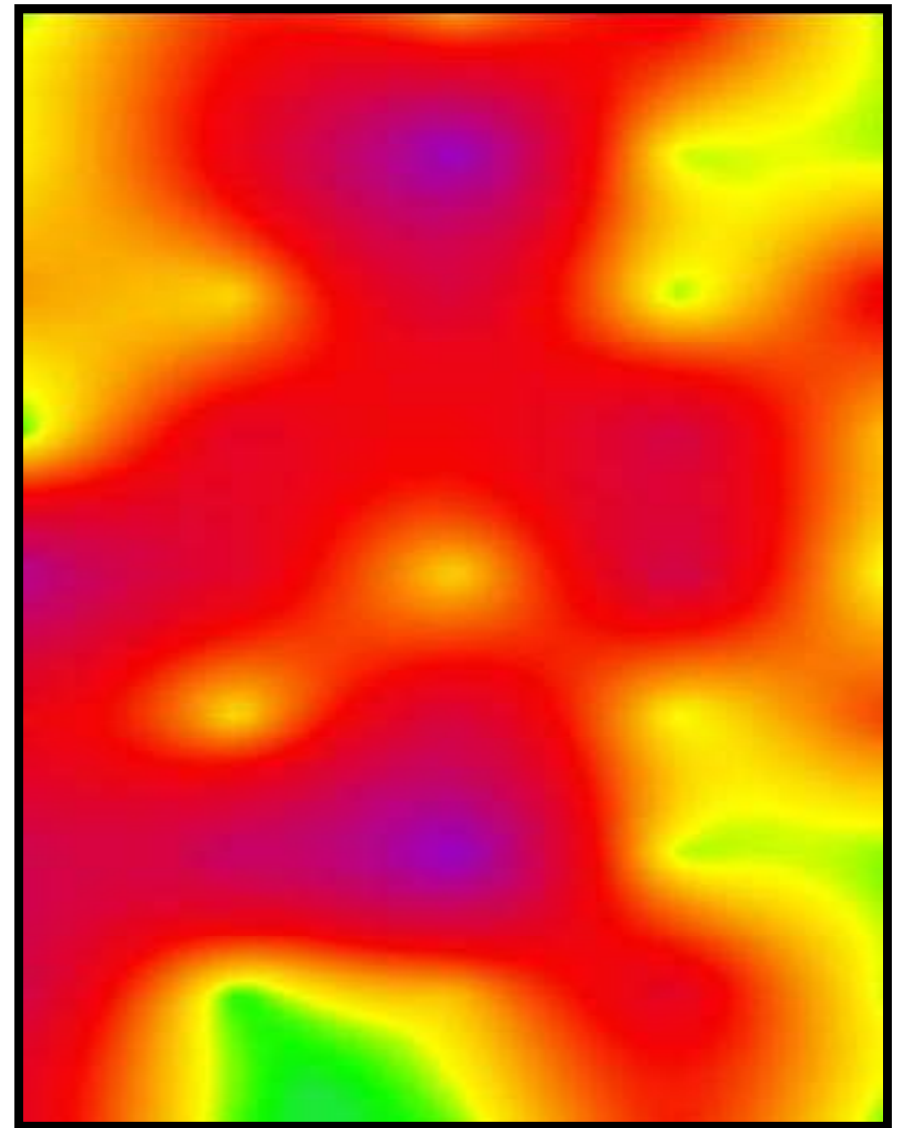
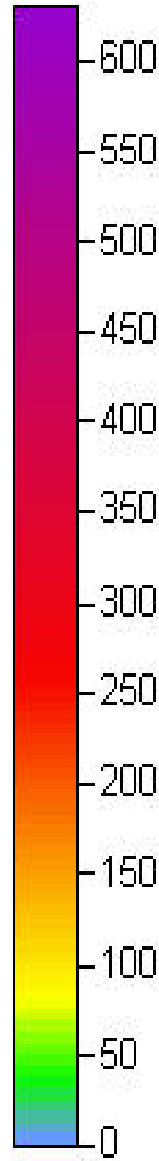
Source: Jungnitsch 2005

# Soil N

( $\text{NO}_3 + \text{NH}_4$  in the 6" depth, kg N/ha)



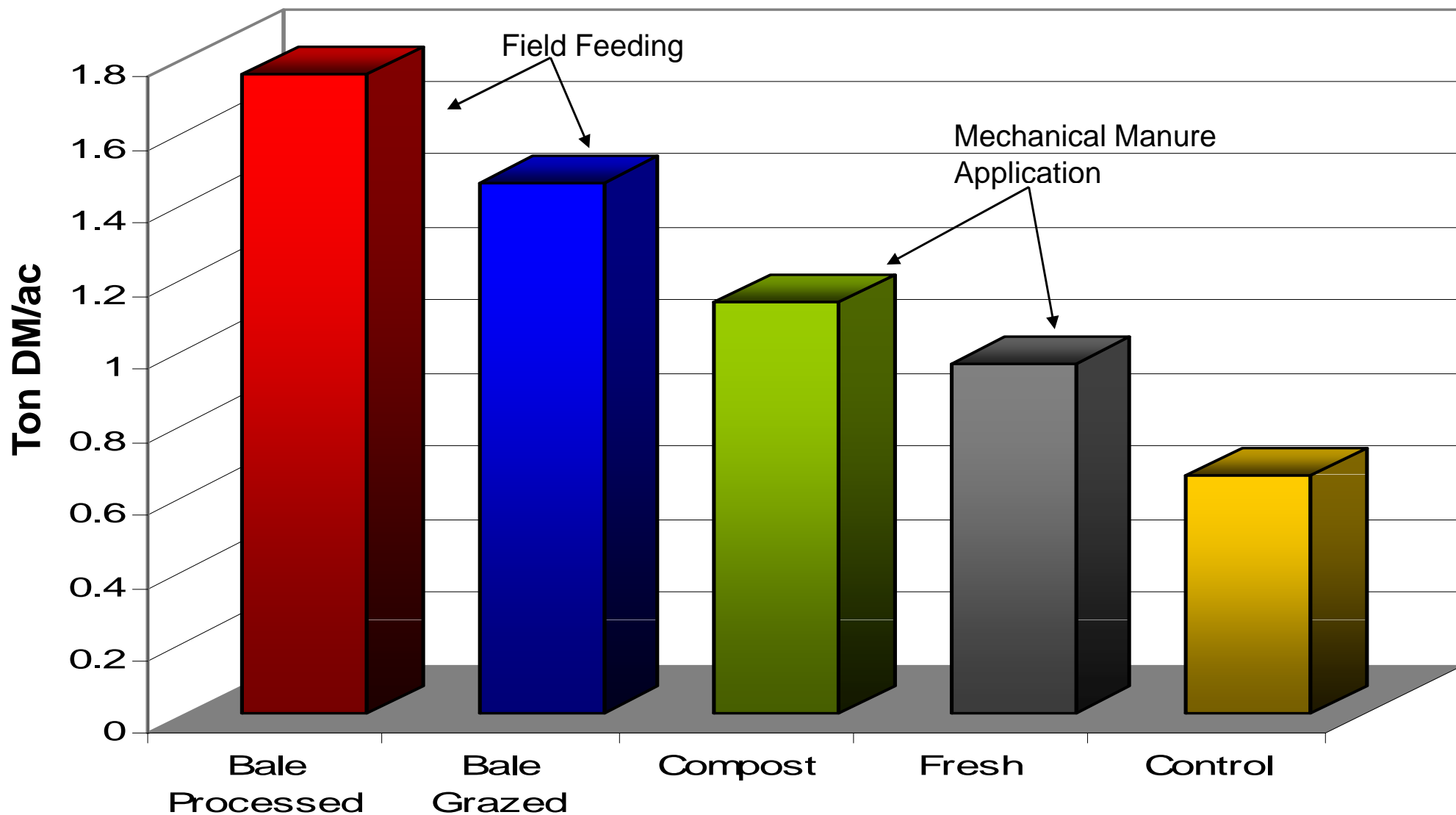
Bale Graze



Bale Processing

Source: Jungnitsch 2005

# Effect of Winter Feed System on Pasture Yield



Source: Jungnitsch 2005

# Current Research



Winter Feeding Systems

2005-2008



# Winter Feed Systems

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In 2005, WBDC initiated a three year study to evaluate beef cow winter feeding systems on an annual cropped field

1. Cow performance and reproductive efficiency
2. Soil nutrient cycling and compaction
3. Crop yield and quality
4. Costs associated with beef cow winter feeding systems

# Background

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- ❑ Swath Grazing
- ❑ Bale Grazing
- ❑ Straw/Chaff Grazing
- ❑ Traditional Drylot



# Winter Feed Systems

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- 100 acres seeded to forage barley mid-June of each year
- Divided into 10, 10 acre paddocks, with one idle paddock
  - Year 1 – raw and compost manure trial
- 180 cows
- 4 feed systems
- 3 paddocks/feed system
  - 15 cows per paddock
  - Drylot cows fed in WBDC yard

# Site Design – 05/06



**Alley**



SG = Swath Graze    ST/CH = Straw/Chaff    BG = Bale Graze

# Winter Feed Systems

- ❑ Crops were swathed at mid-dough stage for swath graze and bale graze
- ❑ Mature straw/chaff paddocks combined into piles using “Wholebuncher”
- ❑ Water and windbreaks were supplied throughout the trial



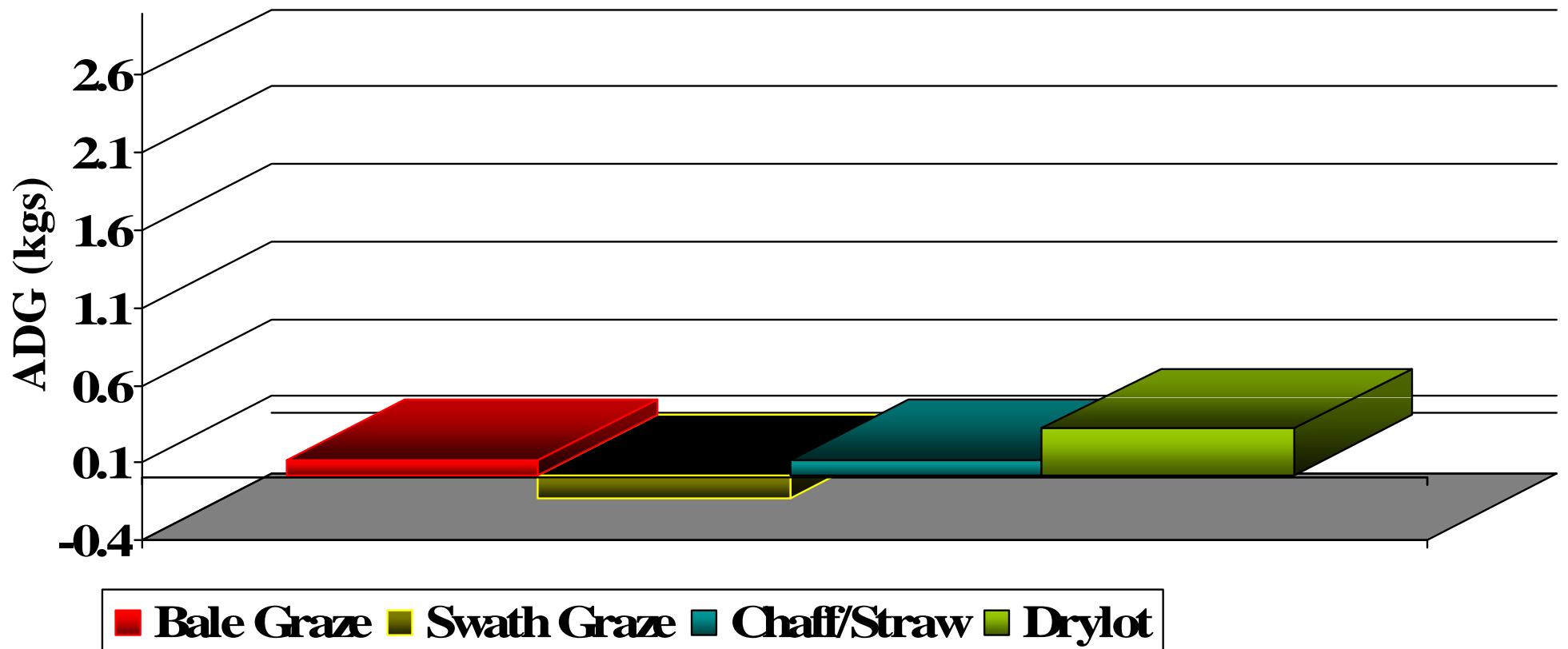
# Cattle Performance

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- Gain and condition
  - Body weight
    - Start, 21 d, & End of Trial
  - Ultra-sound measurements (rib and rump fat)
    - Start & End of Trial
  - Body condition score
    - Start & End of Trial



# Effect of Feeding System on Cow Gain



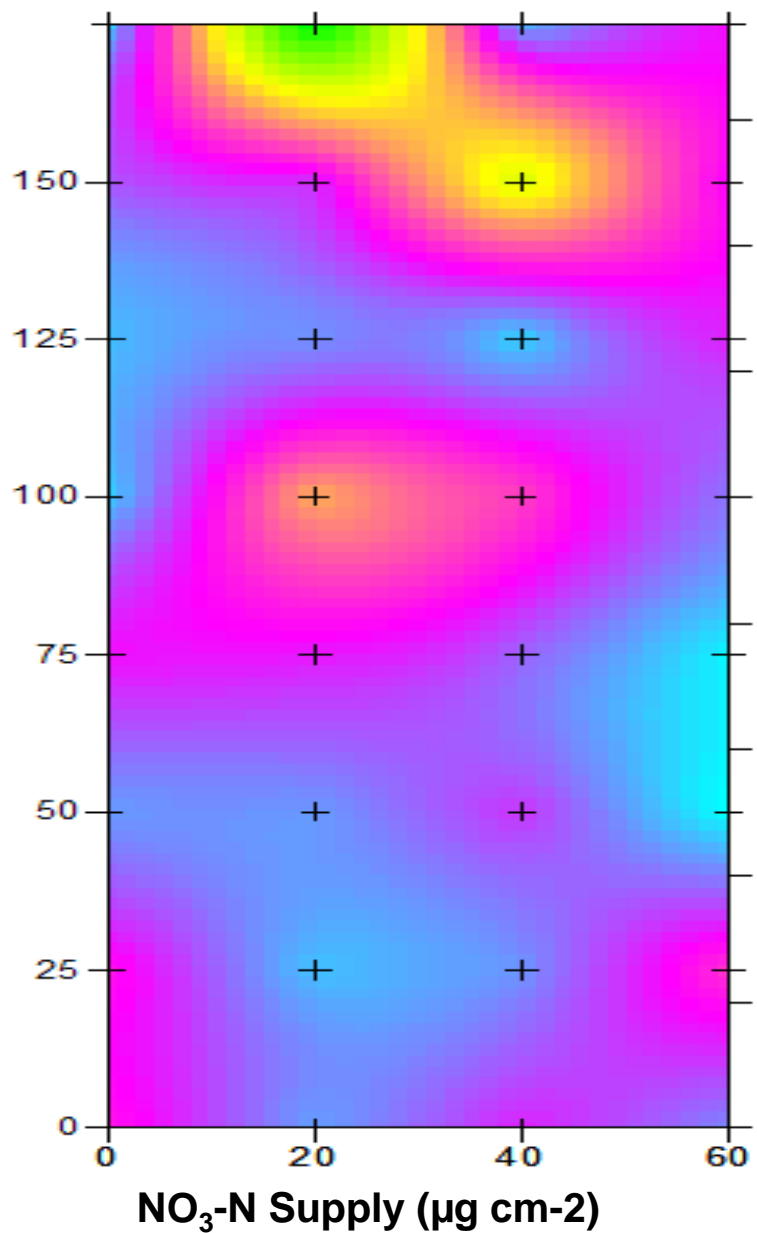


# Soil and Crop Data

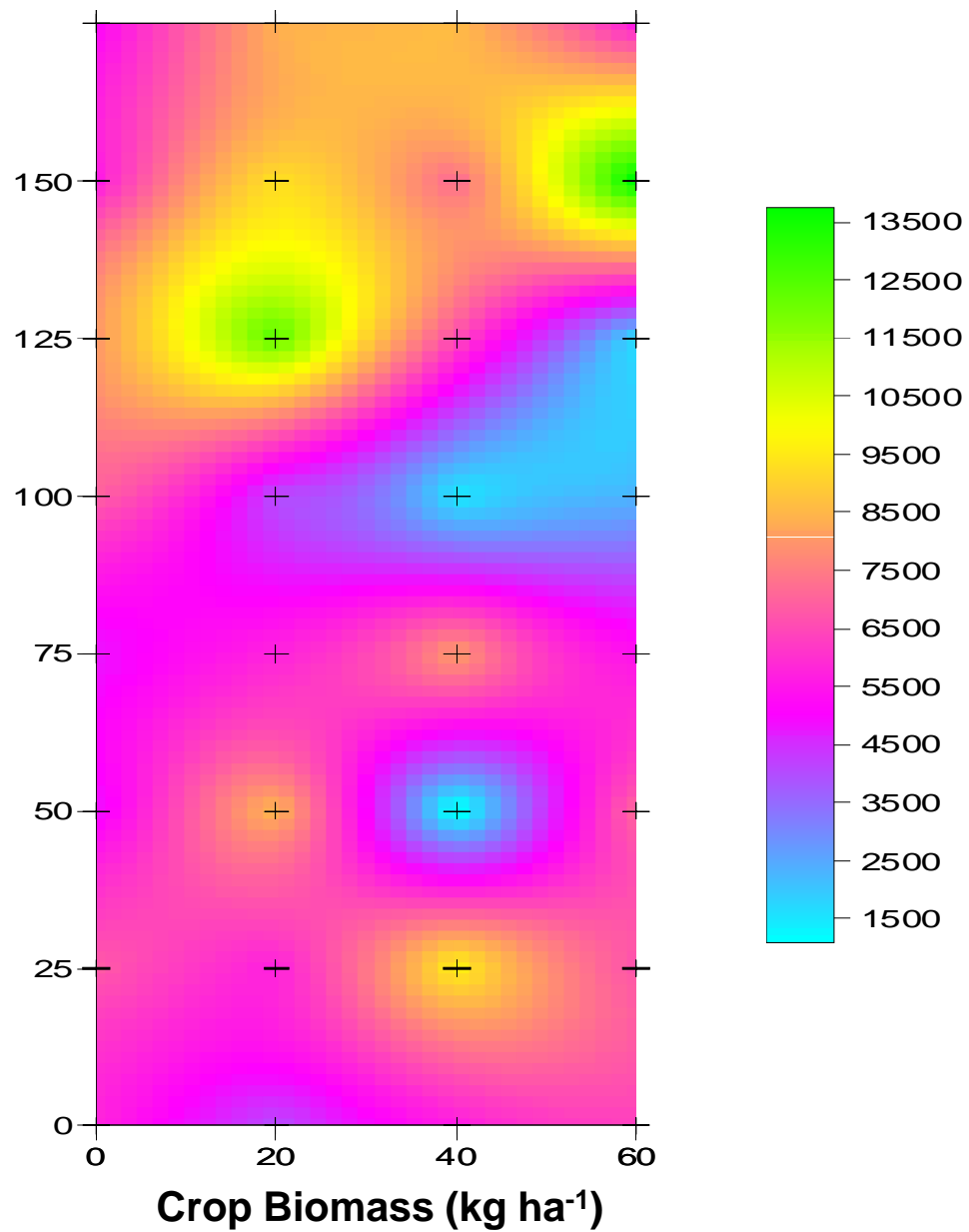
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- Soil nutrients
  - $\text{NO}_3\text{-N}$ ,  $\text{NH}_4\text{-N}$ ,  $\text{P}_2\text{O}_5$ , and K
  
- Soil compaction
  
- Crop yield & crop quality

## Bale Grazed $\text{NO}_3\text{-N}$ Supply

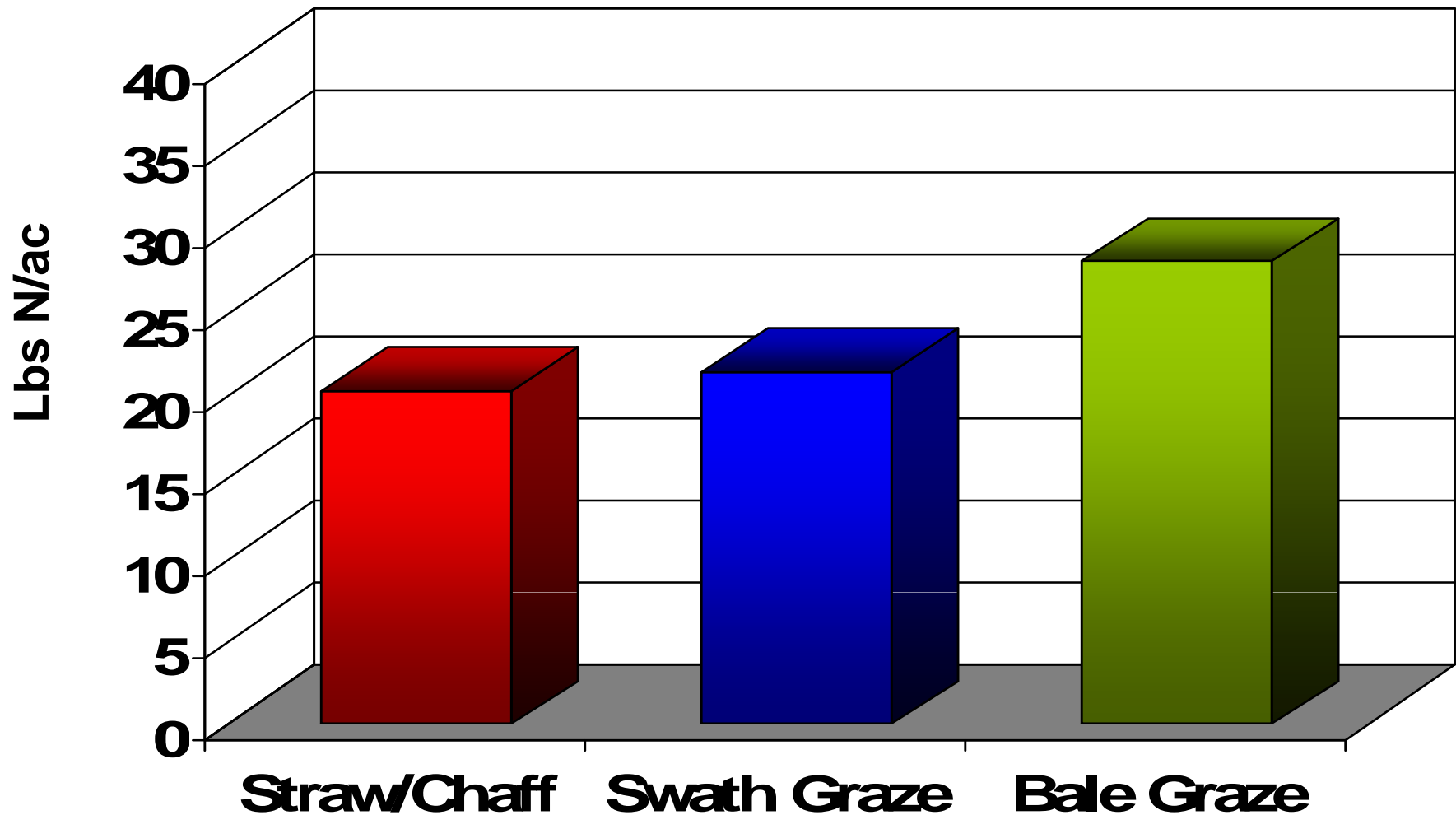


## Bale Grazed Crop Biomass



Source: King and Schoenau 2006

# Soil Inorganic Nitrogen ( $\text{NO}_3 + \text{NH}_4$ ) in the 6" depth (lbs N/ac)



# Cattle return large portion of consumed feed nutrients to soil

## Manure & urine produced daily (ASAE 1999)

62 lb feces (0.4% N; 0.2% P)

20 lb urine (1.1% N; 0.01% P)

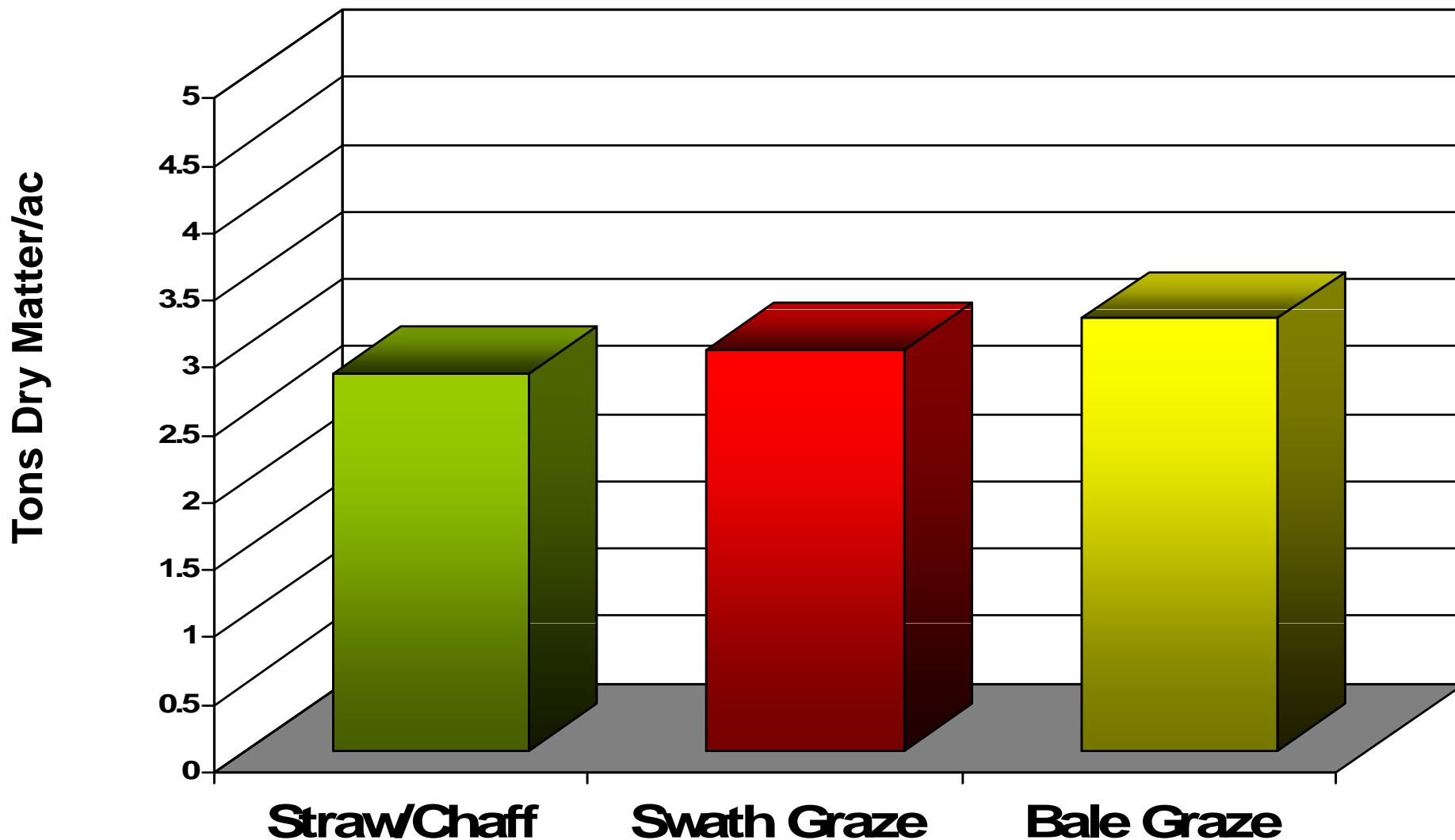
## Calculated Nitrogen

Feces: 45 cows/75d @ 0.25 lb N/hd/day = 844 lb N

Urine: 45 cows/75d @ 0.22 lb N/hd/day = 743 lb N

75% retention = 1190 lb N or 40 lb N/acre

# Effect of Winter Feed System on Barley Crop Yield



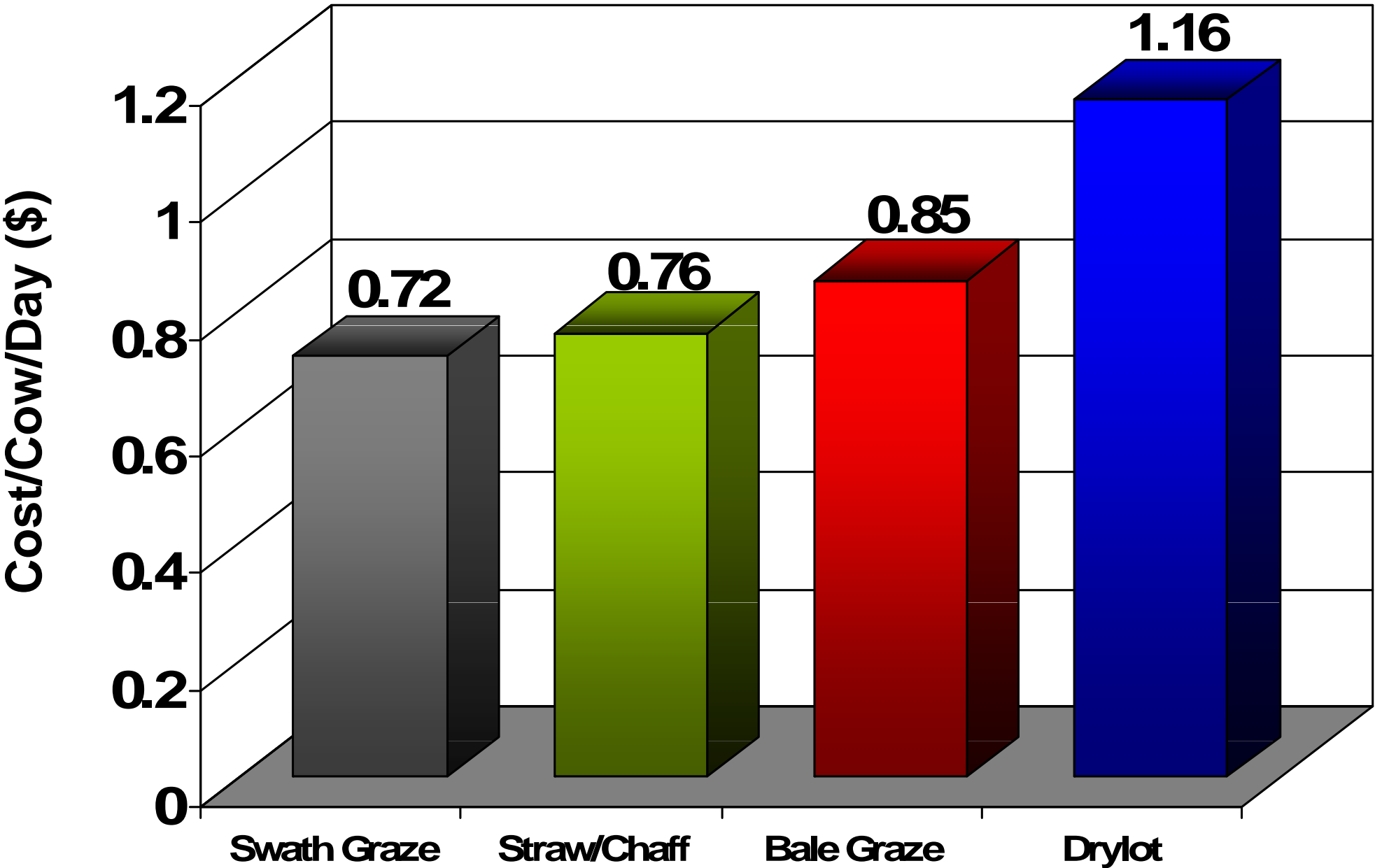
Source: King and Schoenau 2006

# Costs of Winter Feed Systems

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- Swath Graze; Bale Graze
  - field prep, pre and post-seed weed control, seed, seeding, fertilizer, swathing, baling, land rent, feed, labor
- Straw/Chaff
  - field prep, pre and post-seed weed control, seed, seeding, fertilizer, swathing, combining, land rent, feed, supplement, grain revenue, labor
- Drylot
  - field prep, pre and post-seed weed control, seed, seeding, fertilizer, swathing, baling, land rent, feed, labor, feed hauling, yardage, manure hauling

# Costs of Winter Feed Systems





# Conclusions

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- ❑ Field feeding is a viable option
- ❑ Minimal impact on cow performance
- ❑ Patterns of manure distribution indicate capture of nutrients
- ❑ Lower concentration of nutrients compared to pasture feed site trial
- ❑ Weather impact



# Acknowledgments

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- Funding
  - Agriculture Development Fund
  - Beef Development Fund
- Research
  - Leah Froehlich
  - Charles and Maurice Wildeman
  - “Skippy”
  - Tom King
  - Greg Hill
  - Charlotte Ward

# Questions???

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# Costs (\$/cow/day)

<b>Item</b>	<b>Swath Graze</b>	<b>Bale Graze</b>	<b>Straw/ Chaff</b>	<b>Drylot</b>
<b>Feed</b>	<b>0.53</b>	<b>0.77</b>	<b>0.13</b>	<b>0.97</b>
<b>Range Pellet</b>	-	-	<b>0.49</b>	-
<b>Labor</b>	<b>0.20</b>	<b>0.08</b>	<b>0.13</b>	<b>0.04</b>
<b>Equipment</b>	-	-	-	<b>0.13</b>
<b>Custom work (manure)</b>	-	-	-	<b>0.03</b>
<b>Total</b>	<b>0.72</b>	<b>0.85</b>	<b>0.76</b>	<b>1.16</b>

## Swath Graze Crop Production Expenses

Field preparation (harrowing)	3.00
Pre-seeding Round-up (incl.application)	11.70
Seed (\$2/bu @ 2bu/ac)	4.00
Seeding	11.00
Fertilizer	21.35
Chemical Application post-seeding	21.87
Swathing	11.29
Land Rent	30.00
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	\$ 114.21
	<hr/>

## Grazing Expenses

	<b>\$/Cow/Day</b>
Feed	\$ 0.53
Labour	\$ 0.20
Equipment to feed	\$ 0.25
	<hr/>
	<b>\$ 0.97</b>
	<hr/>

## **Bale Graze Crop Production Expenses**

Field preparation (harrowing)	3.00
Round-up (incl.application)	11.70
Seed(2 bu/ac @ \$2/bu)	4.00
Fertilizer	21.35
Seeding	11.00
Chemical Application post-seeding	21.87
Cutting Hay	4.50
Baling (\$8.50/bale)	28.90
Placing bales in field in fall	8.40
Land Rent	30.00
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	\$ 144.72
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## **Grazing Expenses**

	<b>\$/Cow/Day</b>
Feed	\$ 0.77
Labour to allocate new feed	\$ 0.08
Equipment use	\$ 0.25
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	<b>\$ 1.10</b>
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## Straw/ Chaff Crop Production Expenses

Field preparation (harrowing)	3.00
Round-up (incl.application)	11.70
Seed (2 bu/ac @ \$2/bu)	4.00
Fertilizer	21.35
Seeding	11.00
Spraying Puma/Refine (incl. applic)	21.87
Swathing	11.29
Combining	20.00
Hauling Grain	8.67
Land Rent	30.00
Depreciation - Whole Buncher	3.00
Revenue = Harvested Barley Grain	130.87
<b>Total Crop Production Expenses</b>	<hr/> <b>\$ 15.01</b> <hr/>

## Grazing Expenses

	<b>\$/Cow/Day</b>
Feed	\$ 0.13
Pellet Costs	\$ 0.49
Labour to allocate feed	\$ 0.10
Equipment to feed (tractor)	\$ 0.29
Labour to feed pellets	\$ 0.04
	<hr/> <b>\$ 1.04</b> <hr/>

## Drylot Crop Production Expenses

Field preparation (harrowing)	3.00
Round-up (incl.application)	11.70
Seed	4.00
Seeding	11.00
Fertilizer	21.35
Chemical Application post-seeding	21.87
Cutting Hay	4.50
Baling (\$8.50/bale)	28.90
Hauling bales to yard	10.20
Land Rent	30.00
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	\$ 146.52
	<hr/>

## Grazing Expenses

	\$/Cow/Day
Feed (Greenfeed)	\$ 0.97
Labour	\$ 0.04
Tractor	\$ 0.13
Manure Cleaning	\$ 0.03
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	<b>\$ 1.16</b>
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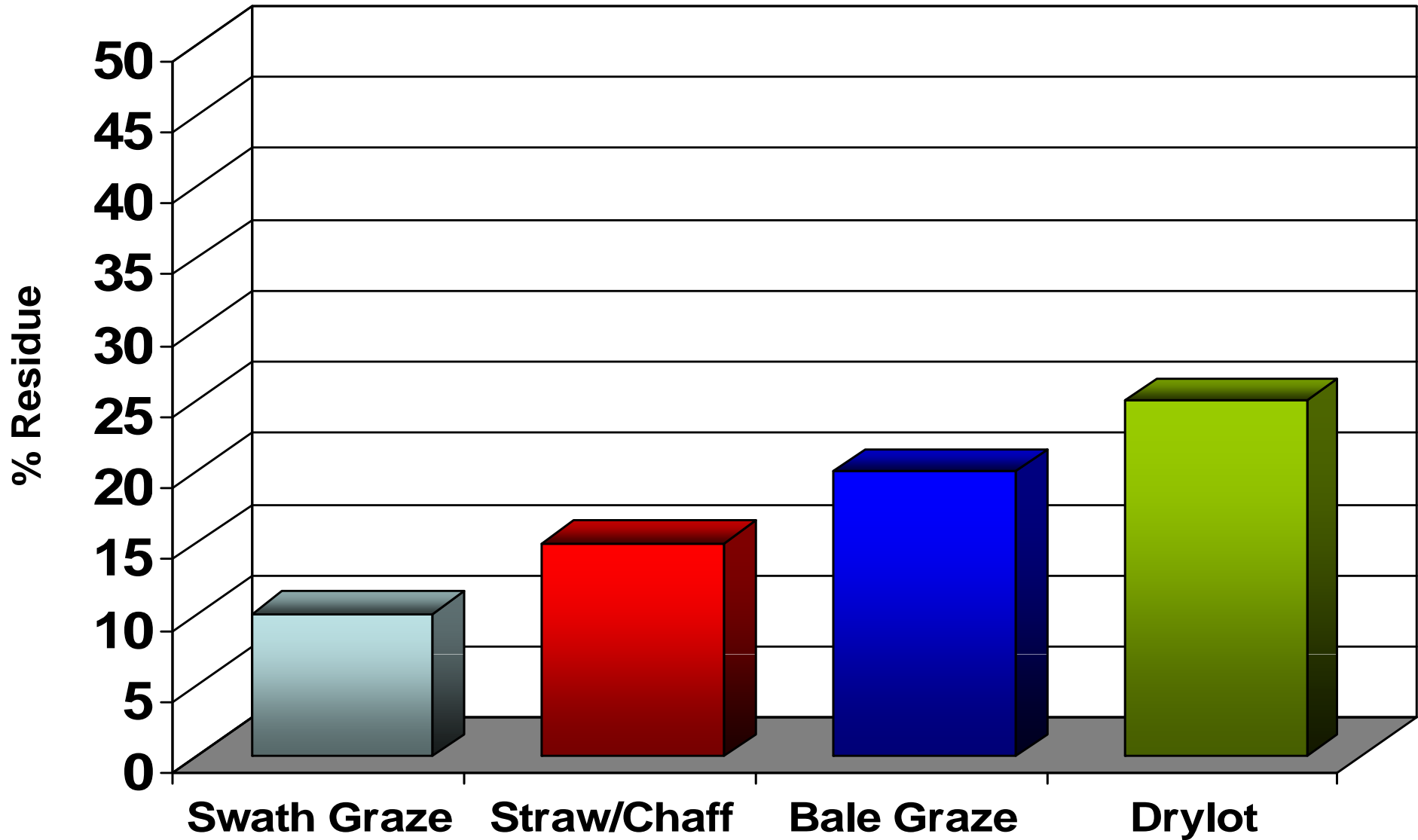
***Composition of Cobalt Ionized salt and 2:1 Mineral***

<b><i>2:1 Minerals</i></b>		<b><i>Cobalt Iodized Salt</i></b>	
<b>Ingredient</b>	<b>Analysis</b>	<b>Ingredient</b>	<b>Analysis</b>
<b>Calcium (Ca) %</b>	<b>22</b>	<b>Salt (NaCl) (Min)</b>	<b>99.0%</b>
<b>Phosphorus (P) %</b>	<b>14</b>	<b>Sodium (Na) Actual</b>	<b>39.0%</b>
<b>Vitamin A KIU/kg</b>	<b>200</b>	<b>Iodine (I) Actual</b>	<b>150 mg/kg</b>
<b>Vitamin E IU/kg</b>	<b>40</b>	<b>Cobalt (Co) Actual</b>	<b>100 mg/kg</b>
<b>Copper (Cu) mg/kg</b>	<b>4000</b>	<b>Salt (NaCl) (Min)</b>	<b>99.0%</b>
<b>Magnesium (Mg) mg/kg</b>	<b>5300</b>		
<b>Zinc (Z) mg/kg</b>	<b>10000</b>		
<b>Iodine (I) mg/kg</b>	<b>125</b>		
<b>Cobalt (Co) mg/kg</b>	<b>40</b>		
<b>Iron (Fe) mg/kg</b>	<b>450</b>		

<b><i>Nutrient composition of range pellet fed to wintering cows</i></b>	
<b><i>Item</i></b>	<b><i>% of Diet</i></b>
<b>Dry Matter %</b>	<b>88.4</b>
<b>TDN %</b>	<b>75.01</b>
<b>Protein %</b>	<b>19.6</b>
<b>Calcium %</b>	<b>0.86</b>
<b>Phosphorus %</b>	<b>0.51</b>
<b>Magnesium %</b>	<b>0.26</b>
<b>Potassium %</b>	<b>0.89</b>
<b>Sulphur %</b>	<b>0.29</b>
<b>Sodium %</b>	<b>0.36</b>
<b>Vitamin A KIU/kg</b>	<b>15</b>
<b>Vitamin E IU/kg</b>	<b>15</b>

<b><i>Nutrient composition of forage fed to wintering cows</i></b>				
	<b>Swath graze</b>	<b>Straw/ Chaff</b>	<b>Bale Graze</b>	<b>Drylot</b>
<b>TDN (%DM)</b>	<b>58.86</b>	<b>54.30</b>	<b>60.36</b>	<b>62.16</b>
<b>CP (%DM)</b>	<b>12.37</b>	<b>9.19</b>	<b>12.83</b>	<b>11.68</b>

# % Residue (waste or benefit?)



# Straw/Chaff





December 12, 2006

# Swath Grazing



# Bale Grazing

