

# Economics of Baled Silage



**Dennis Hancock, PhD.**  
Extension Forage Specialist  
Univ. of Georgia  
Dept. of Crop & Soil Sci.  
**Curt Lacy, PhD.**  
Former UGA Extension  
Livestock Economist



[www.georgiaforages.com](http://www.georgiaforages.com)

# Economics of Baleage

- Baleage has the potential to be more economical than conventional hay production
- Much of this is driven by herd size
- Analyze 3 scenarios w/ yield held constant:
  - Scenario 1: Reduced feeding and storage losses
  - Scenario 2: Reduced purchased feed costs due to feeding higher quality forages
  - Scenario 3: Combination of reduced feeding losses and reduced purchased feed costs
- Analyze a scenario w/ yield increased and increased number of cuttings:
  - More timely harvest, better quality, and more yield

# Wrapper Costs

## Wrapper Styles

- 3 point hitch (\$8,000 - \$22,000)
- individual (\$14,000 - \$26,000)
- in-line (\$20,000 - \$42,000)



# Baled Silage Costs



**Plastic Cost:**  
**\$6.00 - \$8.00/ton DM**



**Wrapper cost:**  
**\$2.00 - \$5.00/ton DM**

**Fuel & Repairs:**  
**\$0.50 - \$5.00/ton DM**

**Labor:**  
**\$0.75 - \$2.00/ton DM**

# Data and Methods

- Compare the direct costs of use of in-line bale wrapper to conventional hay production
- Compare costs of bermudagrass and winter annuals in these scenarios
- Use UGA Extension forage budgets
  - 1,200 pound cow fed for 120 days at 2% of body weight (1.8 tons per cow)

# Assumptions – Equipment Costs

	Conventional Round Baler	High Moisture Round Baler	In-Line Wrapper	Individual Wrapper
Purchase Price	\$31,500	\$36,500	\$30,000	\$22,500
Estimated Useful Life	8 Years	8 Years	15 Years	15 Years
Estimated Annual Use	200 Hours	200 Hours	48 Hours	96 Hours
Repair and Maintenance Rate	90%	90%	5%	5%
Bales Wrapped in 1 Hour	N/A	N/A	48 Bales	15 Bales
Bales Wrapped per Plastic Roll	N/A	N/A	35 Bales	22.5 Bales
Length of Loan	5 Years	5 Years	5 Years	5 Years
Interest Rate	5.25%	5.25%	5.25%	5.25%
Annual Loan Payment	\$7,326.06	\$8,488.93	\$6,977.20	\$5,232.90

Pruitt and Lacy, 2013.



**\$1,162.77  
Difference**



**\$8,139.97  
Total**



**\$6,395.67  
Total**

# Assumptions – Variable Costs for Wrapping (per ton)

	In-Line Wrapper	Individual Wrapper
Tractor Operating Cost (\$3.30/gal. diesel) <sup>1</sup>	\$0.30	\$0.93
Bale Wrapper Repair and Maintenance	\$0.04	\$0.05
Plastic Costs (\$89/roll)	\$2.54	\$3.96
Gas Costs (\$3.30/gal.)	\$0.07	\$0.00
Labor (\$9.60/hour)	\$0.22	\$1.40
Direct Tractor and Bale Wrapper Costs	\$3.16	\$6.35
Indirect Tractor and Bale Wrapper Costs	\$1.35	\$1.94
Total Wrapping Costs	\$4.51	\$8.29
Total Wrapping and Harvesting Costs <sup>2</sup>	\$10.03	\$13.81

Pruitt and Lacy, 2013.

# Economics of Baleage

- Baleage has the potential to be more economical than conventional hay production by virtue of 3 scenarios:
  - Scenario 1: Reduced feeding and storage losses



# The Unseen Cost of Hay Storage

	Expected Losses	Cost of Production (\$/ton)			
		\$80	\$100	\$120	\$140
		<i>Value of Losses in the System (\$/ton)</i>			
Hay, no cover/on ground	50%	\$40	\$50	\$60	\$70
Hay, under roof	25%	\$20	\$25	\$30	\$35
Baleage	15%	\$12	\$15	\$18	\$21

# Variable Costs for Baleage: In-Line Wrapping (per ton)

Total Tons of Baleage Harvested (As Fed Basis)	Savings Due to Reduced Hay Losses <sup>1</sup>	Annual Ownership Cost <sup>2</sup>	Increase in Operation Costs	Cost Increase Per Ton (As Fed Basis)
90	\$3,390.25			
180	\$6,780.50			
270	\$10,170.75			
360	\$13,561.00			
450	\$16,951.25			
540	\$20,341.49			
630	\$23,731.74			
1,000	\$37,669.43			

<sup>1</sup> Hay costs = ~\$125/ton; storage and feeding losses = 30%.

<sup>2</sup> Added ownership cost of bale wrapper and silage baler.

**Breakeven tons of baleage to cover hay losses = 216 tons/year**

# Variable Costs for Baleage: Individual Bale Wrapping (per ton)

Total Tons of Baleage Harvested (As Fed Basis)	Savings Due to Reduced Hay Losses	Annual Ownership Cost <sup>1</sup>	Increase in Operation Costs	Cost Increase Per Ton (As Fed Basis)
90	\$3,103.60			
180	\$6,207.20			
270	\$9,310.80			
360	\$12,414.40			
450	\$15,518.00			
540	\$18,621.60			
630	\$21,725.20			
1,000	\$34,484.45			

<sup>1</sup> Hay costs = ~\$125/ton; storage and feeding losses = 30%.

<sup>2</sup> Added ownership cost of bale wrapper and silage baler.

**Breakeven tons of baleage to cover hay losses = 186 tons/year**

# Scenario 2 Results

- Baleage technology economically justifiable on improved forage quality compared to purchased feed costs
  - Used UGA Basic Balancer (Stewart, Hancock, and Lacy, 2013)
  - Assumed zero feeding losses
  - Ration of whole cottonseed, corn, and a mixture of corn gluten feed and soy hulls

# Ration Costs

	Good Hay	Average Hay	Poor Hay	Bermuda Baleage	Winter annuals Baleage
Amount of DM pounds fed					
Crude Protein					
Total Digestible Nutrient					
Bales needed					
Supplemental feed (tons)					

# Net Savings from Bermudagrass Baleage Excluding Cost of Baler and Bale Wrapper

Number of Beef Cows	Good Hay	Average Hay	Poor Hay
25	(\$4,180.93)	(\$3,192.21)	(\$1,1718.60)
50	(\$8,361.85)	(\$6,384.42)	(\$3,437.20)
100	(\$16,723.71)	(\$12,768.84)	(\$6,874.40)
250	(\$41,809.27)	(\$31,922.10)	(\$17,185.99)
500	(\$83,618.53)	(\$63,844.20)	(\$34,371.98)

- There is not a scenario in this analysis where bermudagrass baleage is more economical than bermudagrass hay – even hay from a year like 2013!

# Winter Annual Baleage Cost Savings Excluding Cost of Baler and Bale Wrapper

Number of Beef Cows	Good Hay	Average Hay	Poor Hay
25	\$28.48	\$1,017.20	\$2,490.81
50	\$56.97	\$2,034.40	\$4,981.63
100	\$113.94	\$4,068.81	\$9,963.25
250	\$284.85	\$10,172.01	\$24,908.13
500	\$569.70	\$20,344.03	\$49,816.25

- With equipment fixed costs of \$7,000 to \$15,000, breakeven herd size is 75 to 150 beef cows.

# Scenario 3 Results

- Improved feeding quality and reduced storage losses results in purchase of baleage technology being more economically feasible
  - Savings of:
    - \$8/cow/year for bermudagrass baleage
    - \$100/cow/year for winter annual grass baleage
- Viable herd size of 50 to 75 beef cows to purchase baleage technology if growing winter annuals.



# Economics of Baleage

- Baleage has the potential to be more economical than conventional hay production
- Much of this is driven by herd size
- Analyze 3 scenarios w/ yield held constant:
  - Scenario 1: Reduced feeding and storage losses
  - Scenario 2: Reduced purchased feed costs due to feeding higher quality forages
  - Scenario 3: Combination of reduced feeding losses and reduced purchased feed costs
- Analyze a scenario w/ yield increased and increased number of cuttings:
  - More timely harvest, better quality, and more yield

# Timely Harvest, Higher Quality, Greater Yields - Bermudagrass

Item	Hay	Baleage
Number of Cuttings	3	5
Tons of Dry Matter per Acre	4.05	6.25
Crude Protein (Percentage)	10.1	12.9
TDN (Percentage)	53.8	57.1
Cost (Dollars per Acre)	\$400.00	\$452.50
Cost (Dollars per Ton of Dry Matter)	\$100.00	\$72.40
Ration Cost (Dollars per Day)	\$1.86 <sup>1</sup>	\$1.26 <sup>2</sup>

Balanced ration for lactating beef cow using 50:50 CG:SH supplement (\$225/ton) requiring 1) 6.8 lbs and 2) 3.7 lbs/hd/d, respectively.

Hersom et al., 2007.

# Conclusions

- Baleage technology has economic merit for Southeastern U.S. beef cow-calf producers
  - Breakeven herd size is approximately 50 cows if already own hay equipment
- Combined reduction in feeding and storage losses make it economically feasible
- Baleage becomes more economical with higher-quality forages such as:
  - Winter annuals
  - Alfalfa
  - Clovers/other legumes mixed with bermudagrass

# Conclusions

- VERY difficult to justify baleage if primary stored forage is bermuda, bahia, or lower-quality forages.
  - Unless, a significant inc. in yield along with improved quality can be realized.



# **Economics of Baleage** *for Beef Cattle Operations*

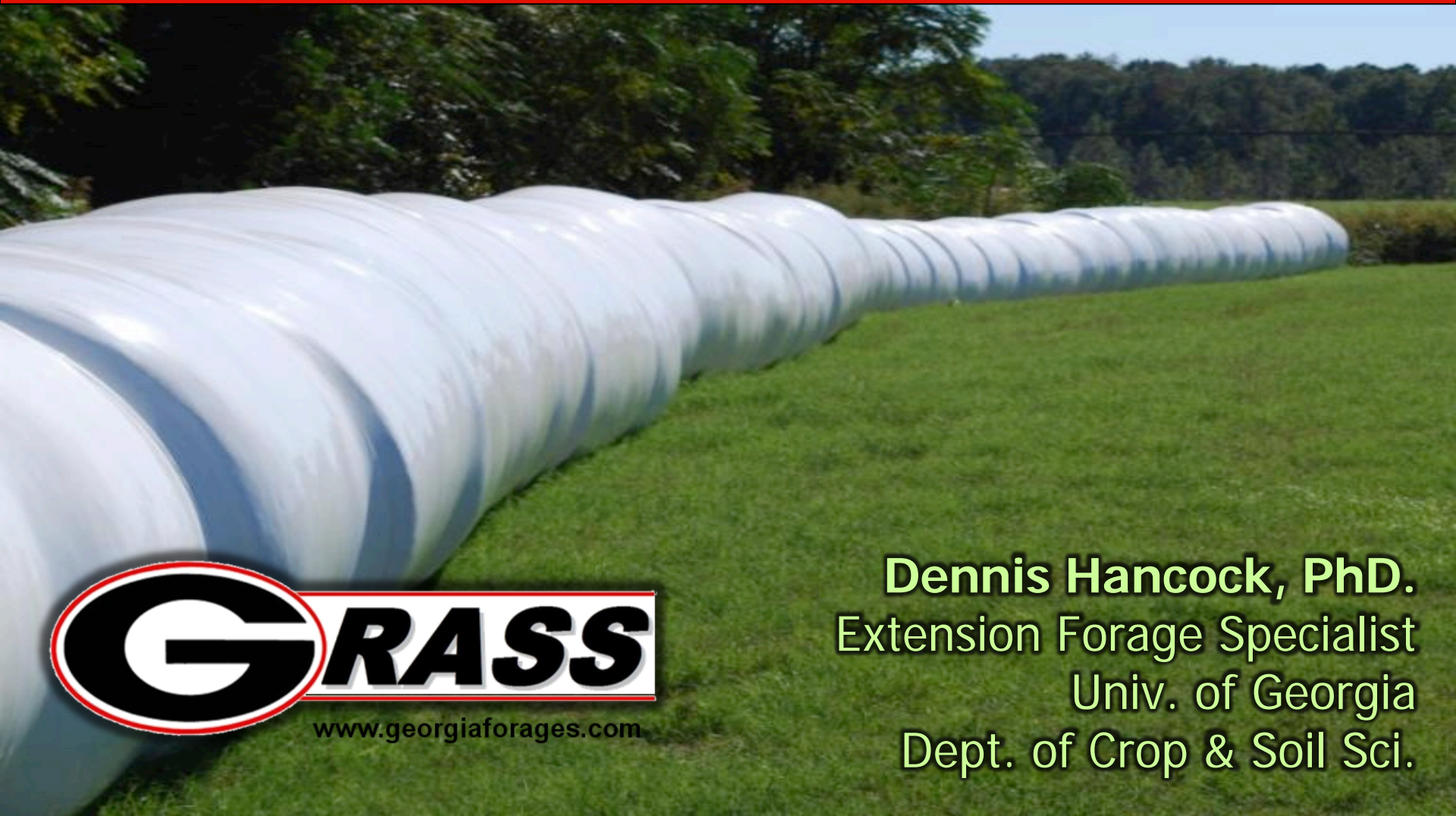
## **J. Ross Pruitt**

Assistant Professor and Extension Economist,  
Department of Agricultural Economics and Agribusiness,  
LSU AgCenter

## **R. Curt Lacy**

Associate Professor and Extension Economist,  
Department of Agricultural and Applied Economics,  
University of Georgia

# Questions?



[www.georgiaforages.com](http://www.georgiaforages.com)

**Dennis Hancock, PhD.**  
Extension Forage Specialist  
Univ. of Georgia  
Dept. of Crop & Soil Sci.