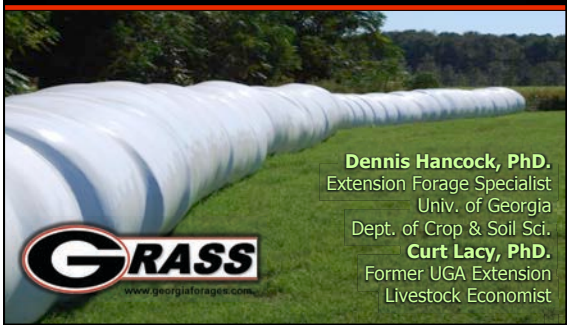
Economics of Baled Silage



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

Background

- Pasture, feed, and forage costs are approximately 2/3 of cash operating expenses in beef cow-calf operations
- Goal is to reduce these costs while minimizing losses in the hay production/feeding phases
- Interest in baleage has increased due to recent droughts and extended wet periods

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

GRASS
www.georgiaforages.com

UNIVERSITY OF GEORGIA
EXTENSION

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)[1]	$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[2]	$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

		Cost of Production ($/ton)			
	Expected Losses	$80	$100	$120	$140
		Value of Losses in the System ($/ton)			
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[1]	Annual Ownership Cost[2]	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			

[1] Hay costs =~$125/ton; storage and feeding losses = 30%.
[2] Added ownership cost of bale wrapper and silage baler.

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

Pruitt and Lacy, 2013.

GRASS www.georgiaforages.com

UNIVERSITY OF GEORGIA EXTENSION

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

Total Tons of Baleage Harvested (As Fed Basis)	Savings Due to Reduced Hay Losses[1]	Annual Ownership Cost[2]	Increase in Operation Costs	Cost Increase Per Ton (As Fed Basis)
90	$3,390.25	$8,140.07	$4,749.82	$52.78
180	$6,780.50	$8,140.07	$1,359.57	$7.55
270	$10,170.75	$8,140.07	($2,030.68)	($7.52)
360	$13,561.00	$8,140.07	($5,420.93)	($15.06)
450	$16,951.25	$8,140.07	($8,811.18)	($19.58)
540	$20,341.49	$8,140.07	($12,201.43)	($22.60)
630	$23,731.74	$8,140.07	($15,591.68)	($24.75)
1,000	$37,669.43	$8,140.07	($29,529.37)	($29.53)

[1] Hay costs =~$125/ton; storage and feeding losses = 30%.
[2] Added ownership cost of bale wrapper and silage baler.

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

Pruitt and Lacy, 2013.

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[1]	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			

[1] Hay costs =~$125/ton; storage and feeding losses = 30%.
[2] Added ownership cost of bale wrapper and silage baler.

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

Pruitt and Lacy, 2013.

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[1]	Increase in Operation Costs	Cost Increase Per Ton (As Fed Basis)
90	$3,103.60	$6,395.77	$3,292.17	$36.58
180	$6,207.20	$6,395.77	$188.57	$1.05
270	$9,310.80	$6,395.77	($2,915.03)	($10.80)
360	$12,414.40	$6,395.77	($6,018.64)	($16.72)
450	$15,518.00	$6,395.77	($9,122.24)	($20.27)
540	$18,621.60	$6,395.77	($12,225.84)	($22.64)
630	$21,725.20	$6,395.77	($15,329.44)	($24.33)
1,000	$34,484.45	$6,395.77	($28,088.68)	($28.09)

[1] Hay costs =~$125/ton; storage and feeding losses = 30%.
[2] Added ownership cost of bale wrapper and silage baler.

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

Pruitt and Lacy, 2013.

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)	($1,718.60)
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!

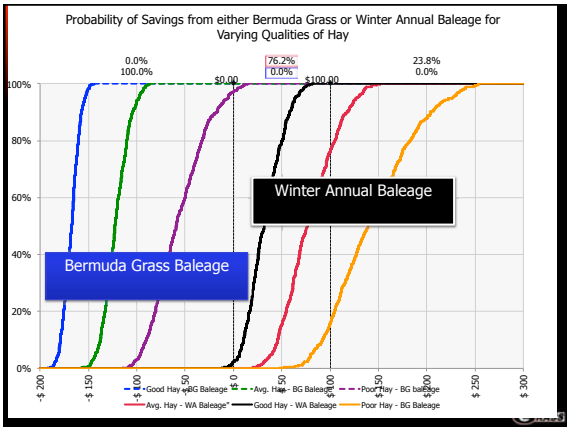
GRASS www.georgiaforages.com

UNIVERSITY OF GEORGIA EXTENSION

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[1]	$1.26[2]

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

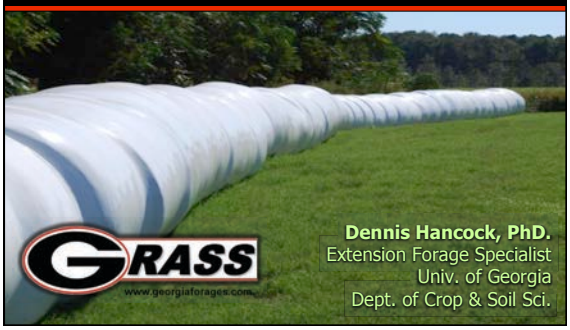
GRASS
www.georgiaforages.com

UNIVERSITY OF GEORGIA
EXTENSION

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.

Questions?



GRASS
www.georgiaforages.com

UNIVERSITY OF GEORGIA
EXTENSION