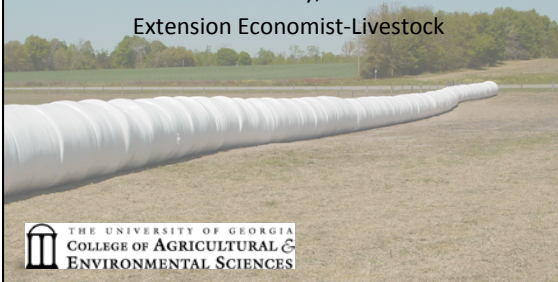


# 2014 Southeast Hay Convention

## Economics of Baled Silage




**Economic Returns and Risk Analysis of Baleage**  
 R. Curt Lacy, Ph.D.  
 Extension Economist-Livestock



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 ENVIRONMENTAL SCIENCES

### Background

- Pasture, feed, and forage costs are approximately 2/3 of cash operating expenses in beef cow-calf operations
- Extension education efforts routinely focus on strategies to reduce these costs
- Interest in baleage has increased due to recent droughts and extended wet periods




### Baleage

- Baleage is harvesting of forages at higher moisture content than hay and wrapping the forage in plastic for later consumption
  - Weather and labor constraints
  - Storage losses in the Southeastern U.S.
- Higher moisture content increases nutritive value and palatability
  - Lowers feeding losses
- Ability to harvest and store higher quality annual forages
  - Lower feed cost
  - Increased animal productivity




### 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
  - Scenario 2: Reduced purchased feed costs due to feeding higher quality forages
  - Scenario 3: Combination of reduced feeding losses and reduced purchased feed costs
- Much of this is driven by herd size



### Data and Methods

- Compare the direct costs of use of in-line bale wrapper to conventional hay production
- Compare costs of Bermuda grass hay and winter annuals in the 2<sup>nd</sup> and 3<sup>rd</sup> scenarios
- Use University of Georgia Extension forage budgets
  - 1,200 pound cow fed for 120 days at 2% of body weight (1.8 tons per cow)



### Assumptions

	Conventional Hay	Bermuda grass Baleage	Winter Annual grass Baleage
DM pounds per bale	850	600	600
Number of bales (1 <sup>st</sup> cutting)	3.50	5.00	6.67
1 <sup>st</sup> harvest total cost (\$/acre)	\$207.91	\$240.01	\$310.93
Additional cuttings	2.00	3.00	2.00
Number of bales subsequent cuttings	10.59	15.00	13.33
Total cost additional cuttings (\$/acre)	\$314.94	\$849.75	\$514.67
Prorated establishment cost (\$/acre)	\$50.00	\$50.00	\$0.00
Total cost per acre	\$572.85	\$1,139.76	\$825.59
Total DM tons per acre	6.00	6.00	6.00
Cost/ton – DM basis	\$95.48	\$189.96	\$137.60
Cost/bale – DM basis	\$40.58	\$56.99	\$41.28

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### Methods

- Using @Risk (MS-Excel add-in), simulated 500 iterations of difference in annual cow feeding costs
  - Triangle distribution used
  - Estimated DM Storage Losses

	Hay	Baleage
Best	5.00%	3.00%
Expected	15.00%	10.00%
Worst	40.00%	15.00%

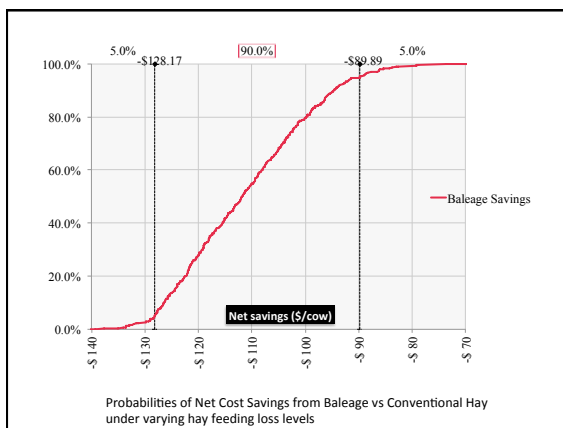
Adapted from Belyea et al. (1985), Hancock and Collins (2006), and Rotz and Shinnars (2007)



### Scenario 1 Results

- Reduced feeding and storage costs are not large enough to justify purchase of an in-line bale wrapper

Production Assumptions	Cow	Hay	Baleage
Average weight (lbs)	1,200		
Consumption per day (% BW)	2%		
Days in winter feeding period	120		
Total DM lbs needed	2,880	2,880	2,880
Feeding losses % DM		20%	9%
Total lbs DM		3,456	3,149
Variable cost per bale (DM basis)		\$40.58	\$56.99
Total feeding costs (\$/cow/year)		\$164.98	\$299.07
Savings from feeding baleage (\$/cow/year)			(\$134.09)



### 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 grass Baleage	Winter annuals Baleage
Amount of DM pounds fed	3,540	3,072	2,292	3,540	3,696
Crude Protein	12%	12%	6%	12%	16%
Total Digestible Nutrient	58%	53%	45%	58%	62%
Bales needed	4.2	3.6	2.7	5.9	6.2
Total hay/baleage costs	\$168.99	\$146.65	\$109.42	\$336.23	\$254.28
Supplemental feed (tons)	0.40	0.62	0.98	0.40	0.00
Supplemental feed (\$/ton)	\$215.00	\$240.00	\$255.00	\$215.00	\$0.00
Total supplement cost	\$86.43	\$148.32	\$249.39	\$86.43	\$0.00
Total feeding cost per cow	\$255.42	\$294.97	\$358.81	\$422.66	\$254.28



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### Net Savings from Bermuda Grass 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 Bermuda grass baleage is more economical than Bermuda grass hay – even hay from a year like 2013!



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## Economics of Baled Silage



### 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 Bermuda grass 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.



### Savings at Different Levels of Hay Quality

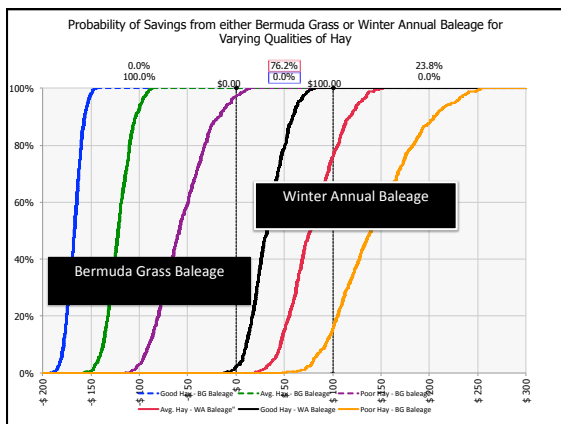
	Bermuda Grass Baleage			Winter Annual Grass Baleage		
	Good Hay	Average Hay	Poor Hay	Good Hay	Average Hay	Poor Hay
Mean	(\$167.70)	(\$120.83)	(\$56.65)	\$5.32	\$52.19	\$116.37
Minimum	(\$192.45)	(\$146.18)	(\$85.10)	(\$12.66)	429.11	\$92.58
Maximum	(\$147.03)	(\$93.40)	(\$27.41)	\$22.92	\$79.21	\$146.55
Standard Deviation	\$8.13	\$10.39	\$11.60	\$7.20	\$9.59	\$11.27
Percent change of positive savings	0.00%	0.00%	0.00%	75.00%	81.00%	100.00%



### What if Feed Prices are Unknown?

	Bermuda Grass Baleage			Winter Annual Grass Baleage		
	Good Hay	Average Hay	Poor Hay	Good Hay	Average Hay	Poor Hay
Mean	(\$167.70)	(\$121.53)	(\$56.41)	\$32.79	\$78.97	\$144.08
Minimum	(\$192.39)	(\$157.55)	(\$114.83)	(\$12.46)	\$19.70	\$47.73
Maximum	(\$144.24)	(\$86.23)	\$14.90	\$81.60	\$151.71	\$253.57
Standard Deviation	\$8.43	\$13.15	\$27.09	\$18.23	\$27.22	\$43.11
Percent change of positive savings	0.00%	0.00%	2.60%	97.60%	100.00%	100.00%

Assumed feed prices per ton were: \$200 (best), \$250 (expected), and \$400 (worst)



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### 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 Bermuda grass
- VERY difficult to justify baleage only considering Bermuda, Bahia, or lower-quality forages.



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## Economics of Baled Silage



**Economics of Baleage  
for Beef Cattle Operations**

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The logo for the University of Georgia Extension, featuring a stylized building icon and the text 'UGA extension'.

Economic Returns and Risk  
Analysis of Baleage

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The background of the slide shows a long, white, cylindrical bale of silage lying on a grassy field under a clear sky.

The logo for the University of Georgia Extension, featuring a stylized building icon and the text 'UGA extension'.

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