

TAES Research Monograph

RM 6C

January 1976

Grasses and Legumes in Texas –
Development, Production, and Utilization

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Chapter 14

ECONOMICS OF HARVESTING FORAGES AS HAY

Table of Contents

	Page
Costs	468
Other Economic Considerations	470
Summary	471
Acknowledgements	471

Chapter 14

ECONOMICS OF HARVESTING FORGES AS HAY

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Farmers and ranchers are currently taking a closer look at new hay harvesting methods. Their interest has been increased by the dwindling supply of hired labor for handling hay and periodic shortages or increased prices of baling wire. More producers are recognizing the value of their time and are looking for labor saving methods of feeding hay. Some items that individual farmers consider when analyzing new hay harvesting systems are as follows:

1. Marketability - Regular hay bales are more readily marketable than are large bales or stacks, especially to small volume buyers such as small herd operators or urban horse owners.
2. Limiting Hay Intake - It is difficult to limit an animal's intake of hay fed from large hay packages. One large round bale or stack may be more hay than the herd's daily requirements; thus, the cattle may actually be overfed. Overfeeding is expensive.
3. Timeliness of Harvest and Storage - Hay quality decreases as harvest dates extend past optimum stages of plant maturity. Custom harvesters are frequently busy when hay should be harvested. Shortages of hay haulers also result in rainfall damage to some hay prior to storage. Owning haying equipment enables optimum harvesting dates and large hay packages minimize hay losses to rain while the hay is in the field.
4. Time Involved - Mowing, raking and baling or stacking hay is rather time consuming. A prospective equipment buyer should evaluate his available time during the hay harvesting seasons to assure that cows are not neglected while hay is being harvested.

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This publication is a part of Research Monograph 6, "Grasses and Legumes in Texas--Development, Production, and Utilization," The Texas Agricultural Experiment Station.

5. Added Investment - Investments in hay equipment may limit the availability of funds needed for operating or alternative improvements.

If farmers are still interested in buying hay harvesting equipment after considering the above items, two questions are "What does it cost to harvest hay with the alternative systems?" and "How much hay must be harvested to justify each system over custom baling rates?". This paper addresses the haying costs of a medium duty regular baler with and without a bale wagon, a roll baler making 1,500 pound bales and a hay stacker putting up 2,500 pound stacks.

COSTS

Costs included in this analysis are the fixed costs of depreciation, interest on investment, taxes and insurance and operating costs of fuel, oil, repairs, labor and wire or twine, if applicable. Equipment life is considered to be 8 years with a 10 percent salvage value. Machine capacities and labor hours per ton of hay are presented in Table 14-1. The interest rate on the investment is 9 percent. The data as

Table 14-1. Machinery capacity and labor requirements*

Machine	Capacity (tons/hr)**	Labor Requirements (man-hrs/ton)
Bale mover (roll, tractor mounted)	2.5	.4
Bale wagon (PTO, 55 bale)	5.0	.2
Baler (medium duty)	6.4	.16
Baler (roll)	7.5	.13
Mower (7 foot)	2.9	.34
Rake (9 foot)	5.2	.19
Stack Wagon (1 ton)	5.0	.2
Stack mover	2.5	.4

*Rider, Allen, R. and Wendell Bowers, Paper: "Forage Systems for the Beef-Calf Operation", Extension Agricultural Engineering, Oklahoma State University, Stillwater Oklahoma. Proceedings of a Symposium on Production IV. The Range Beef Cow. December 15-17, 1975. Denver, Colorado.

**Based on yield of one ton per acre and haul distance of one mile.

presented are applicable to producers who (1) already have an adequate horsepower tractor available, (2) typically harvest hay yielding one ton per acre per cutting, (3) value their or hired labor time at \$2.25 per hour and (4) have a hay haul distance of approximately one mile. The costs of owning and operating the four hay harvesting systems are presented in Table 14-2.

Table 14-2. Cost of owning and operating hay harvesting equipment, four systems, and tons hay harvested per year to breakeven by owning haying equipment over having hay custom harvested and hauled at \$0.65 per bale.

System	Size	Cost	Cost Per Ton With Tons Per Year Of					Annual
			50	100	200	400	600	Breakeven
Tons**								
----- \$ cost/ton ----- tons -								
1. Mower	7 ft	\$1,148						
Rake	9 ft	1,400	\$39.47	\$26.69	\$20.30	\$17.10	\$16.04	165
Baler	14"x18"	4,300						
(medium duty)*								
2. Mower	7 ft	1,148						
Rake	9 ft	1,400						
Baler	14"x18"	4,300	57.66	33.40	21.31	15.27	13.26	194
(medium duty)								
Bale Wagon	55 bales	6,100						
3. Mower	7 ft	1,148						
Rake	9 ft	1,400						
Roll baler	1200-1500 lb	5,500	40.30	24.91	17.21	13.36	12.08	127
Bale mover		200						
(tractor mounted)								
4. Mower	7 ft	1,148						
Rake	9 ft	1,400						
Hay stacker	1-1 1/4 ton	7,000	\$49.41	\$29.36	\$19.33	\$14.32	\$12.64	162
Stack mover		\$1,200						
(wheeled)								

*Considers hay custom hauled at \$0.20 per bale.

** Annual breakeven tons - The tons of hay that must be harvested annually to reduce total fixed and operating cost of owned equipment to the cost of custom baling and hauling at \$0.65 per regular 60 pound bale.

A hay producer that has been paying \$0.65 per bale for custom baling and hauling would have to harvest an estimated 165 tons annually to justify buying a mower, rake and medium duty regular baler for \$6,848. His total harvesting cost, plus paying \$0.20 per bale hauling cost would equal \$26.69 per ton when harvesting 100 tons annually (reference Table 14-2.) The cost would be reduced to \$17.10 per ton when harvesting 400 tons annually. The \$0.05 per bale wire cost and the \$0.20 per bale hauling cost make up almost 50 percent of this \$17.10.

Adding a \$6,100 bale wagon to the haying operation would be profitable if over 194 tons of hay were harvested annually. A 400-ton harvest would cost an average \$15.27 per ton with the bale wagon.

The rolled bale harvesting system is estimated to be the least expensive method of harvesting hay considering a one mile haul distance. The rolled bale system's estimated per ton harvesting cost is \$13.36 with 400 tons harvested annually. The breakeven point with the rolled bale system is 127 tons annually considering a \$0.65 custom baling and hauling charge. Using an inexpensive tractor mounted bale mover helps keep the cost down. A haul distance of more than one mile makes moving bales by tractor slow and expensive and a more expensive truck-towed rolled bale mover should be considered to reduce tractor and labor cost.

The breakeven point for the small hay stacker is 162 tons per year when compared with a \$0.65 per bale custom baling and hauling charge. The stacker has a slightly lower operating cost but a higher purchase price than the round baler. The cost difference per ton when 400 or more tons are harvested annually, however, may not be as significant as which system best fits the farmers' needs and desires.

OTHER ECONOMIC CONSIDERATIONS

1. Another cost involved in comparing large package hay systems with regular bale systems is the expense of feeding the hay to the cattle. Moving the large packages with machinery is generally regarded as more desirable and less expensive than feeding regular bales by hand.

2. It is important that cattlemen decrease the waste of feeding any type of hay. Minimizing waste is primarily accomplished with regular bales by using hay racks.

Feeding racks that enclose 1,500 pound bales or 2,500 pound stacks are also available commercially or easily made with purchasable hardware.

3. Weather deterioration during storage of large package bales or stacks is of major importance in determining their profitability. If the value of the weather deteriorated hay in large bales or stacks is less than the expense of adequately storing regular bales, there would be additional profits of large package systems.

SUMMARY

Many hay producers have started using large package hay harvesting equipment because of the decreased labor requirement to maintain hay quality and the expected decreased harvesting cost. If less than 127 tons are harvested annually and satisfactory custom baling and hauling is easily available at \$0.65 per bale, hiring hay custom harvested would be less expensive than owning haying equipment. As more than 127 tons are harvested, the rolled bale system becomes profitable over \$0.65 per bale custom harvesting. Harvesting more than 600 tons annually makes the rolled baler and the small hay stacker both have an estimated harvesting cost of less than \$13.00 per ton.

ACKNOWLEDGEMENTS

Equipment price, equipment capacity in tons per hour and labor requirements per ton of hay were obtained from a paper, "Forage Systems For The Beef Cow-Calf Operation", by Allen R. Rider and Wendell Bowers, Extension Agricultural Engineering Oklahoma State University, Stillwater, Oklahoma. Proceedings of a Symposium on Production IV. The Range Beef Cow. December 15-17, 1975, Denver, Colorado.