EXTENSION

AGEC-338

The Economic Cost of a Bale of Hay Spreadsheet User's Manual

October 2024

The economic cost of baling hay can frequently outweigh market prices for hay. To help producers assess their economic cost of baling hay, we developed an Excel worksheet that collects and computes producers' costs. The program utilizes macros, so users may need to enable macros if a security warning appears at the top of the spreadsheet. Fields in yellow are input fields, requiring the user to enter a numerical value. Fields in light blue allow user entry via popup menu. To access menus, double right-click on blue cells. (Note, macros must be enabled.) Cells in grey display calculated values. Users cannot overwrite these cells.

In the top section of the spreadsheet, information about hay yield, bale weight and nutrient content is collected. In E11, hay yield in tons per acre is entered. In E12, average bale weight is entered in pounds per bale. The program calculates bales per acre E13.

Next, nutrient content information is collected. Often, producers neglect to consider the value of nitrogen (N), phosphorous (P), and potassium (K) mined from soils. Even if no fertilizer inputs were applied to a hay crop, soil N, P and K can have economic value. If producers need to replace these essential elements to raise future crops, including hay, there is an opportunity cost associated with their depletion. (This is most often the case for phosphorous and/or potassium.)

Protein in hay is 16% N (Coover). Meaning, if hay is 7% protein, a ton of hay contains 22.4 pounds of nitrogen. Prairie hay is typically 0.18% phosphorous, so a ton of hay contains 3.6 pounds of P. Bermuda hay is around 0.24% phosphorous, so a ton of Bermuda hay contains 4.8 pounds of K. Both prairie hay and Bermuda hay are about 0.15% potassium, so a ton of each contains 3 pounds of K.

To calculate an implicit value (opportunity cost) on N, P and K, fertilizer prices are entered. In Cells B22 and B23, users can double right-click to pull up menus with alternative nitrogen and phosphorous sources. Potassium is assumed to be supplied by potash (0-0-60). In Cells E22, E23 and E24, market prices ($/ton) for selected fertilizers are entered. The computer then computes the implied price in dollars per pound of actual N, P and K. These values are then translated into dollars per ton and dollars per bale of hay.

Nitrogen is not typically applied to native grasses. However, Bermudagrass responds to N fertilization. (See extension.okstate.edu/fact-sheets/fertilizing-bermudagrass-hay-and-pasture.html for information on fertilizing Bermudagrass.) To calculate the cost of applied N, input the pounds of actual N applied to Bermudagrass. The program uses the fertilizer formulation and price information entered in Cells B22 and E22 to calculate the cost of nitrogen fertilization.

Next, the program collects information on pesticides applied. (See extension.okstate.edu/fact-sheets/native-hay-meadow-management.html for information on managing native grass stands. See extension.okstate.edu/fact-sheets/bermudagrass-pasture-management.html for information on Bermudagrass meadow management.) The costs of pesticide application per acre are entered in Cells F29 through F31.

Harvest costs are collected per bale in Cells F34 and F35. Note, if the producer is doing some or all harvest operations rather than custom hire, we recommend using local custom rates to approximate the opportunity cost of harvest operations. (See extension.okstate.edu/fact-sheets/oklahoma-farm-and-ranch-custom-rates-2021-2022.html for more information on Oklahoma custom rates for farm and ranch operations.)

Table 1. Economic Cost of a Bale of Hay Spreadsheet.

HAY YIELD AND NUTRIENT INFORMATION	
Yield (tons/acre)	1.10
Bale weight (lb)	1400
Bales per acre	1.6

COLOR KEY
Cells with **LIGHT GREY** background are user entered.
Cells with **MEDIUM GREY** background are calculated.
Cells with **DARK GREY** background are display fields.

NUTRIENT CONTENT OF HAY				
			Per Ton	**Per Bale**
% Protein	7.0 %			
% Nitrogen	1.12 %	Pounds of Nitrogen	22.4	15.7
% Phosphorous	0.18 %	Pounds of Phosphorous	3.6	2.5
% Potassium	0.15%	Pounds of Potassium	3.0	2.1

Fertilizer	$ / ton		Implied price $ / lb		$ per ton		$ per bale	
46-0-0	$	525.00	Nitrogen	$	0.57			
18-46-0	$	810.00	Phosphorous	$	1.79	$	6.44	$	4.48
0-0-60	$	515.00	Potassium	$	0.52	$	1.56	$	1.09

Actual N applied (lb / acre)	0	Nitrogen Cost	$	–	$	–

Pesticides	$ / acre					
Herbicide cost	$	–	$	–	$	–
Insecticide cost	$	–	$	–	$	–
Other pesticide cost	$	–	$	–	$	–

Harvest and Post Harvest	$ / bale					
Swathing, raking and baling	$	28.00	$	40.00	$	28.00
Staking, loading and hauling	$	5.00	$	7.14	$	5.00

Land	$ / acre					
Land rental charge	$	20.00	$	18.18	$	12.50

TOTAL ECONOMIC COST		**$**	**78.32**	**$**	**51.07**

Total Economic Cost Sensitivity Analysis
Economic Cost of Baling hay in $/bale and $/ton

		Bale Weight (lb)								
Yield (tons/acre)		**1120**	**1190**	**1260**	**1330**	**1400**	**1470**	**1540**	**1610**	**1680**
0.8	$/bale	$ 51	$ 53	$ 54	$ 55	$ 56	$ 57	$ 58	$ 60	$ 61
	$/ton	$ 92	$ 88	$ 83	$ 83	$ 80	$ 78	$ 76	$ 74	$ 72
0.9	$/bale	$ 50	$ 51	$ 53	$ 53	$ 54	$ 55	$ 56	$ 57	$ 58
	$/ton	$ 89	$ 86	$ 80	$ 80	$ 77	$ 75	$ 73	$ 71	$ 70
1.0	$/bale	$ 49	$ 50	$ 52	$ 52	$ 53	$ 54	$ 55	$ 56	$ 57
	$/ton	$ 87	$ 83	$ 78	$ 78	$ 75	$ 73	$ 71	$ 69	$ 67
1.1	$/bale	$ 48	$ 49	$ 50	$ 50	$ 51	$ 52	$ 53	$ 54	$ 55
	$/ton	$ 85	$ 82	$ 76	$ 76	$ 73	$ 71	$ 69	$ 67	$ 65
1.2	$/bale	$ 47	$ 48	$ 49	$ 49	$ 50	$ 51	$ 52	$ 53	$ 54
	$/ton	$ 84	$ 80	$ 74	$ 74	$ 72	$ 70	$ 68	$ 66	$ 64
1.3	$/bale	$ 46	$ 47	$ 49	$ 49	$ 49	$ 50	$ 51	$ 52	$ 53
	$/ton	$ 82	$ 79	$ 73	$ 73	$ 71	$ 68	$ 66	$ 64	$ 63
1.4	$/bale	$ 45	$ 46	$ 48	$ 48	$ 49	$ 49	$ 50	$ 51	$ 52
	$/ton	$ 81	$ 78	$ 72	$ 72	$ 69	$ 67	$ 65	$ 63	$ 62

Last, users enter a charge for land costs. If land is rented, use the rental rate paid. However, if land is owned we recommend using the typical local land rental rate. (See extension.okstate.edu/fact-sheets/oklahoma-pasture-rental-rates-2020-21.html for information on Oklahoma pasture rental rates and extension.okstate.edu/fact-sheets/oklahoma-cropland-rental-rates-2020-21.html for information on Oklahoma cropland rental rates.)

Using the entered data, the program reports the total economic cost, including opportunity costs, of hay in dollars per ton and dollars per bale. Armed with this information, operators can make an informed decision about the economic advisability of continued haying operations. OSU Extension also offers a calculator to compare the cost of producing hay versus the cost of hay purchases available.

Given that most producers do not weigh hay bales and can use visual cues to approximate bale weight, we provide an automatic sensitivity analysis on cost of production per bale and per ton at the bottom of the tool. Given the user-entered yield and bale weight, we vary yield in 10% increments and bale weight in 5% increments and compute corresponding total economic cost of production.

Finally, there are several useful links on a separate tab ("Useful links") to assist users with locating additional information regarding hay production and pasture management.

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