



Summary of the

2023 Arkansas Hay Verification Program





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Introduction and Program

This publication updates FSA3161 Economic Summary of the 2022 Arkansas Hay Verification Program (AHVP) by summarizing the 2023 results. The AHVP collaborates with Arkansas forage producers, county Extension agents, and state extension specialists. The goal of the AHVP is to implement Extension recommendations for increasing hay production in accordance with goals established by both the producer and the county Extension agent. The aim is to help hay producers in Arkansas improve the production and quality of their hay and forage resources.

Eleven hay fields participated in the 2023 AHVP. Fields participate on a two-year rotating basis. Among the fields that participated in 2023, four also participated in the 2022 AHVP. Participating farms are located in Cleveland, Conway, Dallas, Drew, Faulkner, Marion, Union, Van Buren, and White counties. Two fields each from Cleveland and Dallas counties participated. All 11 fields grew warm-season forages, which are the current requirement for AHVP.

Table 1 summarizes the acreage and production for the participating fields. The total acreage in the 2023 AHVP was 320 acres, or 29 acres per field. Hay production from the 2023 AHVP totaled 1,285 tons, and average yields were 3.97 tons per acre. Compared to data from the 2022 AHVP, on average, fields were four acres smaller, and yields were 0.05 tons per acre lower in 2023 (Mitchell and Mills, 2023). Using average prices received by farmers for hay in 2023, the estimated value of production from the 2023 AHVP totaled \$184,946.95 (USDA-NASS, 2024).

Data Collection

Participating producers worked with county Extension agents to collect and record production and economic data as input for the Mississippi State University (MSU) budget generator. Producers recorded data in a standardized Excel file to generate enterprise budgets. Each time a field activity was performed (fertilizing, cutting, raking, baling, etc.), the participating producer and county agent recorded the tractor's make, model, and horsepower and the implement's make, model, and dimensions. Per unit prices and quantities for fertilizer and pesticide applications were recorded. Additional cost items included custom rate application, net wrap, and equipment rental costs, among others. Poultry litter prices and application rates were recorded separately from fertilizer applications. Information about bale dimensions and average bale weights was recorded to estimate per-ton hay yields.

The Mississippi State University farm budget generator is a tool developed by the university's Extension Service to help farmers and ranchers in Mississippi develop budgets for their agricultural operations. The generator allows users to input information specific to their operation, such as crop type, acreage, and expected yields, as well as costs for inputs such as seed, fertilizer, and labor. The budget generator uses the field activities performed to estimate the per acre machine costs (fuel, labor, repairs, depreciation, interest, taxes, etc.) associated with that activity. These machine costs are based on estimates from the American Society of Agricultural and Biological Engineers (ASABE) Standards

Table 1. 2023 AHVP Acreage and Production.

COUNTY/FIELD	ACREAGE	PRODUCTION (TONS/ACRE)	TOTAL PRODUCTION (TONS)
Cleveland 1	11	2.53	27.83
Cleveland 2	20	2.05	41
Conway	42	5.3	222.6
Dallas 1	12	4.66	55.92
Dallas 2	12	2.67	32.04
Drew	5	3.721	18.605
Faulkner	100	2.5	250
Marion	46	6.16	283.36
Union	12	5.6	67.2
Van Buren	41	5.7	233.7
White	19	2.75	52.25

and formulas developed by Kay, Edwards, & Duffy, 2020. The tool then generates a budget that estimates expected revenue, expenses, and profitability measures such as net income and return on investment.

Budgets for each farm are in Appendix A, and each table reports revenue from hay production. A price of \$144/ton is used as a placeholder and is based on average hay prices received by Arkansas farmers from USDA-NASS (2024). Operating, fixed, and total specified costs are calculated for each farm. Operating costs (total direct costs) are costs used in the production of the crop and generally include herbicides, fertilizers, insecticides, fuel, custom rate application, and labor. Hay hauling is assumed to be a separate farm enterprise. Fixed costs include non-cash expenses such as depreciation and cash-expenses such as interest, taxes, and housing costs on tractors and equipment. The rationale for including depreciation as a non-cash expense is to reflect cash savings to replace tractors and equipment after their useful life. Total specified costs are defined as operating (direct) costs plus fixed costs.

Summary of 2023 Budgets

Table 2 summarizes hay budgets for the twelve fields. Operating costs averaged \$404.96/acre, ranging from \$181.99/acre in Cleveland County to \$829.05/acre in Union County. Relative to results from the 2022 AHVP, operating costs were 7.9% or \$29.82/acre higher in 2023. Total costs averaged \$496.58/acre, ranging from \$244/acre in Cleveland County to \$943.30/acre in Union County. The field in Conway County was irrigated, which explains the \$405.82/acre difference between operating and total costs for that field.

Fields in the 2023 AHVP had an average fixed cost of \$105.90/acre, up from \$46.89/acre in 2022. The increase in fixed costs mainly reflects the influence of the only irrigated field in Conway County. When Conway County is removed, fixed costs decline to \$69.00/acre. Depreciation on tractors averaged \$26.77/acre. Depreciation on implements is, on average, \$38.93/acre. Larger fields are positively correlated with lower fixed costs per acre, reflecting economies of scale.

Breakeven prices are calculated by dividing total specified costs by production per acre (tons/acre). Note that breakeven refers to the hay price where revenue equals total costs. The average breakeven price of hay among farms in the 2023 AHVP is \$129.07/ton, up from \$111.88/ton in 2022. Breakeven prices range from \$89.90/ton in Marion County to \$168.45/ton in Union County. Among the eleven fields in the 2023 AHVP, eight, or 73%, have a breakeven price below the 2023 state-average price of \$144/ton estimated by USDA-NASS (2024).

Figure 1 shows cost items proportionally to total operating costs. Among all items, fertilizer represents the largest proportion of 2023 operating costs at 50%, down from 63% in 2022. In 2022 uncertainty surrounding the

Table 2. 2023 AHVP Costs, Returns and Breakeven Prices.

COUNTY/ FIELD	TOTAL DIRECT COSTS \$/AC	TOTAL FIXED COSTS \$/AC	TOTAL SPECIFIED COSTS \$/AC	NET RETURNS ^a \$/AC	BREAKEVEN ^b PRICE \$/TON
Cleveland 1	\$182.55	\$62.77	\$245.32	\$119.00	\$96.96
Cleveland 2	\$181.99	\$62.78	\$244.77	\$50.43	\$119.40
Conway	\$436.50	\$405.82	\$842.32	-\$79.12	\$158.93
Dallas 1	\$440.56	\$61.46	\$502.02	\$169.02	\$107.73
Dallas 2	\$317.35	\$55.28	\$372.63	\$11.85	\$139.56
Drew	\$471.95	\$78.82	\$550.77	-\$14.95	\$148.02
Faulkner	\$243.80	\$69.52	\$313.32	\$46.68	\$125.33
Marion	\$469.83	\$83.93	\$553.76	\$333.28	\$89.90
Union	\$829.05	\$114.25	\$943.30	-\$136.90	\$168.45
Van Buren	\$603.87	\$111.96	\$715.83	\$104.97	\$125.58
White	\$277.14	\$58.27	\$335.41	\$60.59	\$121.97

^a Net returns, revenue minus total specified costs, estimated using \$144/ton for hay prices. ^b Total specified expenses divided by hay production per acre.

Russia-Ukraine conflict put tremendous pressure on global fertilizer prices. Russia is the world's largest exporter of fertilizer, with an export value of \$18.7 billion in 2022 (USDA-ERS, 2023). Global capacity to produce fertilizer has adjusted for a lack of Russian exports, helping decrease on-farm fertilizer expenses. Between 2022 and 2023, Urea and Potash prices decreased by \$0.15 and \$0.17 per pound, respectively (Bloomberg Green Markets, 2024). Repairs (13.9%), Fuel (10.9%), and Labor (9.9%) are the next largest cost items. Poultry litter is calculated separately from fertilizer and reflects 5.3% of operating costs.

Figure 2 shows the relationship between fertilizer application (pounds/acre) and hay yields (tons/acre) for the 2023-2024 hay crop. Note that fertilizer data from each field is not recorded in sufficient detail to calculate pounds of nutrient applied per acre. Therefore, Figure 2 does not specifically show the relationship between nutrient application and hay yields.

With that caveat, an increase of 100 pounds/acre of fertilizer is correlated with a 0.26 ton/acre increase in hay yields. Figure 3 shows the relationship between per-acre fertilizer use and net returns for the 2023-2024 hay crop. Importantly, there is no relationship between fertilizer use and profitability (Figure 3). This suggests that yield gains from increased fertilizer use offset the increase in operating costs.

Based on this data, reducing operating costs by using less fertilizer is not an effective strategy for improving profitability. The nutrient management recommendations of this program are on an individual basis and depend on the goals of the producer and agent and the soil test results of the field. Nutrient management goals are to achieve the most efficient application of nutrients. Inherent environmental factors can influence nutrient availability and efficiency of applied fertilizers further influencing the economical return of fertilizer applications. Producers are encouraged to coordinate with county Extension agents to review soil tests and precise fertilizer applications.

Figure 1. Proportion of operating costs from 12 fields in the 2023 Arkansas Hay Verification Program

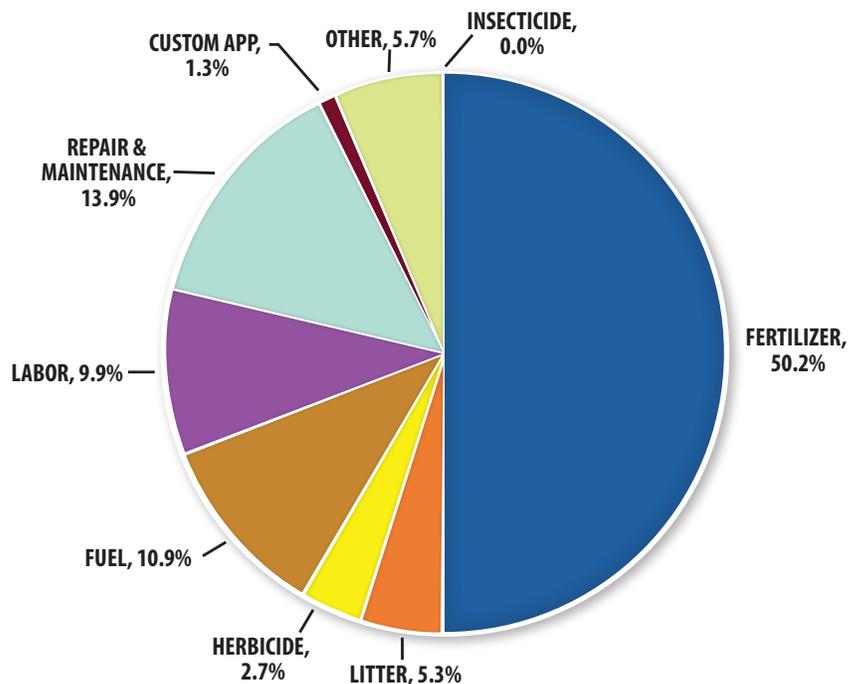


Figure 2. Relationship between fertilizer use and hay yields, Arkansas Hay Verification Program 2023-2024 hay crop (N=12)

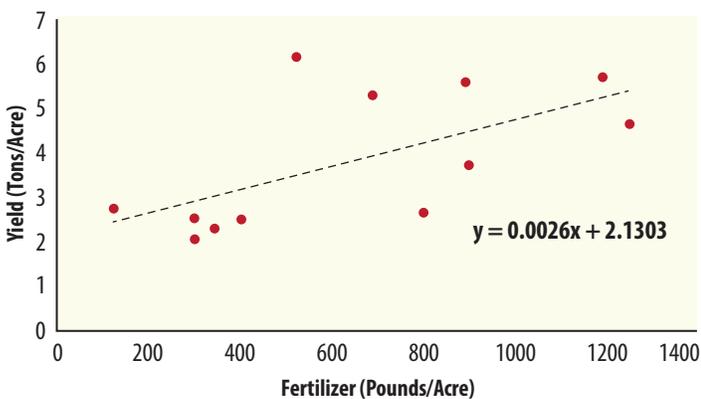
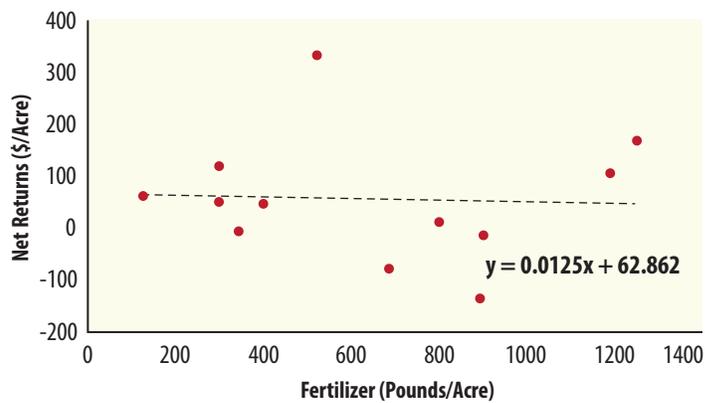


Figure 3. Relationship between fertilizer use and net returns, Arkansas Hay Verification Program 2023-2024 hay crop (N=12)



CLEVELAND COUNTY

Two fields in Cleveland County were enrolled in the 2023 Hay Verification Program. Field 1 was an 11-acre Bahiagrass field in the third year of the program; Field 2 was a 20-acre Bahiagrass field in the first year of the program. Both fields were soil sampled in January 2023 for soil nutrient concentrations, fertilizer, and lime requirements. Recommendations for fertilizer applications were provided for both fields following UADA recommendations; however, due to unforeseen circumstances, fields only received one application of 150 lb. Urea (46-0-0) and 300 lb. Potash (0-0-60) per acre. Both fields were monitored through the growing season for weed management following UADA recommendations, yet no weed control efforts were needed. Both fields were harvested three times, and average weight and forage quality samples were collected from each harvest event. The Cleveland County hay verification fields produced an average annual production of 2.5 and 2.1 tons of hay per acre, for Field 1 and Field 2 respectively. Specified costs per acre were \$245.32 and \$245.77 for Field 1 and Field 2 respectively, with a breakeven price of \$96.96 per ton of hay (\$38.78 per 800 lb. bale) on Field 1 and \$119.40 per ton of hay (\$47.76 per 800 lb. bale) for Field 2. Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) were \$96.96 per acre for Field 1 and \$119.40 per acre for Field 2.

CONWAY COUNTY

A 42-acre pivot irrigated Midland Bermudagrass field in Conway County was enrolled in the 2023 Hay Verification Program. The field was prepared in the fall of 2022, receiving an application of 5 oz. per acre Rezilon for Ryegrass control. The following spring the field received 175 lb. per acre Urea (46-0-0) on 5/3/2023; however, a lack of bermudagrass response resulted in a follow-up application of 75 lb. per acre Urea (46-0-0). An application of 1 quart per acre Grazon P+D was made on 5/25/2023 for horsenettle control and resulted in bermudagrass stress and yellowing. Irrigation of 0.75 in/acre was applied on 5/29/2023, and the field was baled on 6/10/2023. A second application of 130 lb. Urea (46-0-0) was made on 6/13/2023, and the field was harvested on 7/19/2023. A third application of 165 lb. Urea (46-0-0) was delayed until 8/5/2023 due to storm damage to the irrigation system. Repairs to the irrigation system were made and the field received 1.25 in/acre of irrigation the week following 8/14/2023. Drought stress in the non-irrigated corners resulted in the field being harvested on 8/23/2023. The field received a fourth application of 140 lb. Urea (46-0-0) on 9/7/2023, and the field was harvested for the final time 10/7/2023. The Conway County hay verification field produced an average annual production of 5.33 tons of hay per acre, with total specified costs of \$842.32 per acre and a breakeven price of \$158.93 per ton of hay (\$63.57 per 800 lb. bale). Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) resulted in a loss of \$79.12 per acre.

DALLAS COUNTY

Two fields in Dallas County were enrolled in the 2023 Hay Verification Program. Both fields were 12 acres consisting of predominately Bahiagrass on a fine sandy loam soil. An application of 100 lb. per acre of Ammonium Nitrate (34-0-0) and 100 lb. per acre of Potash (0-0-60) was made to Field 1 on 5/2/2023, and to Field 2 on 5/9/2023. Field 1 was harvested on 5/28/2023 and an application of 250 lb. per acre blended fertilizer (30-12-12-5; N-P-K-S) on 6/17/2023. Field 2 was harvested on 6/26/2023, and the field received an application of 100 lb. per acre of Ammonium Nitrate (34-0-0) and 100 lb. per acre of Potash (0-0-60) on 7/13/2023. Field 1 was harvested for a second time on 7/16/2023 and received a final application of 150 lb. per acre of Ammonium Nitrate (34-0-0) and 150 lb. per acre of Potash (0-0-60) was made on 8/5/2023. Field 2 was harvested 7/30/2023 and did not receive a third fertilizer application. The final harvest occurred on 8/21/2023 on Field 1, and 9/28/2023 on Field 2. The Dallas County hay verification fields produced an average annual production of 4.7 and 2.7 Tons of hay per acre, for Field 1 and Field 2 respectively. Specified costs per acre were \$502.02 and \$372.63 for Field 1 and Field 2 respectively, with a breakeven price of \$107.73 per ton of hay (\$43.09 per 800 lb.

⁶This website provides forms to start or alter an LLC in Arkansas: <https://www.sos.arkansas.gov/business-commercial-services-bcs/forms-fees/llc>.

bale) on Field 1 and \$139.56 per ton of hay (\$55.82 per 800 lb. bale) for Field 2. Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) were \$169.02 per acre for Field 1 and \$11.85 per acre for Field 2.

DREW COUNTY

A 5-acre field on the campus of the University of Arkansas at Monticello in Drew County was enrolled in the 2023 Hay Verification Program. The field had a mixed stand of Bahiagrass and Bermudagrass and was primarily used as a bull pasture over winter and hay production in the summer. The field was soil sampled in March 2023 for soil nutrient concentrations, fertilizer, and lime requirements. Winter weeds and grasses were harvested on 6/5/2023 in preparation for 2023 warm season production. A fertilizer application of 450 lb. per acre Triple 19 (19-19-19) was made on 6/9/2023; Triple 19 was used due to limited availability. The field was harvested on 7/17/2023. Forage quality analysis revealed a crude protein content of 9.3% and a total digestible nutrient concentration of 53.6%. A second application of 450 lb. per acre Triple 19 (19-19-19) was made on 8/7/2023 and the field was harvested a second time on 8/29/2023. Second harvest forage quality analysis revealed a crude protein content of 7.8% and a total digestible nutrient concentration of 52.8%. The Drew County hay verification field produced an average annual production of 3.3 tons of hay per acre, with total specified costs of \$550.77 per acre and a breakeven price of \$148.02 per ton of hay (\$59.21 per 800 lb. bale). Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) resulted in a loss of \$14.95 per acre.

FAULKNER COUNTY

A 100-acre Bermudagrass field near Saltillo in Faulkner County was enrolled in the 2023 Hay Verification Program. The field received an application of 130 lb. Urea (46-0-0) and 70 lb. Potash (0-0-60) per acre on 3/22/2023 and the first harvest was conducted on 6/1/2023. The field received an application of 0.3 oz per acre Patriot and 1 qt per acre 2,4-D to target horsenettle and other warm-season weeds on 6/25/2023. A final fertilizer application of 130 lb. Urea (46-0-0) and 70 lb. Potash (0-0-60) per acre was made on 7/11/2023 and the second harvest was conducted on 8/13/2023. The Faulkner County hay verification field produced an average annual production of 2.5 tons of hay per acre, with total specified costs of \$313.32 per acre and a breakeven price of \$125.33 per ton of hay (\$50.13 per 800 lb. bale). Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) were \$46.68 per acre.

MARION COUNTY

A 46-acre Greenfield hybrid Bermudagrass field on a fine sandy loam soil near Ralph in Marion County was enrolled in the 2023 Hay Verification Program. The field received a burndown herbicide application of 1 qt glyphosate (Cornerstone), and 0.75 oz Patriot per acre on 3/3/2023. The field received an application of 4 tons per acre of poultry litter, with a nutrient concentration of 80 lb. N, 40 lb. P₂O₅, and 60 lb. K₂O per ton. A supplemental application of 54 lb. Urea (46-0-0) and 31 lb. Potash (0-0-60) per acre was applied on 5/23/2023, and the field was baled on 6/5/2023. Forage quality analysis from the first harvest revealed 17% crude protein and 65% total digestible nutrients. The field received a second fertilizer application of 54 lb. Urea (46-0-0) and 31 lb. Potash (0-0-60) per acre on 6/8/2023, and a herbicide application of 1.33 oz per acre of Outrider for Johnsongrass control on 6/29/2023. The field was baled for a second time on 7/21/2023, and forage quality analysis revealed 10% crude protein and 57% total digestible nutrients. A final fertilizer application of 54 lb. Urea (46-0-0) and 31 lb. Potash (0-0-60) per acre was applied on 8/22/2023, and the field was harvested for the final time on 9/12/2023. Final harvest forage quality analysis revealed 9% crude protein and 57% total digestible nutrients. The Marion County hay verification field produced an annual total production of 6.16 tons of hay per acre, with total specified costs of \$553.76 per acre and a breakeven price of \$89.90 per ton of hay (\$35.96 per 800 lb. bale). Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) were \$333.28 per acre.

UNION COUNTY

A 12-acre field with a mixed stand of Bermudagrass and Bahiagrass near El Dorado in Union County was enrolled in the 2023 Hay Verification Program. The field was soil sampled, and 2 tons of calcitic lime per acre was applied on 3/1/2023 to neutralize soil acidity. The field was harvested on 5/1/2023, and the forage quality analysis revealed 9.4% crude protein and 53% total digestible nutrients. The field received an application of 350 per acre blended fertilizer (20-0-20; N-P-K) on 5/10/2023. The field was harvested for a second time on 6/6/2023 and the forage quality analysis revealed 13.3% crude protein and 58% total digestible nutrients. The field received an application of 350 per acre blended fertilizer (30-12-12; N-P-K) and 42 lb. Potash (0-0-60) per acre. The field was harvested for a third time on 7/17/2023, and the forage quality analysis revealed 11.2% crude protein and 53% total digestible nutrients. An insecticide application of 3.5 oz Lambda Cy per acre was made to the field on 8/11/2023. The field received a third application of 150 lb. Urea (46-0-0) and 150 lb. Potash (0-0-60) per acre and was harvested a fourth time on 8/20/2023. The forage quality analysis from the fourth harvest revealed 13.4% crude protein and 59% total digestible nutrients. A fifth harvest was conducted on 11/3/2023 and the forage quality analysis revealed 8.5% crude protein and 56% total digestible nutrients. The Union County hay verification field produced an annual total production of 5.6 tons of hay per acre, with total specified costs of \$943.30 per acre and a breakeven price of \$168.45 per ton of hay (\$67.38 per 800 lb. bale). Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) resulted in a loss of -\$136.90 per acre.

VAN BUREN COUNTY

A 40-acre Bermudagrass field near Scotland in Van Buren County was enrolled in the 2023 Hay Verification Program for the second year. A burndown application of 2 qt Glyphosate per acre was made on 3/7/2023 to control winter weeds and prepare for the 2023 season. The field received a green-up application of 160 lb. Urea (46-0-0), 85 lb. DAP (18-46-0), 150 lb. Potash (0-0-60) and an application of 20 oz DuraCor per acre on 5/15/2023. The field received an application of 2 pt Grazon PD3 per acre on 5/22/2023 and was harvested on 6/19/2023. The field received a second application of 145 lb. Ammonium Nitrate (37-0-0), 100 lb Ammonium Sulfate (12-0-0-24), 85 lb. Diammonium Phosphate (18-46-0), and 160 lb. Potash (0-0-60) on 6/29/2023 and an application of 10 oz Glyphosate and 1.5 oz Pastora on 6/30/2023. The field was harvested for a second time on 7/25/2023 and received a third application of 250 lb. Ammonium Nitrate (34-0-0) and 50 lb Potash (0-0-60) per acre on 8/4/2023. An application of 6 oz Glyphosate and 1.5 oz Pastora on 8/8/2023 and was harvested for the final time on 9/19/2023. The Van Buren County hay verification field produced an annual total production of 5.7 tons of hay per acre, with total specified costs of \$715.83 per acre and a breakeven price of \$125.58 per ton of hay (\$50.32 per 800 lb. bale). Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) were \$104.97 per acre.

WHITE COUNTY

A 19-acre field with a mixed stand of Bahiagrass and Bermudagrass near Mount Vernon in White County was enrolled in the 2023 Hay Verification Program. The field was soil sampled on 4/12/2023 for nutrient concentrations, lime, and fertilizer needs. The field was harvested for the first cutting on 5/22/2023 and received an application of 125 lb. Urea (46-0-0) on 6/14/2023. The second fertilizer application of 2 tons poultry litter per acre was applied on 7/20/2023, with a nutrient concentration of 59 lb. N, 60 lb. P₂O₅, and 69 lb. K₂O per ton. The second harvest was conducted on 8/1/2023, and a third fertilizer application was foregone due to dry conditions through August and early September. The final harvest was conducted on 9/22/2023. The field was monitored for weeds and insects, and no control thresholds were met for either. The White County hay verification field produced an annual total production of 2.8 tons of hay per acre, with total specified costs of \$335.41 per acre and a breakeven price of \$121.97 per ton of hay (\$48.79 per 800 lb. bale). Net returns calculated using an estimated hay price of \$144 per ton (\$57.60 per 800 lb. bale) were \$60.59 per acre.

Table 3. Field information, harvest dates, and total yield for each county hay verification field enrolled in 2023.

COUNTY	SPECIES	FIELD SIZE (ACRES)	HARVEST DATES					YIELD (TONS/AC)
			1st	2nd	3rd	4th	5th	
Cleveland 1	Bahiagrass	11	June 25	July 17	Sept. 4	--	--	2.5
Cleveland 2	Bahiagrass	20	June 25	Aug. 12	Sept. 29	--	--	2.1
Conway	Bermudagrass	42	June 10	July 15	Aug. 23	Oct. 7	--	5.3
Dallas 1	Mixed WSG	12	April 28	July 16	Aug. 21	--	--	4.7
Dallas 2	Mixed WSG	12	June 26	July 30	Sept. 26	--	--	2.7
Drew	Mixed WSG	5	June 5	July 17	Aug. 29	--	--	3.7
Faulkner	Bermudagrass	100	June 1	July 5	Aug. 13	--	--	2.5
Marion	Bermudagrass	46	June 3	July 19	Sept. 7	--	--	6.2
Union	Mixed WSG	12	May 1	June 6	July 17	Aug. 20	Nov. 3	5.6
Van Buren	Bermudagrass	41	June 19	July 25	Sept. 26	--	--	5.7
White	Mixed WSG	19	May 22	Aug. 1	Sept. 19	--	--	2.8

Table 4. Fertilizer application information for each county hay verification field enrolled in 2023. Fertilizers are presented in the pounds of product per acre.

COUNTY	GREEN-UP	AFTER 1ST HARVEST	AFTER 2ND HARVEST	AFTER 3RD HARVEST
----- (lb/acre) -----				
Cleveland 1	--	150 lb. Urea + 150 lb. Potash	--	--
Cleveland 2	--	150 lb. of Urea + 150 lb. of Potash	--	--
Conway	175 lb. Urea fb 75 lb. Urea	129 lb. Urea	167 lb. Urea	143 lb. Urea
Dallas 1	100 lb. Am. Nitrate + 100 lb. Potash	250 lb. (30-12-12-5) [†]	150 lb. Am. Nitrate + 150 lb. Potash	--
Dallas 2	100 lb. Am. Nitrate + 100 lb. Potash	100 lb. Am. Nitrate + 100 lb. Potash	--	--
Drew	--	450 lb. (19-19-19) [†]	450 lb. (19-19-19) [†]	--
Faulkner	130 lb. Urea + 70lb. Potash	--	130 lb. Urea + 70lb. Potash	--
Marion	4 tons Poultry Litter 54 lb. Urea + 31 lb. Potash	54 lb. Urea + 31 lb. Potash	54 lb. Urea + 31 lb. Potash	--
Union	2 tons Ag Lime	350 lb. (20-0-20) [†]	250 lb. (30-12-12) [†] + 42 lb. Potash	150 lb. Urea + 100 lb. Potash
Van Buren	160 lb. Urea + 85lb. DAP + 150lb. Potash	145 lb. Am. Nitrate + 100 lb. Am. Sulfate + 85lb. DAP + 150lb. Potash	250 lb. Am. Nitrate 50 lb. Potash	--
White	--	125 lb. Urea 2 tons Poultry Litter	--	--

[†] Blended fertilizers nutrient concentrations present in (%N - %P2O5 - %K2O - %S04).

Table 5. Pesticide application information for each county hay verification field enrolled in 2023. Pesticides are presented in the amount of product per acre.

COUNTY	DATE	HERBICIDE	INSECTICIDE
------(product/acre)-----			
Cleveland 1	--	--	--
Cleveland 2	--	--	--
Conway	May 25	1 qt Grazon P+D	--
Dallas 1	--	--	--
Dallas 2	--	--	--
Drew	--	--	--
Faulkner	June 25	0.3 oz Patriot + 1 qt 2,4-D	--
Marion	March 8	1 oz Patriot + 1qt Glyphosate	--
	June 29	1.33 oz Outrider	--
Union	March 3	1 qt. Dicamba + 2,4-D	--
	June 11	1 pt 2,4-D + 2oz DuraCor	--
	Aug. 11	--	3.5 oz Lambda Cy
Van Buren	March 7	2 qt Glyphosate	--
	May 15	20 oz DuraCor	--
	May 22	2 pt Grazon PD3	--
	June 30	10 oz Glyphosate + 1.5 oz Pastora	--
	Aug. 8	6 oz Glyphosate + 1.5 oz Pastora	3 oz Lambda Cy
White	--	--	--

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Appendix

Appendix A Farm Budgets¹

Table A.1: Estimated costs and returns per acre, Cleveland County Field 1, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	Total Amount
INCOME				
Bahiagrass	tons	\$144.00	2.53	\$364.32
TOTAL INCOME				\$364.32

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Urea + Potash	lbs	\$0.29	300.00	\$87.00
<i>OTHER</i>				
Net Wrap	bale	\$1.35	6.50	\$8.78
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	1.55	\$25.69
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.04	\$0.38
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	8.39	\$28.88
<i>REPAIR & MAINTENANCE</i>				
Implements	acre	\$23.17	1.00	\$23.17
Tractors	acre	\$3.95	1.00	\$3.95
INTEREST ON OP. CAP.	acre	\$4.70	1.00	\$4.70
TOTAL DIRECT EXPENSES				\$182.55
RETURNS ABOVE DIRECT EXPENSES				\$181.77

FIXED EXPENSES				
Implements	acre	\$33.32	1.00	\$33.32
Tractors	acre	\$29.45	1.00	\$29.45
TOTAL FIXED EXPENSES				\$62.77
TOTAL SPECIFIED EXPENSES				\$245.32
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$119.00

¹ The mention in this report of any commercial product does not imply its endorsement by MSU-ES, MAFES, or USDA over other products not named nor does the omission imply they are not satisfactory.

Table A.2: Estimated costs and returns per acre, Cleveland County Field 2, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Bahiagrass	tons	\$144.00	2.05	\$295.20
TOTAL INCOME				\$295.20

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Urea + Potash	lbs	\$0.29	300.00	\$87.00
<i>OTHER</i>				
Net Wrap	bale	\$1.35	5.55	\$7.49
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	1.55	\$25.69
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.04	\$0.38
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	8.39	\$28.88
TOTAL DIRECT EXPENSES				\$181.99
RETURNS ABOVE DIRECT EXPENSES				\$113.21

FIXED EXPENSES				
Implements	acre	\$33.31	1.00	\$33.31
Tractors	acre	\$29.47	1.00	\$29.47
TOTAL FIXED EXPENSES				\$62.78
TOTAL SPECIFIED EXPENSES				\$244.77
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$50.43

Table A.3: Estimated costs and returns per acre, Conway County, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Bahiagrass	tons	\$144.00	5.30	\$763.20
TOTAL INCOME				\$763.20

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Urea	lbs	\$0.28	689.00	\$192.92
Agrotain	qts	\$18.00	0.69	\$12.42
<i>HERBICIDE</i>				
Grazon P+D	qts	\$8.00	1.00	\$8.00
Surfactant	qts	\$2.75	0.14	\$0.39
<i>OTHER</i>				
Net Wrap	bale	\$1.35	7.20	\$9.72
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	2.70	\$44.72
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.29	\$2.67
<i>IRRIGATE LABOR</i>				
Special Labor	hour	\$9.06	0.18	\$1.61
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	14.61	\$50.27
Engine, 1/4 CP, 65	gal	\$3.44	0.67	\$2.31
<i>REPAIR & MAINTENANCE</i>				
Implements	acre	\$41.49	1.00	\$41.49
Tractors	acre	\$6.64	1.00	\$6.64
Engine, 1/4 CP, 65	ac-in	\$3.88	0.45	\$1.75
Pivot, 4 Tower CP	each	\$1,055.00	0.03	\$33.02
Well & Pump, 1/4 CP	each	\$472.80	0.03	\$14.80
INTEREST ON OP. CAP.	acre	\$13.77	1.00	\$13.77
TOTAL DIRECT EXPENSES				\$436.50
RETURNS ABOVE DIRECT EXPENSES				\$326.70

FIXED EXPENSES				
Implements	acre	\$62.13	1.00	\$62.13
Tractors	acre	\$49.77	1.00	\$49.77
Engine, 1/4 CP, 65	each	\$1,891.51	0.03	\$59.20
Pivot, 4 Tower CP	each	\$5,574.14	0.03	\$174.47
Implements	each	\$62.13	0.03	\$60.25
TOTAL FIXED EXPENSES				\$405.82
TOTAL SPECIFIED EXPENSES				\$842.32
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				-\$79.12

Table A.4: Estimated costs and returns per acre, Dallas County 1, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Bahia/crabgrass/berm	tons	\$144.00	4.66	\$671.04
TOTAL INCOME				\$671.04

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Amm Nitrate + Potash	lbs	\$0.27	1000.00	\$270.00
Fert 30-12-12-5	lbs	\$0.19	250.00	\$47.50
<i>OTHER</i>				
Net Wrap	bale	\$1.35	10.00	\$13.50
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	2.13	\$35.28
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.25	\$2.29
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	7.30	\$25.12
<i>REPAIR & MAINTENANCE</i>				
Implements	acre	\$25.73	1.00	\$25.73
Tractors	acre	\$3.04	1.00	\$3.04
INTEREST ON OP. CAP.	acre	\$18.10	1.00	\$18.10
TOTAL DIRECT EXPENSES				\$440.56
RETURNS ABOVE DIRECT EXPENSES				\$230.48

FIXED EXPENSES				
Implements	acre	\$38.66	1.00	\$38.66
Tractors	acre	\$22.80	1.00	\$22.80
TOTAL FIXED EXPENSES				\$61.46
TOTAL SPECIFIED EXPENSES				\$502.02
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$169.02

Table A.5: Estimated costs and returns per acre, Dallas County 2, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Bahia/Dallas	tons	\$144.00	2.67	\$384.48
TOTAL INCOME				\$384.48

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Amm Nitrate + Potash	lbs	\$0.27	800	\$216.00
<i>OTHER</i>				
Net Wrap	bale	\$1.35	6.84	\$9.23
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	1.7483	\$28.92
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.1684	\$1.53
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	6.5325	\$22.47
<i>REPAIR & MAINTENANCE</i>				
Implements	acre	\$23.90	1	\$23.90
Tractors	acre	\$2.66	1	\$2.66
INTEREST ON OP. CAP.	acre	\$12.64	1	\$12.64
TOTAL DIRECT EXPENSES				\$317.35
RETURNS ABOVE DIRECT EXPENSES				\$67.13

FIXED EXPENSES				
Implements	acre	\$35.37	1	\$35.37
Tractors	acre	\$19.91	1	\$19.91
TOTAL FIXED EXPENSES				\$55.28
TOTAL SPECIFIED EXPENSES				\$372.63
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$11.85

Table A.6: Estimated costs and returns per acre, Drew County, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Bahia/Dallas	tons	\$144.00	3.72	\$535.82
TOTAL INCOME				\$535.82

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Fert 19-19-19	lbs	\$0.38	900.00	\$342.00
<i>OTHER</i>				
Net Wrap	bale	\$1.35	7.80	\$10.53
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	1.91	\$31.55
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.22	\$2.03
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	10.31	\$35.46
<i>REPAIR & MAINTENANCE</i>				
Implements	acre	\$29.30	1.00	\$29.30
Tractors	acre	\$4.69	1.00	\$4.69
INTEREST ON OP. CAP.	acre	\$16.39	1.00	\$16.39
TOTAL DIRECT EXPENSES				\$471.95
RETURNS ABOVE DIRECT EXPENSES				\$63.87

FIXED EXPENSES				
Implements	acre	\$43.77	1.00	\$43.77
Tractors	acre	\$35.05	1.00	\$35.05
TOTAL FIXED EXPENSES				\$78.82
TOTAL SPECIFIED EXPENSES				\$550.77
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				-\$14.95

Table A.7: Estimated costs and returns per acre, Faulkner County, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Bermudagrass	tons	\$144.00	2.50	\$360.00
TOTAL INCOME				\$360.00

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Fert 30-0-20	lbs	\$0.27	400.00	\$108.00
<i>HERBICIDE</i>				
Metsulfuron	oz	\$4.00	0.30	\$1.20
2,4-D	qt	\$6.50	1.00	\$6.50
<i>OTHER</i>				
Net Wrap	bale	\$1.35	6.24	\$8.42
<i>CUSTOM FERT</i>				
Custom Spread (Truck)	appl	\$7.50	2.00	\$15.00
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	1.82	\$30.18
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.02	\$0.19
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	9.86	\$33.93
<i>REPAIR & MAINTENANCE</i>				
Implements	acre	\$24.72	1.00	\$24.72
Tractors	acre	\$4.54	1.00	\$4.54
INTEREST ON OP. CAP.	acre	\$11.12	1.00	\$11.12
TOTAL DIRECT EXPENSES				\$243.80
RETURNS ABOVE DIRECT EXPENSES				\$116.20

FIXED EXPENSES				
Implements	acre	\$35.53	1.00	\$35.53
Tractors	acre	\$33.99	1.00	\$33.99
TOTAL FIXED EXPENSES				\$69.52
TOTAL SPECIFIED EXPENSES				\$313.32
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$46.68

Table A.8: Estimated costs and returns per acre, Marion County, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Bermudagrass	tons	\$144.00	6.16	\$887.04
TOTAL INCOME				\$887.04

DIRECT EXPENSES				
<i>FERTILIZER</i>				
Poultry Litter	tons	\$14.00	4.00	\$56.00
Urea + Potash	lbs	\$0.34	522.00	\$177.48
<i>HERBICIDE</i>				
Patriot	oz	\$2.49	0.75	\$1.87
Cornerstone	qt	\$8.74	1.00	\$8.74
Outrider	oz	\$12.56	1.33	\$16.70
<i>OTHER</i>				
Net Wrap	bale	\$1.35	12.95	\$17.48
<i>ADJUVANTS</i>				
Valcheck	qt	\$8.74	0.22	\$1.92
Interlock	qt	\$16.50	0.20	\$3.30
<i>CUSTOM FERT</i>				
Custom Spread (Truck)	appl	\$7.50	1.00	\$7.50
<i>OPERATOR LABOR</i>				
Tractors	hour	\$16.54	2.16	\$35.67
<i>HAND LABOR</i>				
Implements	hour	\$9.06	0.31	\$2.80
<i>DIESEL FUEL</i>				
Tractors	gal	\$3.44	25.97	\$89.33
<i>REPAIR & MAINTENANCE</i>				
Implements	acre	\$31.32	1.00	\$31.32
Tractors	acre	\$4.91	1.00	\$4.91
INTEREST ON OP. CAP.	acre	\$14.81	1.00	\$14.81
TOTAL DIRECT EXPENSES				\$469.83
RETURNS ABOVE DIRECT EXPENSES				\$417.21

FIXED EXPENSES				
Implements	acre	\$47.11	1.00	\$47.11
Tractors	acre	\$36.82	1.00	\$36.82
TOTAL FIXED EXPENSES				\$83.93
TOTAL SPECIFIED EXPENSES				\$553.76
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$333.28

Table A.9: Estimated costs and returns per acre, Union County, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Mixed grass hay	tons	\$144.00	5.60	\$806.40
TOTAL INCOME				\$806.40

DIRECT EXPENSES				
FERTILIZER				
Fert 20-0-20	lbs	\$0.30	350.00	\$105.00
Fert 30-12-12	lbs	\$0.41	250.00	\$102.50
Fert 0-0-60	lbs	\$0.50	42.00	\$21.00
Urea	lbs	\$0.64	150.00	\$96.00
Potash	lbs	\$0.50	100.00	\$50.00
HERBICIDE				
Brash	qts	\$10.00	1.00	\$10.00
2,4-D	pt	\$2.10	1.00	\$2.10
DuraCor	oz	\$0.87	12.00	\$10.44
INSECTICIDE				
Lamda	oz	\$1.15	3.50	\$4.03
OTHER				
Net Wrap	bale	\$1.35	12.85	\$17.35
CUSTOM LIME				
AgLime	ton	\$111.00	2.00	\$222.00
OPERATOR LABOR				
Tractors	hour	\$16.54	3.24	\$53.51
HAND LABOR				
Implements	hour	\$9.06	0.35	\$3.20
DIESEL FUEL				
Tractors	gal	\$3.44	13.26	\$45.60
GASOLINE				
Tractors	gal	\$3.21	0.43	\$1.38
REPAIR & MAINTENANCE				
Implements	acre	\$46.58	1.00	\$46.58
Tractors	acre	\$6.49	1.00	\$6.49
INTEREST ON OP. CAP.	acre	\$31.87	1.00	\$31.87
TOTAL DIRECT EXPENSES				\$829.05
RETURNS ABOVE DIRECT EXPENSES				-\$22.65

FIXED EXPENSES				
Implements	acre	\$68.06	1.00	\$68.06
Tractors	acre	\$46.19	1.00	\$46.19
TOTAL FIXED EXPENSES				\$114.25
TOTAL SPECIFIED EXPENSES				\$943.30
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				-\$136.90

Table A.10: Estimated costs and returns per acre, Van Buren County, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Berm Tifton/Common	tons	\$144.00	5.70	\$820.80
TOTAL INCOME				\$820.80

DIRECT EXPENSES				
FERTILIZER				
Urea+DAP+Potash	lbs	\$0.32	400.00	\$128.00
Fert NPKS	lbs	\$0.29	490.00	\$142.10
Amm Nitrate + Potash	lbs	\$0.25	300.00	\$75.00
HERBICIDE				
Glyphosate	qts	\$8.80	2.28	\$20.09
Duracor	oz	\$0.76	20.00	\$15.20
Grazon PD3	pts	\$7.50	2.00	\$15.00
Pastora	oz	\$18.50	2.54	\$46.90
Lambda Cye	oz	\$0.51	3.00	\$1.53
OTHER				
Net Wrap	bale	\$1.35	2.46	\$3.32
CUSTOM FERT				
Custom Spread (Truck)	appl	\$7.50	3.00	\$22.50
OPERATOR LABOR				
Tractors	hour	\$16.54	2.14	\$35.43
HAND LABOR				
Implements	hour	\$9.06	0.14	\$1.23
DIESEL FUEL				
Tractors	gal	\$3.44	14.54	\$50.01
REPAIR & MAINTENANCE				
Implements	acre	\$18.60	1.00	\$18.60
Tractors	acre	\$8.92	1.00	\$8.92
INTEREST ON OP. CAP.	acre	\$20.04	1.00	\$20.04
TOTAL DIRECT EXPENSES				\$603.87
RETURNS ABOVE DIRECT EXPENSES				\$216.93

FIXED EXPENSES				
Implements	acre	\$45.09	1.00	\$45.09
Tractors	acre	\$66.87	1.00	\$66.87
TOTAL FIXED EXPENSES				\$111.96
TOTAL SPECIFIED EXPENSES				\$715.83
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$104.97

Table A.12: Estimated costs and returns per acre, White County, AR, 2023.

ITEM	UNIT	PRICE	QUANTITY	TOTAL AMOUNT
INCOME				
Mixed grass hay	tons	\$144.00	2.75	\$396.00
TOTAL INCOME				\$396.00

DIRECT EXPENSES				
FERTILIZER				
Urea (WC)	lbs	\$0.29	125.00	\$36.25
Litter	tons	\$65.00	2.00	\$130.00
OTHER				
Net Wrap	bale	\$1.35	11.49	\$15.51
CUSTOM FERT				
Custom Spread (Truck)	appl	\$7.50	1.00	\$7.50
OPERATOR LABOR				
Tractors	hour	\$16.54	1.62	\$26.83
HAND LABOR				
Implements	hour	\$9.06	0.04	\$0.38
DIESEL FUEL				
Tractors	gal	\$3.44	7.39	\$25.42
REPAIR & MAINTENANCE				
Implements	acre	\$22.96	1.00	\$22.96
Tractors	acre	\$3.37	1.00	\$3.37
INTEREST ON OP. CAP.	acre	\$8.92	1.00	\$8.92
TOTAL DIRECT EXPENSES				\$277.14
RETURNS ABOVE DIRECT EXPENSES				\$118.86

FIXED EXPENSES				
Implements	acre	\$33.04	1.00	\$33.04
Tractors	acre	\$25.23	1.00	\$25.23
TOTAL FIXED EXPENSES				\$58.27
TOTAL SPECIFIED EXPENSES				\$335.41
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				\$60.59



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RESEARCH & EXTENSION

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