

**Economics of Production Systems Involving Stocker Cattle and
Soft Red Winter Wheat from 1996 through 1999**

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Economics of Production Systems Involving Stocker Cattle and Soft Red Winter Wheat from 1996 through 1999¹

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Story in Brief

Economics of two production systems were evaluated from 1996 through 1999. These included: (1) stocker cattle, which grazed soft red winter wheat forage from late October until late February, followed by harvesting wheat grain in June, or (2) stocker cattle that continuously grazed soft red winter wheat forage from late October until the end of April. Two cultivars of wheat (Hickory and Jaypee) fertilized at seedling emergence with 0 or 50 lb N/acre and two stocking densities (500 and 750 lb beef/acre) were used. Wheat was seeded on September 10 or 11 for 1996 and 1997 and September 18 or 19, 1998. Average production costs for wheat cultivars were \$151.17 and \$147.93/acre for Hickory and Jaypee, respectively. Non-forage costs for cattle from October until March were \$54.63 and \$76.37/acre for steers stocked at 500 or 750 lb/acre respectively. For steers grazing wheat forage from October through April, non-forage costs were \$72.98 and \$101.90/acre for steers stocked at 500 and 750 lb/acre. Based on a selling price of \$75.00/cwt for cattle and \$3.50/bu for wheat grain, income over expenses ranged from \$29.06 to \$39.60/acre for cattle grazing from October through April, to \$129.57 to \$138.70 for cattle grazing from October through February and then harvesting wheat grain in June. When all production costs were charged to grain, income over expenses ranged from \$6.33 and \$9.59/acre. Grazing stocker cattle on wheat forage provided an economic advantage over harvesting for wheat grain only.

Introduction

Arkansas leads the nation in the production of soft red winter wheat, producing over 45 million bushels of grain annually (Klugh and Abbe, 1999) from about one million acres. Wheat farmers need a secondary source of net income from their land. One system that has been tried is to double crop wheat with soybeans. The viability of this system is limited because of a lack of soil moisture following the harvesting of wheat in mid to late June and because of possible frost damage to soybeans in the fall before the beans mature.

The production of stocker cattle from grazing hard red winter wheat forage in the Southern Plains is a unique and economical renewable resource. Income is derived from both grain and the increased value that is added as weight gain to growing cattle. This grain/livestock system has been a practice for many years in the Southern Great Plains (Horn, 1994; Horn et. al., 1994). Grazing soft red winter wheat forage in Arkansas may offer an alternative source of income to farmers.

Because of the even distribution and amount of rainfall and the warmer or milder winter temperature, soil and climate conditions favor the production of soft red winter wheat forage in the Southern United States over hard red winter wheat produced in the Southern Plains. Most of the land planted to soft red winter wheat in Arkansas will support grazing stock-

er cattle even though it may receive 14 to 15 in. of rainfall from October through April. Over 25 % of the nation's beef cows are located in the Southern United States (Taylor, 1994). Approximately, one million beef cows that produce nearly 875,000 calves annually are located in Arkansas (Klugh, 1999). Many of these calves are sold at weaning during the fall to cattlemen in the Southern plains and western states as stocker cattle and graze wheat forage before they are placed in feedlots. Arkansas has an ample supply of stocker cattle available to develop a sizable stocker cattle industry.

Therefore, it was the objective of a three-year study to evaluate the economics of production systems involving stocker cattle, and soft red winter wheat. The systems were: 1) grazing soft red winter wheat with stocker cattle from November until approximately March 1, followed by harvesting wheat grain in June, and 2) grazing soft red winter wheat forage with stocker cattle from November through April.

Materials and Methods

This research was conducted from 1996 through 1999 to evaluate the economics of production systems involving stocker cattle and soft red winter wheat at the Livestock and Forestry Branch Research Station, Batesville.

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Twenty-four 2 acre pastures, having a Peridge silt loam soil, were treated with Roundup® three times with 1/3 gallon/acre/treatment to kill existing vegetation. Soil test analyses were conducted for each pasture each year and the pastures were fertilized each year for wheat grain production according to the soil test. All fertilizer was applied by broadcasting with ground equipment. Each pasture was seeded with 120 lb/acre of either Hickory or Jaypee cultivar of soft red winter wheat on September 10 or 11 in 1996 and 1997 and September 18 or 19 in 1998 in a clean tilled prepared seedbed. After seeding the pastures were rolled with a cultipacker to preserve soil moisture. Half of the pastures of each cultivar received an additional 50 lb N/acre applied with ground equipment at seedling emergence.

A total of 360 crossbred commercial steers, averaging 500 lb body weight, were used as experimental animals for the three-year study. Sixty steers were randomly assigned to the pastures in October of each year, and 60 steers were randomly assigned on March 1 of each year at a stocking density of either 500 or 750 lb beef/acre. Treatments were replicated three times.

Two plots (12x20 feet) were fenced off in each pasture before grazing for an ungrazed control; two plots of the same size were fenced off at first hollow stems; and two when first jointing in ungrazed wheat occurred. Grain was harvested from each plot to estimate yield.

Records were kept relative to labor, tractor use, fencing, chemicals, fertilizer, seed, feed, etc. for economic analyses. Selling price of cattle was \$75/cwt and selling price of wheat grain ranged from \$2.50 to \$3.50/bu. A scenario is also used for \$75/cwt to \$85 cwt for purchase cost of cattle.

Results and Discussion

Average production cost/acre for soft red wheat cultivars, Hickory and Jaypee, are presented in Table 1. These costs included soil preparation, seeding, fertilization, seed cost, chemicals, etc., harvesting and hauling. Total cost of production of Hickory and Jaypee were \$151.17 and \$147.93/acre, respectively. The difference was the cost of seed of the Hickory cultivar. These production costs/acre of wheat are similar to the cost of production/acre of soft red winter wheat grown for grain by the average wheat farmer in Arkansas.

The production costs/acre, excluding forage costs, for production of stocker cattle that grazed soft red winter wheat forage from October through February are shown in Table 2. Costs of labor and maintenance for the production of stocker cattle were \$39.63 and \$53.87 for stocking densities of 500 and 750 lb/acre, respectively. If the transportation costs of shipping cattle to the feedlot are included, costs of \$15.00 and \$22.50/acre for stocking densities of 500 and 750 lb/acre, should be added in the total cost of \$54.63 and \$76.37/acre for stocking densities of 500 and 750 lb beef/acre, respectively. Forage costs were \$93.34 and \$90.10 for Hickory and Jaypee cultivars, respectively (Table 3).

Economic analysis of stocker cattle production when

soft red winter wheat forage was grazed from October through February during 1996-1999 is shown in Table 3. Income over the cost of forage and non-forage specified expenses/acre for stocker cattle ranged from \$79.90 to \$114.17 depending on cultivar of wheat and the stocking density of cattle. Average income over expenses/acre were \$98.60 and \$96.97 for Hickory and Jaypee, respectively. Average income above expenses for cattle having a stocking density of 500 and 750 lb/acre were \$81.47 and \$114.10, respectively. Income over expenses per head averaged \$70.52 and \$68.90 for Hickory and Jaypee, respectively whereas it was \$70.60 and \$68.82 for stocking densities of 500 and 750/acre. Cost per lb of gain averaged \$0.465 for both for Hickory and Jaypee and \$0.48 and \$0.45 for stocking densities of 500 and 750 lb beef/acre.

Returns over specified expenses of wheat grain production are shown in Table 4. Since there were no significant differences in wheat grain yield due to time the cattle were removed from the wheat and wheat yields were essentially state average (45 bu/acre), 45 bushel/acre of wheat grain with a selling price of \$3.50/acre were used in this economic scenario. Income over expenses/acre when all expenses were charged to grain was \$6.33 for Hickory and \$9.57 for Jaypee. If one received \$2.50/bu for wheat grain, income over expenses would have been -\$38.67 and -\$35.43 for Hickory and Jaypee, respectively. If average wheat grain yields were increased to 55 bu/acre, income over expenses would have been \$41.33 and \$44.57 for Hickory and Jaypee, respectively, when selling price was \$3.50/bu and \$61.03 and \$76.07 when the selling price of wheat was \$4.00/bu. Therefore, there is a good potential of making money from stocker cattle when wheat grown for grain is grazed.

An economic analysis of stocker cattle wheat grain production system when steers grazed wheat forage from October through February, 1996-1999 and wheat grain was harvested in June is shown in Table 5. Selling price of cattle was \$75/cwt and \$3.50 per bu for wheat grain. Income over expenses/acre ranged from \$179.57 for Jaypee stocked at 500 lb beef/acre to \$214.70 for Jaypee stocked at 750 lb beef/acre. Average income above expenses for Hickory was \$198.27/acre and for Jaypee was \$197.14/acre. Income above expenses was \$181.13 and \$214.27/acre for stocking densities of 500 and 750 lb beef/acre. Thus, excellent returns were made when stocker cattle grazed soft red winter wheat forage from October through February and wheat was then harvested in June. Average income above expenses was \$198.93/acre.

An economic analysis scenario looking at net returns from cattle grazing soft red winter wheat forage from October through February, 1996-1999 is shown in Table 6. Purchase cost of steers was based on either \$85, \$80 or \$75/cwt and selling price of steers was \$75/cwt and selling price of wheat grain was \$3.50/bu. When purchase price of steers was \$85/cwt, net return/acre ranged from \$129.57 for Jaypee stocked at 500 lb beef/acre to \$138.70 for Jaypee stocked at 750 lb beef/acre. Average net income/acre was \$134.20/acre. When purchase cost of steers was \$80/cwt, average net income/acre was \$165.00, whereas when the purchase cost of

steers was \$75/cwt, net income/acre averaged \$196.70/acre. Thus, a wheat farmer having 200 acres of wheat has the potential to net from \$26,840 to \$39,340/year. Increase in selling price of cattle or wheat would change this scenario. Therefore, these data suggest that the potential to increase net income from wheat greatly increases if it is planted in early September and grazed with stocker cattle from October through February.

An economic analysis of stocker cattle that grazed soft red winter wheat from March through April 1997-99 with a selling price of steers of \$75/cwt is shown in Table 7. Income over expenses/acre ranged from \$59.66 for Hickory stocked at 500 lb beef/acre to \$84.10 for Jaypee stocked at 750 lb beef/acre. Average return above expenses was \$71.51 and \$72.07/acre for Hickory and Jaypee, respectively and \$59.85 and \$83.75/acre for stocker densities of 500 and 750 lb beef/acre.

Economics of stocker cattle which grazed soft red winter wheat from October through April, 1996-99 based on a selling price of steer at \$75/cwt is shown in Table 8. Income above specified expenses/acre ranged from \$139.82/acre for Jaypee stocked at 500 lb beef/acre to \$198.38/acre for Jaypee stocked at 750 lb beef/acre. Average income over expenses/acre was \$171.01 and \$169.10/acre for Hickory and Jaypee, respectively and \$142.15 and \$197.90 when stocked at 500 or 750 lb beef/acre respectively.

Given in Table 9 is a scenario of purchasing cattle at \$85, \$80 or \$75/cwt, grazing soft red winter wheat forage from November through April and selling steers at \$75/cwt. This scenario shows that net return is greatly influence by the purchase and selling price of cattle. Average net return/acre when cattle were purchased at \$85, \$80 and \$75/cwt were \$33.80, \$96.07 and \$158.87/acre respectively.

Economics of harvesting soft red winter wheat forage with two sets of stocker cattle as compared to harvesting wheat forage with cattle from October through February and then harvesting wheat grain in June is given in Table 10. Harvesting wheat forage with cattle only was not as profitable as harvesting wheat forage with cattle plus harvesting wheat grain. Average net income when the purchase price was \$85/cwt and the selling price was \$75 cwt was \$34.47/acre when wheat forage was harvested with cattle and \$134.20/acre when wheat forage was harvested with cattle plus harvesting a wheat grain crop having a selling price of \$3.50/bu. Price of cattle and or price of yield of wheat grain will change income over specified costs.

Implications

Stocker cattle grazing soft red winter wheat forage from October through February can enhance income over specified expenses. This provides an alternative for the wheat farmer to net more income from his wheat land.

Literature Cited

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Table 1. Three year average cost of production of Hickory and Jaypee cultivars of soft red winter wheat for grain.

Labor and operating cost	Hickory	Jaypee
	-----\$/acre -----	
Disking	14.29	14.29
Fertilizer spreading	5.18	5.18
Grain drilling	8.11	8.11
Spraying	2.80	2.80
Rolling	4.26	4.26
Round-up	5.40	5.40
Wheat seed	19.20	15.96
Lime	11.60	11.60
Fertilizer	22.50	22.50
Subtotal	93.34	90.10
Spring urea	27.17	27.17
Fertilizer spreading	2.59	2.59
Custom combining	21.32	21.32
Custom hauling	6.75	6.75
Subtotal	57.83	57.83
Total	151.17	147.93

Table 2. Three year average cost for feed and maintenance of stocker cattle which grazed wheat forage having a stocking density of 500 and 750 lb beef per acre during October through February, 1996-1999.

Stocking Density	500 lb/acre	750 lb/acre
Expenses:¹	-----\$/acre-----	
Electric fence	5.00	5.00
Corn	15.75	23.66
Hay	4.48	6.72
Labor	3.20	3.20
Water	3.02	3.02
Minerals and Monensin	4.90	7.35
Vet and medical	3.28	4.92
Sub-Total	<u>39.63</u>	<u>53.87</u>
Hauling to feedlot	<u>15.00</u>	<u>22.50</u>
Total	<u>54.631</u>	<u>76.371</u>

¹ These costs do not include preconditioning or insurance.

Table 3. Economic analysis of stocker cattle production while grazing soft red winter wheat forage during October through February, 1996-1999 based on \$75/cwt selling price of cattle.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters:				
Total gain, lb/acre	308.00	378.50	299.50	374.00
Gross income, \$/acre	231.00	283.88	224.63	280.50
Total non-forage cost, \$/acre	54.63	76.37	54.63	76.37
Return, \$/acre	176.37	207.51	170.00	204.13
Forage cost, \$/acre	93.34	93.34	90.10	90.10
Net income over specified expenses, \$/acre	83.03	114.17	79.90	114.03
Net income over specified expenses, \$/head	72.16	68.87	69.03	68.77
Cost per lb gain, \$	0.48	0.45	0.48	0.45

Table 4. Economic analysis of soft red winter wheat which was grazed by stocker cattle from October through February, 1996-1999 and harvested for grain based on \$3.50/bu, \$3.00/bu, and \$2.50/bu selling price of wheat grain and assuming all production costs were for grain.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters:				
Wheat grain yield, bu/acre ²	45	45	45	45
Cost of production, \$/acre	151.17	151.17	147.93	147.93
Gross income, \$/acre (\$3.50/bu)	157.50	157.50	157.50	157.50
Gross income, \$/acre (\$3.00/bu)	135.00	135.00	135.00	135.00
Gross income, \$/acre (\$2.50/bu)	112.50	112.50	112.50	112.50
Net income over specified expenses ¹ (\$3.50/bu)	6.33	6.33	9.57	9.57
Net income over specified expenses (\$3.00/bu)	-16.17	-16.17	-12.93	-12.93
Net income over specified expenses (\$2.50/bu)	-38.67	-38.67	-35.43	-35.43

¹Specified cost did not include land use cost.

²Since yields were near state average in the study, state average (45 bu/acre) yields were used.

Table 5. Economic analysis of a stocker cattle – wheat grain production system where steers grazed wheat forage from November through February, 1996-1999 followed by harvesting wheat grain. Selling price of cattle was \$75/cwt and wheat \$3.50/bu.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters:				
Income from cattle, \$/acre	231.00	283.88	224.63	280.50
Income from wheat, \$/acre				
\$3.50/bu	157.50	157.50	157.50	157.50
\$3.00/bu	135.00	135.00	135.00	135.00
\$2.50/bu	112.50	112.50	112.50	112.50
Expenses: \$/acre				
Non-forage	54.63	76.37	54.63	75.37
Cost of wheat production ¹	151.17	151.17	151.17	151.17
Return over specified expenses \$/acre				
\$3.50/bu	182.70	213.84	179.57	214.70
\$3.00/bu	160.20	191.34	157.07	192.20
\$2.50/bu	137.70	168.84	134.57	169.70

¹Wheat production expenses do not include land use cost.

Table 6. Net return when cattle grazed soft red winter wheat forage from October through February, 1996-1999 with a purchase cost of steer being either \$85, \$80 or \$75/ cwt as selling price of wheat grain being \$3.50/bu.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters:				
Gross income, \$/acre				
Steers	606.00	846.38	599.63	843.00
Wheat grain	157.50	157.50	157.50	157.50
Total income	763.50	1003.88	757.13	1000.50
Expenses, \$/acre				
Purchase of steers, \$85/cwt	425.00	637.50	425.00	637.50
Purchase cost of steer \$80/cwt	400.00	600.00	400.00	600.00
Purchase cost of steer, \$75/cwt	375.00	562.50	375.00	562.50
Non-forage cost, \$/acre	54.63	76.37	54.63	75.37
Grain & forage costs, \$/acre ¹	151.17	151.17	147.93	147.93
Total cost feed, forage and grain \$/acre	205.80	227.54	202.56	224.30
Net income over specified cost, \$/acre				
Purchase cost of steers, \$85/cwt	132.76	135.84	129.57	138.70
Purchase cost of steers, \$80/cwt	157.70	173.34	154.57	176.20
Purchase cost of steers, \$75/cwt	182.70	210.84	179.77	213.70

¹Grain and forage costs do not include land use cost.

Table 7. Economics of stocker cattle that grazed soft red winter wheat forage from March through April, 1997-1999 based on a selling price of cattle of \$75/cwt.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters:				
Gain lb/acre	118.50	160.00	119.00	161.00
Income, \$/acre	88.88	120.00	89.25	120.75
Expenses: \$/acre¹				
Urea	10.87	10.87	10.87	10.87
Corn	8.40	12.60	8.40	12.60
Fence	2.50	2.50	2.50	2.50
Labor	1.50	1.50	1.50	1.50
Water	1.50	2.50	1.50	2.50
Mineral	2.45	3.68	2.45	3.68
Vet and medical	2.00	3.00	2.00	3.00
Sub-Total	29.22	36.68	29.22	36.65
Income over specified expenses, \$/acre	59.66	83.35	60.03	84.10
Income over specified expenses \$/head	59.66	55.57	60.03	56.07

¹Do not include preconditioning, costs or insurance.

Table 8. Economic analysis of a stocker cattle production system using soft red winter wheat forage from October through April based on \$75/cwt selling price during 1996-1999.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters:				
Income:				
Returns from cattle (fall) \$/acre	232.80	284.24	224.52	280.50
Returns from cattle (Spring) \$/acre	88.88	120.00	89.25	120.75
Total income	321.68	404.24	313.77	401.25
Expenses¹:				
Non-forage cost (Fall) \$/acre	54.63	76.37	54.63	76.37
Non-forage cost (Spring) \$/acre	18.35	25.53	18.35	25.53
Forage cost (Fall) \$/acre	93.34	93.34	90.10	90.10
Forage cost (Spring) \$/acre	10.87	10.87	10.87	10.87
Total expenses	177.19	206.71	173.95	202.87
Net income over specified expenses \$/acre	144.49	197.53	139.82	198.38
Net income over specified expenses \$/h	144.49	131.69	139.82	132.25

¹Do not include preconditioning, insurance or land use.

Table 9. Income over specified expenses per acre of stocker cattle which grazed soft red winter wheat forage from October through April.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters:				
Total income, \$/acre	1069.88	1528.88	1063.88	1525.25
Expenses¹:				
Forage costs, \$/acre	115.08	115.08	111.84	111.84
Non-forage costs, \$/acre	72.98	101.90	72.98	101.90
Animal purchase cost, \$75/cwt	750.00	1125.00	750.00	1125.00
Animal purchase cost, \$80/cwt	800.00	1200.00	800.00	1200.00
Animal purchase cost, \$85/cwt	850.00	1275.00	850.00	1275.00
Income over specified expenses \$/acre:				
Purchase cost \$75/cwt	131.82	186.90	129.06	186.51
Purchase cost \$80/cwt	81.82	111.90	79.06	111.51
Purchase cost \$85/cwt	31.82	36.90	29.06	37.41

¹Do not include preconditioning, insurance or land use.

Table 10. Economic scenario of harvesting soft red winter wheat forage from October through April with stocker cattle, harvesting winter wheat from October through February with stocker cattle and then harvesting wheat grain, or only harvesting wheat grain.

Stocking density	Hickory		Jaypee	
	500 lb/acre	750 lb/acre	500 lb/acre	750 lb/acre
Economic parameters¹:				
Net income over specified expenses, \$/acre				
Continuous grazing				
Purchase \$85 cwt – selling \$75 cwt	31.82	39.60	29.06	37.41
Purchase \$80 cwt – selling \$75 cwt	81.82	111.90	79.06	111.51
Purchase \$75 cwt – selling \$75 cwt	131.82	186.90	129.06	186.51
Grazing & wheat grain (\$75 cwt selling)				
Wheat \$3.50/bu	182.70	231.84	179.57	214.70
Wheat \$3.00/bu	160.20	191.34	157.07	192.20
Wheat \$2.50/bu	137.70	168.84	134.57	169.70
Wheat grain				
\$3.50/bu	6.33	6.33	9.57	9.57
\$3.00/bu	-16.17	-16.17	-12.93	-12.93
\$2.50/bu	-38.67	-38.67	-35.45	-35.43

¹Do not include land use cost, preconditioning or insurance.