

# PROFITABILITY OF COTTON PRODUCTION IN THE TEXAS HIGH PLAINS

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## Abstract

The Standardized Performance Analysis method was used to perform total farm financial analysis and enterprise performance for dryland and irrigated cotton producers in the Texas High Plains over the period 1995 through 1999. The results indicate that dryland cotton production was profitable in three of the five years, while irrigated cotton production was profitable each year. However, revenues from the sale of cotton lint were only sufficient to cover the total cost of production in two years for dryland and one year for irrigated production.

## Introduction

Cotton is the major field crop produced in Texas, accounting for approximately 10% of all Texas agricultural commodity cash receipts in 1999 (TASS). Planted acres within the state have fluctuated between 5.5 and 6.4 million acres with production ranging from 3.6 to 5.2 million bales from 1995 to 1999 (TASS). The Texas High Plains Region (THP) is the leading cotton producing region in Texas. Total cotton acres planted in the THP have been relatively stable, fluctuating between 3.4 and 3.8 million acres from 1995 to 1999. However, as a result of varying weather conditions and other factors, total cotton production has varied between 2.6 and 3.4 million bales over the same period (TASS).

The continued long-term viability of cotton production in the THP depends on its profitability within farming operations. Additionally, producers in the THP are facing rising production costs and an uncertain farm policy environment (Johnson and McGrann, 2000). These factors present a definite need for detailed information on actual production costs and profitability to assist producers in making production and marketing decisions (Clark, 1998). The objective of this study was to evaluate the production costs and profitability of irrigated and dryland cotton production in the THP from 1995 to 1999.

## Methods and Procedures

### Standardized Performance Analysis- Multiple Enterprises (SPA-ME)

The SPA-ME computer program was used to generate all individual farm analyses used in this study. This program is an analytical tool that utilizes whole farm financial statements to examine enterprise performance in addition to total farm financial analysis. Farm financial statements, which include the balance sheet and income statement, are allocated to specific enterprises and sub-enterprises within the farming operation to determine a true assessment of enterprise production costs and profitability.

### Data

The data utilized in this study was generated from financial and production information collected from cotton producers in the THP from 1995 to 1999 for cotton produced under crop share rental agreements. Total farm financial statements (accrual adjusted income statement, balance sheet, and cash flow statement) were generated for each producer based upon recommendations from the Farm Financial Standards Council. The total farm financial statements were allocated to the enterprise and specific farm levels using standardized allocation methods. The results from individual analyses were further combined into databases for each respective year to

generate aggregated results for the THP. It is important to note that all reported results are on an aggregated basis to protect the confidentiality of individual producers. Additionally, the results reported for 1999 are preliminary at this point.

## Empirical Results

The aggregate results from all databases were used to develop enterprise reports on irrigated and dryland cotton for each respective year. In general, gross accrual revenues and net incomes showed substantially more variation when compared to total costs of production. This is representative of fluctuations in market prices and yields, due to various weather factors from year to year. However, costs of inputs and overhead costs remained relatively stable from year to year producing significantly less variation in total production costs.

Production costs and profitability over the past five years were calculated on an aggregate basis for each enterprise. The final result is that producers can compare their costs of production against the database to evaluate their individual performance. Furthermore, breakeven and unit costs of production were derived for each respective crop in the THP. The breakeven cost is the price necessary to recover total costs of production. The unit cost of production, however, represents the price necessary to recover total costs of production after taking into account other revenues received such as government payments, co-op distributions, and crop insurance.

### Dryland Cotton

Standardized Performance Analyses of individual farming operations provided 24, 22, 30, 37 and 15 dryland cotton observations from 1995 to 1999, respectively. Results from the analyses of dryland cotton showed substantial variation across all five years with respect to gross accrual revenues and net incomes. The variability in costs, however, was much lower when compared to gross accrual revenues and net incomes with the exception of 1995. The aggregate dryland cotton results for the THP are presented in Tables 1 and 3.

Gross accrual revenues were substantially higher in 1996 and 1997 when compared to 1995, 1998, and 1999. In fact, dryland gross accrual revenues were highest in 1996 at \$293.27 per acre with the lowest revenues occurring in 1995 at \$165.34 per acre. This variation in gross accrual revenues reflected the differences in yields and prices across years. Average dryland cotton yields for SPA participants from 1995 to 1999 were 229, 431, 435, 179, and 289 pounds per acre, respectively.

The variability in cash operating expenses, excluding 1995, was much lower than gross accrual revenues. Cash operating expenses ranged from \$127.17 to \$137.48 per acre between 1996 and 1999. However, 1995 cash operating expenses were substantially lower at \$84.72 per acre primarily due to lower costs with respect to repairs & maintenance, hired labor & management, and other miscellaneous expenses. In addition, overhead expense variability closely mirrored the variability of cash operating expenses. Producers' overhead expenses ranged from \$59.85 to \$70.52 per acre from 1996 to 1999. Overhead expenses were lowest in 1995 at \$47.90 per acre due to lower family living withdrawals and depreciation expenses. Dryland cotton total enterprise costs produced under crop share rental agreements averaged \$180.33 per acre over the five year period.

Net income from dryland cotton varied between \$32.72 and \$95.58 per acre from 1995 to 1997. However, in 1998 and 1999, dryland cotton production showed negative average net incomes of \$11.01 and \$3.10 per acre, respectively. This can partially be attributed to the reduction of dryland cotton yields and lower prices for 1998 and 1999. In Table 3, a comparison of enterprise net returns per acre to the non-primary product income shows the importance of non-primary product income in achieving enterprise

profitability. Producers received average net returns and non-primary product income of \$35.35 and \$63.95 per acre, respectively, over the past five years. Hence, producers would have faced negative net returns on average over the past five years without the non-primary product income.

Unit cost of production and breakeven cost of production for dryland cotton produced under crop share rental agreements averaged \$0.52 per pound and \$0.85 per pound, respectively, from 1995 to 1999. A comparison to the average price received for cotton lint over this period of \$0.64 per pound shows the importance of the non-primary product income to the profitability of dryland cotton production.

### **Irrigated Cotton**

Standardized Performance Analyses of individual farming operations provided 22, 43, 49, 77, and 26 irrigated cotton observations from 1995 to 1999, respectively. Results from these analyses indicate less variability in gross accrual revenues and net incomes for irrigated cotton when compared to dryland cotton. This is partially a result of lower variability in yields that comes with the ability to supplement crop moisture. Irrigated cotton yields for SPA participants were 520, 601, 520, 521, and 550 pounds per acre for 1995 through 1999, respectively. The aggregate irrigated cotton results for the THP are presented in Tables 2 and 4.

Irrigated cotton producers received gross accrual revenues that varied by \$56.07 per acre between 1995 and 1999. In 1996, gross accrual revenues reached a high of \$359.89 per acre, which can be attributed to higher yields, while revenues for the remaining years were relatively stable, fluctuating between \$303.82 and \$318.32 per acre.

Cash operating expenses ranged from \$175.33 to \$223.13 per acre over the five years included in this study. Additionally, total overhead expenses varied from \$57.52 to \$76.67 per acre from 1996 to 1999. However, total overhead expenses were substantially higher in 1995 at \$101.79 per acre due to higher operator labor & management and depreciation expenses. Total enterprise costs for irrigated cotton produced under crop share rental agreements averaged \$272.63 per acre over the past five years.

Net incomes varied from \$8.83 to \$58.99 per acre with the exception of 1996. In 1996, net income was significantly higher at \$107.89 per acre as a result of lower costs and higher yields. As shown in Table 4, over the past five years, producers received average per acre net returns and non-primary product income of \$46.87 and \$68.98, respectively. As in dryland cotton production, this comparison highlights the importance of non-primary product income in helping irrigated cotton producers achieve a positive net return.

Unit cost of production and breakeven cost of production for irrigated cotton produced under crop share rental agreements averaged \$0.50 per pound and \$0.67 per pound, respectively, from 1995 to 1999. A comparison to the average price received for cotton lint over this period of \$0.61 per pound shows the importance of the non-primary product income to the profitability of irrigated cotton production.

### **Concluding Remarks**

Irrigated cotton production in the THP has been more consistent with respect to profitability when compared to dryland cotton production. This is to be expected given the ability to regulate crop moisture during times of lower rainfall. Dryland cotton production results indicated a negative net income in two of the five years included in this study. The two years of negative net incomes occurred in years with relatively lower yields resulting from unfavorable rainfall distributions, lower prices, and other related factors. However, dryland cotton production did result in a positive net income when evaluated by the five-year average. Thus, dryland cotton production seems to be profitable in the THP in the medium to long run.

The implication of this previous result is that dryland cotton producers must be able to effectively manage profits in favorable years to compensate for losses in other years. Additionally, the above conclusions include the contributions of non-primary product income in evaluation of profitability. The results from this study indicate that producers would face negative net returns in the medium to long run without non-primary product income. This highlights the importance of non-primary product income in sustaining profitability and achieving the above results in the medium to long run for irrigated and dryland cotton production.

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Table 1 – Dryland Cotton Enterprise Report (Crop Share).

	1995	1996	1997	1998	1999	Avg
<b>Observations</b>	<b>24</b>	<b>22</b>	<b>30</b>	<b>37</b>	<b>15</b>	<b>25.6</b>
	<b>Pounds Per Acre</b>					
<b>Total Yields</b>	<b>229</b>	<b>431</b>	<b>435</b>	<b>179</b>	<b>289</b>	<b>313</b>
<b>Crop Share Yields</b>	<b>172</b>	<b>323</b>	<b>326</b>	<b>134</b>	<b>217</b>	<b>234.4</b>
	<b>\$/Per Acre</b>					
<b>Gross Cash Income</b>						
-Crops for Sale						
Cotton Lint*	128.09	231.53	207.28	81.51	110.23	151.73
-Ag Program Payments	4.84	19.6	20.37	24.63	48.64	23.62
-Crop Insurance	17.67	23.07	2.56	1.36	0	8.93
-Other Income**	14.74	19.07	30.94	69.77	22.5	31.40
<b>Total Gross Enterprise Accrual Revenue</b>	<b>165.34</b>	<b>293.27</b>	<b>261.15</b>	<b>177.27</b>	<b>181.37</b>	<b>215.68</b>
<b>Cash Operating Expenses</b>						
-Chemicals						
Herbicides	11.22	13.98	9.67	6.43	8.6	9.98
Insecticides	0.01	1.29	2.56	1.31	1.24	1.28
Harvest Aids	0.11	0	2.89	0.56	2.24	1.16
Growth Regulators	0	1.09	0.82	2.61	0.61	1.03
-Fertilizer & Lime	7.11	6.12	11.76	12.87	9.32	9.44
-Gasoline, Fuel, & Oil	6.8	12.41	9.75	9.2	5.41	8.71
-Seeds & Plants	3.97	4.3	3.59	7.56	4.33	4.75
-Repairs & Maintenance	9.87	17.41	17.55	17.35	17.63	15.96
-Hired Labor and Management	14.94	22.87	23.95	22.17	29.49	22.68
-Irrigation	0	0	0	0	0	0
-Other Operating Expenses***	30.69	47.7	54.94	38.02	45.74	43.42
<b>Total Cash Operating Expenses</b>	<b>84.72</b>	<b>127.17</b>	<b>137.48</b>	<b>118.08</b>	<b>124.61</b>	<b>118.41</b>
Total Interest Expense	2.37	8.18	7.79	8.8	5.83	6.59
Depreciation Expense	18.08	27.43	22.77	33.39	25.46	25.43
Operator Labor and Management	27.45	34.91	30.56	28.01	28.56	29.90
<b>Total Overhead Expenses</b>	<b>47.9</b>	<b>70.52</b>	<b>61.12</b>	<b>70.2</b>	<b>59.85</b>	<b>61.92</b>
<b>Total Enterprise Cost</b>	<b>132.62</b>	<b>197.69</b>	<b>198.6</b>	<b>188.28</b>	<b>184.46</b>	<b>180.33</b>
<b>Net Income</b>	<b>32.72</b>	<b>95.58</b>	<b>62.55</b>	<b>-11.01</b>	<b>-3.1</b>	<b>35.35</b>
	<b>\$/Pound</b>					
<b>Unit Cost of Production</b>	<b>0.55</b>	<b>0.41</b>	<b>0.42</b>	<b>0.69</b>	<b>0.52</b>	<b>0.52</b>

\* Cotton lint revenue was accrual adjusted to account for the entire crop share yield

\*\* Other income includes coop distributions, custom hire earnings, and misc. income

\*\*\* Other expenses include custom hire, insurance, rent, supplies, and misc. expenses

Table 2 – Irrigated Cotton Enterprise Report

	1995	1996	1997	1998	1999	Avg
<b>Observations</b>	<b>32</b>	<b>43</b>	<b>49</b>	<b>77</b>	<b>26</b>	<b>45.4</b>
	<b>Pounds Per Acre</b>					
<b>Total Yields</b>	<b>520</b>	<b>601</b>	<b>520</b>	<b>521</b>	<b>551</b>	<b>543</b>
<b>Crop Share Yields</b>	<b>390</b>	<b>451</b>	<b>390</b>	<b>391</b>	<b>413</b>	<b>407</b>
	<b>Per Acre</b>					
<b>Gross Cash Income</b>						
-Crops for Sale						
Cotton Lint*	267.58	301.96	227.10	231.36	224.56	250.51
-Ag Program Payments	9.89	27.30	28.40	41.98	58.33	33.18
-Crop Insurance	5.76	7.65	6.41	4.00	0.00	4.76
-Other Income**	28.39	22.98	41.91	40.98	20.93	31.04
<b>Total Gross Enterprise Accrual Revenue</b>	<b>311.62</b>	<b>359.89</b>	<b>303.82</b>	<b>318.32</b>	<b>303.82</b>	<b>319.49</b>
<b>Cash Operating Expenses</b>						
-Chemicals						
Herbicides	21.38	22.99	24.18	16.13	14.38	19.81
Insecticides	5.60	6.38	7.25	6.52	12.26	7.60
Harvest Aids	0.00	2.17	2.36	5.83	7.67	3.61
Growth Regulators	1.05	0.49	1.70	5.51	5.42	2.83
-Fertilizer & Lime	23.95	16.48	21.04	18.57	17.29	19.47
-Gasoline, Fuel, & Oil	18.18	10.89	12.52	9.90	6.00	11.50
-Seeds & Plants	4.78	6.56	7.56	11.34	7.58	7.56
-Repairs & Maintenance	13.81	20.31	20.99	16.62	15.50	17.45
-Hired Labor and Management	26.67	25.02	30.85	27.12	29.10	27.75
-Irrigation	28.22	25.00	22.00	39.85	29.18	28.85
-Other Operating Expenses***	57.36	39.04	72.68	52.84	42.92	52.97
<b>Total Cash Operating Expenses</b>	<b>201.00</b>	<b>175.33</b>	<b>223.13</b>	<b>210.23</b>	<b>187.30</b>	<b>199.40</b>
Total Interest Expense	14.97	12.72	14.06	12.51	6.53	12.16
Depreciation Expense	36.90	30.98	25.50	26.78	28.20	29.67
Operator Labor and Management	49.92	32.97	26.05	25.27	22.79	31.40
<b>Total Overhead Expenses</b>	<b>101.79</b>	<b>76.67</b>	<b>65.61</b>	<b>64.56</b>	<b>57.52</b>	<b>73.23</b>
<b>Total Enterprise Cost</b>	<b>302.79</b>	<b>252.00</b>	<b>288.74</b>	<b>274.79</b>	<b>244.82</b>	<b>272.63</b>
<b>Net Income</b>	<b>8.83</b>	<b>107.89</b>	<b>15.08</b>	<b>43.54</b>	<b>58.99</b>	<b>46.87</b>
	<b>(\$/pound)</b>					
<b>Unit Cost of Production</b>	<b>0.65</b>	<b>0.43</b>	<b>0.54</b>	<b>0.47</b>	<b>0.40</b>	

\* Cotton lint revenue was accrual adjusted to account for the entire crop share yield

\*\* Other income includes coop distributions, custom hire earnings, and misc. income

\*\*\* Other expenses include custom hire, insurance, rent, supplies, and misc. expenses

Table 3 – Dryland Cotton Summary Enterprise Report (Crop Share).

	1995	1996	1997	1998	1999	Avg
			<b>\$/Pound</b>			
Total Cash Operating Expenses	0.49	0.39	0.42	0.88	0.57	0.55
Total Enterprise Cost	0.77	0.61	0.61	1.41	0.85	0.85
Unit Cost of Production	0.55	0.41	0.42	0.69	0.52	0.52
Cotton Lint Price Received	0.74	0.72	0.64	0.61	0.51	0.64
			<b>\$/Acre</b>			
Net Returns per Acre	32.72	95.58	62.55	-11.01	-3.10	35.35
<b>Non-Primary Product Income</b>	<b>37.25</b>	<b>61.74</b>	<b>53.87</b>	<b>95.76</b>	<b>71.14</b>	<b>63.95</b>

Table 4 – Irrigated Cotton Summary Enterprise Report (Crop Share)

	1995	1996	1997	1998	1999	Avg
			<b>\$/Pound</b>			
Total Cash Operating Expenses	0.52	0.39	0.57	0.54	0.45	0.49
Total Enterprise Cost	0.78	0.56	0.74	0.70	0.59	0.67
Unit Cost of Production	0.65	0.43	0.54	0.47	0.40	0.50
Cotton Lint Price Received	0.69	0.67	0.58	0.59	0.54	0.61
			<b>\$/Acre</b>			
Net Returns per Acre	8.83	107.89	15.08	43.54	58.99	46.87
<b>Non-Primary Product Income</b>	<b>44.04</b>	<b>57.93</b>	<b>76.72</b>	<b>86.96</b>	<b>79.26</b>	<b>68.98</b>