

## Economics of Wheat Production in District Faisalabad

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**Abstract:** Wheat is the single largest staple food crop of Pakistan. But it is the irony of fate that average yield per hectare of Wheat is very low in Pakistan as compared to other countries. There are many physiological and agronomic factors responsible for this menace. Among these the most important are inadequate and unbalanced application of fertilizer and manure, poor crop management practices, bad quality of soil, irrigation deficiency at critical stages, lack of usage of HYVs, high weed intensity in the fields etc. This study was conducted, using the primary data, in order to undertake the economic analysis of the different factors on the farm based categories: small, medium, large and the productivity based categories: low, medium, high. In the economic analysis gross margins, marginal costs and marginal rates of returns were evaluated from the primary data collected from district Faisalabad.

**Key Words:** Economics of Wheat Production, Factors for Low Productivity of Wheat

### Introduction

Dawn of 21<sup>st</sup> century has seen the people of third world struggling for survival. On the one hand, developed countries are entering the new millennium on the wings of the technological advancement while on the other hand; third world countries are facing the problem of food security. Agriculture is providing support to the economies of these developing countries. Same is the case with Pakistan. Agriculture sector contributes slightly above than 25% to GDP, while employs 44% of the workforce (Economic Survey of Pakistan, 2000). During 1999-2000, agriculture growth rate accounted for 5% as against a relatively, to meet the increasing food demand of the country, agricultural development is direly needed. The requisite food supply can be increased either by bringing more area under cultivation or by increasing yield per unit area of different crops. As a matter of fact, it is not possible to increase area under cultivation due to increasing occupation of fertile land by expanding cities and industries. Therefore only one alternative left for increasing the food supply is through higher yield per unit area. Pakistan has a population of 130 million (Population Census 1998). So there is need for the optimization of agricultural resource use in order to gain maximum level of productivity and fulfill the gap between the increasing population and decreasing food supply.

We know that Wheat (*Triticum Aestivum* L.) is the most important food grain crop grown in the world. It ranks first in the world crop production and is a staple food of about one third of the world population. It occupies approximately 21-22% of the world's cropland. It was grown on nearly 224374 thousand hectares in 1998 in 123 different countries (FAO Production Year Book, 1998). In 1998-99, total area under wheat cultivation in Pakistan was 8229.6 thousand hectares with annual production of 17857.6 thousand tones and average grain yield per hectare was 2170 kg/ha (Agricultural Statistics of Pakistan 1998-99). It is irony of fate that average yield per hectare of wheat is very low as compared to the other countries of the world. As a result of low yield, the demand for wheat has always remained higher than its production with the result that we imported wheat from other countries of the world

every year. There are many physiological and agronomic factors, which are responsible for low yield per unit area in Pakistan. The most important among these are the poor crop management practices, inadequate and unbalanced application of fertilizer, defective plant protection measures and irrigation deficiency at critical stages etc. These in turn stem from the lack of information about the optimum doses of different production inputs and their contribution to productivity. The self-sufficiency in wheat can be achieved by adoption of improved production technology of wheat especially by using optimum level of inputs.

Table 1 describe the comparison of different countries in respect of yield in kg/ha. It depicts that Pakistan has a yield of 2238 kg/ha and stands on the 7th Pakistan comity of nations.

Table 1: Yield Per Hectare of Wheat of Different Countries (1998)

Countries	Yield in Kg/Ha
France	7603
Mexico	4197
China	3667
USA	2907
India	2578
Canada	2266
Pakistan	2238
Turkey	2234
Australia	1907
Iran	1714

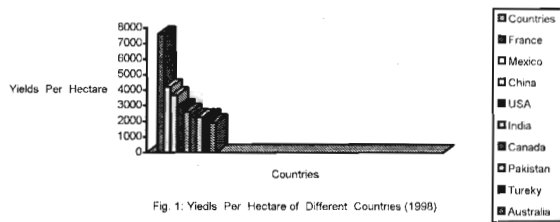


Fig. 1: Yields Per Hectare of Different Countries (1998)

**Objectives:** The main objectives of the study were as follows:

1. To estimate the factors of yield variability, their costs and their effect on yield changes.

2. To check the productivity gaps between small, medium and large farmers and low, medium and high yield farms.
3. To calculate the gross margin, marginal income marginal cost and marginal rate of return.
4. To suggest the policy measures to minimize the productivity gap.

**Materials and Methods**

Collection of primary data was done in Faisalabad district falling in three tehsils naming Samundari, Jaranwala and Faisalabad. For this purpose; a multistage random sampling was adopted to select tehsil villages and respondents. Few villages representing average conditions were selected from each tehsil. A sample size of roundabout 30-35 farm respondents was selected from each tehsil. Thus the total sample near about 647 acres of land. To collect data, a well-designed and pre-tested interview schedule was adopted. After the collection, the data was tabulated and classified into three farm size categories according to farm size level. Three farm size categories were small farmers operating up to 5 acres, medium farmers operating up to 10 acres and large farmers operating above than 10 acres. Similarly, three productivity levels were low, medium and high. Then data was tabulated as regards their input uses and costs were concerned. In the economic analysis, gross income, total variable cost, gross margin, marginal income, marginal cost and Marginal Rate of Return (MRR) were calculated at different farm size categories and productivity levels. For the analysis purpose following formulas were used for the calculations:

$$\text{Average Yield of the crop} = \Sigma Y_i / N$$

Where  $Y_i$  = Average yield of the crop  
 $N$  = Number of the farmers

Field Price of the output = Sale Price of the output - (Transport cost+ Bagging cost +Loading Cost+ Marketing Cost)

Variable Costs = Costs that vary are the costs of purchased inputs that vary between the new technology and the current farmer practice.

Gross Margin = Gross income - TVC

Marginal Cost for a Yield Level=TVC of this level- TVC of next level

$$\text{M.R.R} = \frac{\text{Marginal Income}}{\text{Marginal Cost}}$$

Although a number of factors were included in the analysis, but even then many were still left out. Management, tenure system, sources of credit cropping intensity, crop rotation and labor were rather more important but left out due to the statistical problems in the estimation of the model. In addition the data was collected relying on the memory of the respondents, so it may have suffered from some memory bias.

**Results and Discussion**

As described earlier, the economics of Wheat production will be analyzed both on the farm size levels and the productivity levels. So will discuss them one by one.

**Economics of Wheat Production by Farm Size Levels:** Three farm size categories were developed

here. The results identified by Marra and Schurle (1994) showed that yield risk increased at an increasing rate as the numbers of acres in the risk measures decreased. The study in hand depicts the veracity of these results as on small farms yields were 25.40 mds / acre while on the medium and large farms, they were 25.90 mds / acre and 28.65 mds / acre respectively. Table 2 shows that gross income was 4290.70 Rs / acre on small farms while it was 1.14 and 1.15 times greater on medium and large farm categories.

While coming to the costs side, we see that the plowing costs were 547.70 Rs / acre and it was the greatest in case of the medium size farms i.e: 628.40 Rs and on large farms these costs decreased to 580.40 Rs showing that as the area of the farms increased up to the extent of large farms, these plowing costs came down. The seed cost was 226.40 Rs / acre on small farms and it was greater on medium and large farms as 1.15 and 1.05 times respectively. The cost of chemical fertilizer increased gradually from 679.96 Rs / acre to 718.3 Rs / acre and 746.22 Rs / acre respectively on medium and large farms. Irrigation cost decreased on medium and large farms by 0.92 and 0.90 times than that of the small farms which was 238.70 Rs. This was due to the reason that small farmers had to incur the costs on irrigation through tubewell from their own pocket by purchasing it at high cost, while most of the large farmers had their own tubewells. Similarly large farmers were found to be involved in the malpractices like theft of canal water.

In case of Weedicide costs, the results were quite astonishing. It was found that the Weedicide cost was 325.50 Rs, 289.56 Rs and 284.56 Rs on small, medium and large farms respectively. It showed that it decreased to 0.88 times on medium farms and 0.87 times on large farms than that of the small farms. These results show the high incidence of weeds on smaller farms due to which they have to incur high costs to curb weeds. The harvesting cost were found to be 392.40 Rs on small farms and it increased on medium and large farms by 1.02 and 1.06 times respectively. It was only because of the reason that small farmers were involved mostly in manual harvesting (in some cases hiring the labor), while the larger farmers were also engaged in the utilization of harvesters. In the same way, the threshing cost was calculated to be 309.09 Rs while on medium and large farms, it was 302.40 Rs and 292.70 Rs. It shows that on large farms the threshing costs were less because they practicing the combine harvesters, while small farmers had to thresh their Wheat separately so incurring high cost on it. By the addition to all of the variable costs, the total variable cost turned to be 2719.75 Rs on small farm while on the medium and large farms, it was 2786.63 Rs and 2776.92 Rs respectively. After having calculated the TVC, the gross margin (Gross income -TVC) was calculated, which was 1570.95 Rs / acre on small farms and 2113.37 Rs / acre and 2148.08 Rs / acre on medium and large farms respectively. This was maximum in case of large farmers. The marginal income on the medium farms was 542.42 Rs / acre and 34.71 Rs / acre on large farms. Similarly, the marginal cost was 66.88 Rs / acre for the medium farms and it had a negative value on large farms i.e. -9.71 Rs / acre. This result was quite astonishing and was due to the reason that TVC of large farms was less than medium farms by 9.71 Rs. Lastly, the marginal

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rate of return ( MRR = Marginal income / Marginal cost ) was calculated. It was 8.11 on medium farms and -3.57 on large farms. The analysis on different farm categories has also been conducted by Chanda (1979) and he has focused on how well small farms (compared with medium and large farms) convert inputs into outputs. Our results have shown that the large farmers are quenching the highest profits, while small farmer is living from hand to mouth cultivating his field for subsistence farming.

### Economics of Wheat Production by Productivity Levels:

On the three productivity levels yields on high productivity farms had a large gap than that of the small farms. The results in Table 3 show that on small farms the yield level was 20.35 mds / acre while on medium and large farms they were 26.35 mds/acre and 35.46 mds/ acre respectively. Gross income on the low productivity arms was found to be 3293.05 Rs / acre while the gross income on medium and high yield categories was 1.43 and 1.90 times greater than the low yield farms and it was 4638.50 Rs and 6270.50 Rs respectively. Hurby (1990 ) estimated the production costs and returns and found that optimum yield were not achieved due to inefficient production techniques and management practices. Here in this study we find that high number of ploughings were being undertaken by high productivity farmers and they got high yields. On the other hand the yields were quite low especially on low productivity farms. While the plowing costs were quite high ranging from 616.90 Rs / acre , 576.40 Rs / acre and 615.90 Rs / acre on low , medium and high yield farms respectively. . Seed cost was calculated as 1.01 times higher on medium and 0.99 times lesser on high yield farms. The seed costs on low yield farms were 616.90 Rs / acre. All the productivity levels almost utilized the same seed rates. So it indicates that seed rate was not a major factor in the high productivity. The cost of fertilizer on low yield farms was 628.47 Rs / acre and 689.38

Rs / acre and 924.30 Rs / acre on medium and high productivity farms. It describes that the high productivity farms were being given relatively high quantities of fertilizer than those of other productivity levels and were getting good yields. Pal and Mukhopadhyay, (1987) had described that there was a scope for increasing Wheat yields if the requisite levels of irrigation could be assured. According to this study the number of irrigation were low on low and medium yield farms while they were quite high in the case of high productivity farms. The irrigation cost was less to 0.99 and 0.96 times than that of the low yield farms. Its cost was 235.60 Rs / acre on low yield farms. The cost of Weedicide was calculated as 279.23 Rs / acre on low yield farms while on the medium and high yield farms, they were found to be 295.12 Rs / acre and 373.71 Rs / acre. The harvesting cost amounted to 257.47 Rs / acre on low yield category farms while it was 1.73 and 1.87 times greater on medium and high yield categories. In addition, the threshing cost was 1.71 and 1.32 times greater than that of the low yield category, which was 199.70 Rs / acre. After adding all the above costs, the TVC was found to be 2443.97 Rs / acre on low yield and 2807.96 Rs / acre and 3313.31 Rs / acre on medium and high yield categories respectively. It showed that medium and high yield farms had 1.15 and 1.35 times greater TVC than that of the low yield farms. So far as the gross margin is concerned, it increased step by step from 843.68 Rs, 1830.54 Rs and 2757.34 Rs on low, medium and high yield categories respectively. The marginal income was nil for the low yield farms while medium yield farms had 986.86 Rs and high yield farms had 1129.86 Rs respectively. Now just like the marginal income, marginal cost was zero for low yield farms while it was 358.59 Rs and 505.35 Rs for medium and high yield farms. After the division of the marginal income by marginal cost, MRR was calculated which was nil

Table 2: Economics of Wheat Production by Farm Size Levels

Variable	Farm Size Levels		
	Small	Medium	Large
Yield (md/acre)	25.40	25.90	28.65
Ratio	1.00	1.02	1.13
Gross Income (Rs/acre)	4290.70	4900.00	4925.00
Ratio	1.00	1.14	1.15
Costs			
Plowings (No)	7.70	8.10	7.90
Cost (Rs)	547.70	628.40	590.40
Ratio	1.00	1.14	1.07
Seed (Kg)	44.32	42.60	43.40
Cost (Rs)	226.40	228.40	232.02
Ratio	1.00	1.15	1.02
Chemical Fertilizer (Kg)	69.70	69.74	76.10
Cost (Rs)	679.96	718.38	746.22
Ratio	1.00	1.05	1.09
Irrigation (No)	3.40	3.50	3.67
Cost (Rs)	238.70	219.57	215.28
Ratio	1.00	0.92	0.90
Weedicide	325.50	289.56	284.56
Cost (Rs)	1.00	0.88	0.87
Ratio			
Harvesting	392.40	400.00	415.74
Cost (Rs)	1.00	1.02	1.06
Ratio			
Threshing	309.09	302.40	292.70
Cost (Rs)	1.00	0.97	1.06
Ratio			
Total Variable Cost (Rs/acre)	2719.75	2786.63	2776.92
Ratio	1.00	1.02	1.02
Ratio			
Gross Margin (Rs/acre)	1570.95	2113.37	2148.08
Marginal Income (Rs/acre)	-	542.42	34.71
Marginal Cost	-	66.88	-9.71
MRR	-	8.11	-3.57

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Table 3: Economics of Wheat Production by Farm Productivity Levels

Variable	Productivity Levels		
	Low	Medium	High
Yield (md/acre)	20.35	26.55	35.46
Ratio	1.00	1.30	1.74
Gross Income (Rs/acre)	3293.05	4638.50	6270.65
Ratio	1.00	1.43	1.90
Costs			
Plowings (No)	8.16	8.00	9.23
Cost (Rs)	616.90	567.40	615.9
Ratio	1.00	0.92	0.99
Seed (Kgs)	40.20	42.60	44.35
Cost (Rs)	232.00	235.00	230.32
Ratio	1.00	1.01	0.99
Chemical Fertilizer (Kg)	53.60	70.50	108.10
Cost (Rs)	628.47	689.38	924.30
Ratio	1.00	1.09	1.047
Irrigation (No)	3.52	3.92	6.05
Cost (Rs)	235.60	235.24	225.24
Ratio	1.00	0.99	0.96
Weedicide	279.23	295.12	373.71
Cost (Rs)	1.00	1.05	1.34
Ratio			
Harvesting	257.47	445.12	481.15
Cost (Rs)	1.00	1.73	1.87
Ratio			
Threshing	199.70	340.70	462.69
Cost (Rs)	1.00	1.71	1.32
Ratio			
Total Variable Cost (Rs/acre)	2449.37	2807.96	3313.31
Ratio	1.00	1.15	1.35
Gross Margin (Rs/acre)	843.68	1830.54	2957.34
Marginal Income (Rs/acre)	-	986.86	1129.8
Marginal Cost	-	358.59	505.35
MRR	-	2.75	2.32

for low productivity farms. The high productivity farms had lower MRR of 2.23 as compared to medium yield farms having a value of 2.75.

**Recommendations:** After a pithy study as described above, we suggest certain recommendations for the ameliorations in the productivity of wheat as follows:

1. The time and quantity of application of fertilizers should correspond with the time of their greatest needs and these should be applied in optimum quantity.
2. The study showed that most of the farmers (Approximately 66 %) were sowing seeds of banned / unimproved varieties. So it is suggested that agriculture department should supply adequate quantity of certified seed of high quality at reasonable prices.
3. It was seen in the areas studied that shortage of irrigation water was the major problem especially for the small farmers while large farmers were less prone to this danger. To overcome this problem it is suggested that efforts should be made to increase the quantity of canal water and its availability at proper time. Similarly measures should be taken to stop the theft of canal water by the influentials.
4. The establishment of soil and water testing labs is the necessity of time. It will not only enable the physical and chemical analysis of soil prior to cultivation but also tell the suitability of irrigation water.
5. Lastly, there is need for an integrated approach for wheat production in which

extension advice should be accompanied by availability of inputs in the required quantity, desired quality at proper time and place and timely availability of required agricultural credit on easy terms and conditions.

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