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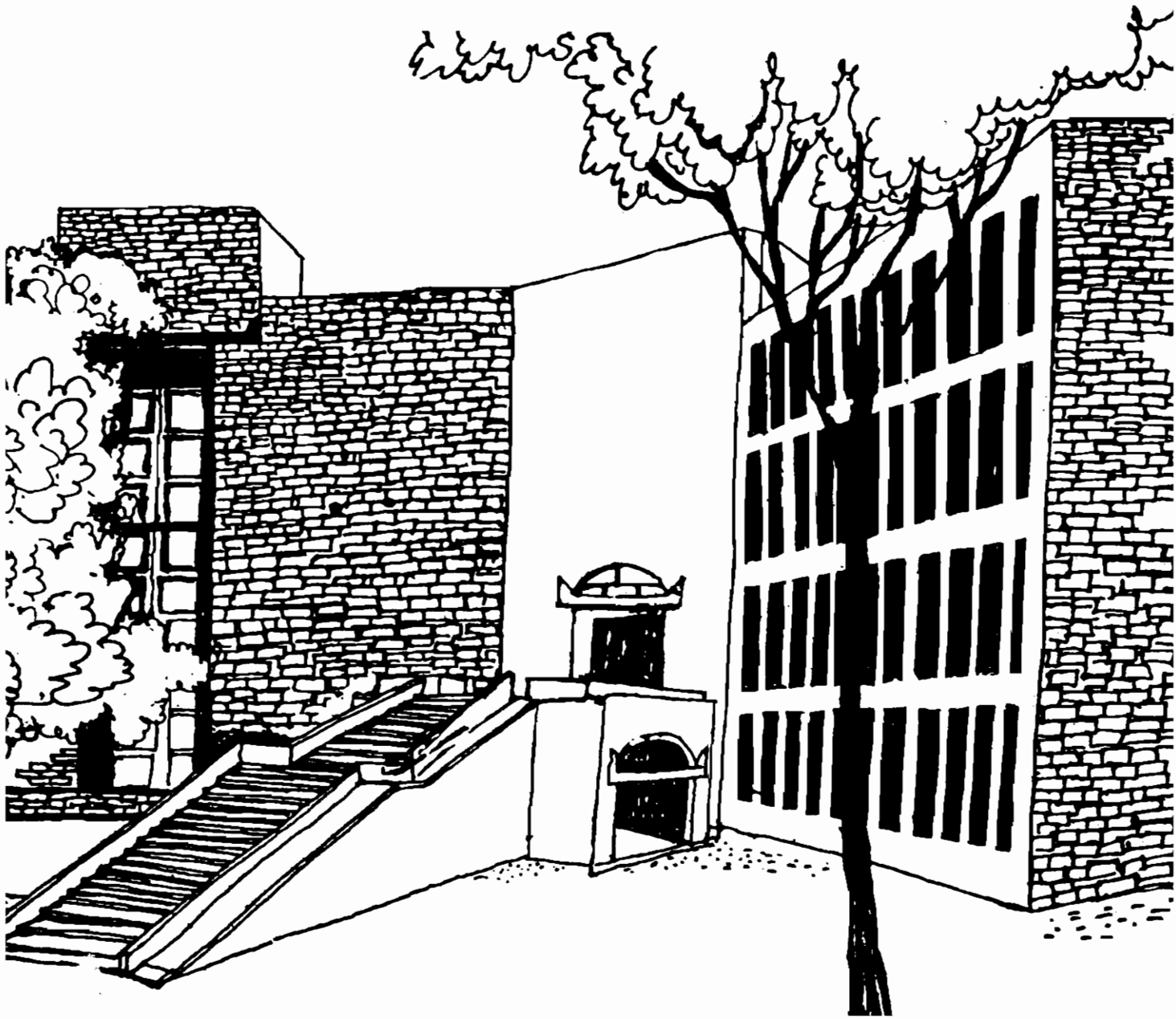

SETTING UP AN IRRIGATION COOPERATIVE: A FEASIBILITY STUDY

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ABSTRACT

The objective of the study was to examine the feasibility of setting up an irrigation cooperative in Hadgood village in Kheda district of Gujarat. A sample of 80 households, choosen at random, was studied and households having no irrigation sources and having irrigation sources were compared on the following aspects :

i) landholding and intensity of land use:
ii) cropping pattern:
iii) costs and returns from different crops with existing water resources: and
iv) farm income per household.

An attempt was also made to assess the viability of the irrigation cooperative society by considering factors like :

i) potential for increasing irrigation:
ii) extent of dependence of the households on agricultural income:
iii) additional sources of income like dairy and employment:
iv) adoption of farm technology, and
v) making investments for establishing an irrigation cooperatives.

The study has shown that the potential for improving the productivity of agriculture through either :

a) irrigating more land or
b) increasing cropping intensity or
c) changing the cropping pattern or
d) adoption of modern farm practices, is rather low.

It is therefore, concluded that, keeping the overall situation of the village in view, the setting up of an irrigation cooperative society in Hadgood Village is not feasible.

Chapter 1:Introduction

INTRODUCTION

HADGOOD village is about 5 kilometers from Anand town of Kheda district and situated near the Gujarat Agricultural University. Most of the people are economically backward and are farmers, plumbers, painters, and masons by profession. General information about village are given below.

Population (1981)	1,885 persons
No. of households	365
Total land of the village	442.6 ha
Cultivable land	405.6 ha
Pasture land	37.2 ha

The village has a rural health center initiated by the Tribhuvandas Foundation, a milk producers' cooperative society, and a Gobar gas producers' cooperative society.

The principal objective of this study was to evaluate the feasibility of an irrigation cooperative society in this village. This was proposed to be done by examining the potential for improving the productivity through irrigating more land. A secondary objective was to assess whether an irrigation cooperative society would be viable, given the over all situation of the village.

METHODOLOGY

In order to assess the benefits of irrigation in this village, cropping under irrigation was compared with cropping under dry conditions using relevant data from a sample of households. The impact of irrigation was assessed by examining changes in the intensity of land use, cropping pattern and yields. It is assumed that yields from rainfed crops were achieved without irrigation sources.

Households with and without irrigation sources were compared on the following criteria:

i) land holding and intensity of land use;
ii) cropping pattern;
iii) costs and returns from different crops with existing water resources: and
iv) farm income per household.

An attempt was also made to assess the viability of the irrigation cooperative society by considering the following factors:

i) potential for increasing irrigation.
ii) extent of dependence of the households on agriculture income,
iii) additional sources of income from dairy and employment,
iv) adoption of farm technology, and
v) investments required for establishing irrigation cooperative.

The study is based on a survey conducted on a random sample of 80 households drawn from the village. A structured questionnaire was used to obtain relevant data from the sample farmers through interviews. Farm business data were collected from the sample farmers for one full year comprising of rabi 87-88, summer 88, and kharif 88.

Estimated cost of cultivation per hectare includes the expenditure on the following items: i) Out of pocket expenses incurred on purchase of seeds, farm-manure, fertilizer, chemicals and pesticides; ii) Wages paid to hired labour; iii)Charges paid for tractor and bullocks services; iv) Electricity cost for operating pumpsets and expenditure incurred on repairs of farm equipments. v) The cost of home produced manure and seeds valued at the prevailing market rate, (the cost of family labour engaged in farm operations has not been included in the estimated cost of production).

Generally, the gross farm income per household includes the following four sources: i) Value of produce (quantity of crop produced multiplied by price realized); ii) value of by-product; iii) sales from irrigation services iv) income from hiring out pumpsets. But for purpose of analysis here, only the first one (value of produce) is considered because the production of by-product, income from irrigation services, and hiring out pumpsets were not reported by the households.

Chapter 2: Crop Analysis

This section is devoted to an analysis of the impact of irrigation. The impact of irrigation has been evaluated in terms of the following parameters.

i) Additional area that can be brought under irrigation,

ii) Intensity of land use,

iii) Cropping pattern,

iv) Costs and returns from individual crops per hectare with existing water resources.

v) Adoption of farm technology.

LAND HOLDING

The land holding of sample households ranged from less than 0.5 ha to 3.0 ha and above. Table 1 shows the average land holding of each class. The net holding of the sample households is 61.42 ha. Average land holding per household is 0.77 ha for all the sample households. Table 1 reveals that 53 percent of households have less than 0.5 ha land. Average land holding for this class is 0.31 ha. This class holds only 21.5 percent land of the total land holding. Twenty percent of households, which have own land in the range of 0.5 ha to 1.0 ha, have an average 0.79 ha. While this class holds only 20.4 percent of total land. The remaining 27 percent of households own more than 1 ha land. This range hold 58 per cent of total land.

CROPPED AREA AND CROPPING PATTERN

Cropped area under each land holding class and for each season is shown in Table 2. In kharif, 47 percent of land was cultivated, while in summer and rabi 55 and 77 percent of land was cultivated respectively. Generally farmers take a rainfed crop, but in this village, they were leaving their land fallow in the kharif season. Land cultivated by each class varied from 29 percent to 51 percent for kharif season except in the range above 3 ha. There was only one household in that class (above 3 ha.) who also owned a well, therefore its land holding and land cultivated in all seasons were 100 percent.

A measure of irrigation potential is the additional area which can be brought under irrigation. Gross cropped area irrigated by canal and water from own sources and that purchased from others is 101.31 ha (Table 3). Table 3 also shows unirrigated area, irrigated area and total area in each season. The unadjusted cropping intensity is 2.09, and the adjusted intensity is 2.26. In estimating adjusted cropping intensity gross cropped areas of long duration crops longer than one season, are multiplied by their duration in terms of seasons. For example, tobacco acreage is multiplied by 2 as it grows over two seasons.

In Table-3, we see that net sown area of the sample households is

52.35 ha. Thus gross sown area which can be achieved in a year over three seasons is 157.05 ha. But, as from adjusted cropping intensity, the sample households had 118.33 ha gross sown area. So, they can bring additional 38.72 ha under irrigation. This is assuming that the land is activated during all the three seasons. But as Table-2 shows, as much as 50% of the land is left fallen during kharif and summer. It is, therefore, debatable whether in such circumstances additional irrigation source, and hence an irrigation cooperative society, will be of much use to them unless fallowing is primarily due to lack of irrigation.

CROPPING PATTERN

Broadly, there are three ways by which farmers can strive to earn higher return from investment in irrigation. These are: i) more intensive use of land through multiple cropping or by increasing cropping intensity; ii) adoption of remunerative cropping pattern or by change in cropping pattern, and; iii) yield improvement through adoption of modern farming practices including the use of fertilisers, pesticides, and improved seeds. Investments in irrigation development will not be viable unless farmers switch to commercial farming from subsistance farming.

The cropping pattern adopted by the sample farmers can be seen in Table 4. The major crop in kharif and summer is bajra, which occupied 69 and 76 percent of land in the respective seasons. Wheat, which covered 32 percent of cultivated land in Rabi

season, is the major rabi crop. Radish, bajra, and grass were grown on 20, 10 and 15 percent of the land respectively in rabi season. In kharif, summer, and rabi seasons, 20, 3 and 4 percent of the crops area did not receive any irrigation. Area occupied by cash crops such as tobacco, castor, and mustard in rabi season was only 12 percent.

CROP ECONOMICS

The farm income of each crop per hectare has been estimated from value of farm produce per hectare and cost of production per hectare. The survey data reveals that in the village, canal and ground water sources are existing and many households either take water from canal or buy water from well owners. Average cost of cultivation per hectare for kharif, summer, and rabi seasons are shown in Tables 5(a), 5(b) and 5(c) respectively. The average cost of irrigation considers all water resources cost combined per hectare.

In kharif season (Table 5(a)), all crops were irrigated either by canal water or by ground water except Bajra and pasture, which few households have grown only through rainfed water. The income from these crops can be treated as income which can be obtained without irrigation. It is seen that the net returns per hectare have been negative for all crops except for irrigated bajra and tobacco. One farmer has grown jowar and cabbage, but for both the

crops, 'he' has reported input costs which seems very high. Paddy is the second crop, which is preferred by farmers, where also the cost of cultivation per hectare reported appears to be unreasonably high.

Table 5(b) shows the average cost of cultivation per hectare for the summer season where farmers have cultivated bajra, maize, and pasture crops. For maize crop, farmers received very poor yield and also did not give the market value of output.

All the crops were irrigated except for grass in rabi season (Table 5(c)). Pigeonpea showed highest net returns per hectare. Radish crop has showed positive returns per hectare where farmers have sold their output at Rs. 9.30 per Kg. However, the aggregate price for radish crop at Anand and Ahmedabad wholesale markets was reported to be only Rs. 0.30 per Kg and Rs. 0.90 per Kg. respectively during November 1987 to February 1988. Therefore, the net return per hectare for Radish crop was negative (Rs. -2520 per hectare at Anand and Rs.-1813 per hectare at Ahmedabad). The net return per hectare of the bajra crop was also negative because of poor yield and less market price for output.

It is worth noting that some of the farmers have cultivated pasture in all the seasons but they have not reported any input costs per hectare and output per hectare. Most of the farmers

have not given the value of the product as it is generally fed to cattle.

CROP ECONOMICS WITH WATER RESOURCES

This section analyses crop cultivation by using different water sources such as canal, purchased groundwater, and water from own well.

Table 6(a) shows the crop-wise area under canal, purchased water, and water from own well with input and output costs per hectare for kharif season. For paddy and vetch the canal water cost per hactare appears to be somewhat high, because for canal water irrigation department has fixed the water cost per hectare for the entire season, which in any cases does not exceed Rs. 400 per hectare. Also, for canal irrigated bajra crop, the farm mannure costs per hectare are 2.26 and 4.10 times higher than purchased water and well owners respectively, and therefore, their returns per hectare are negative .

Tobbaco grown with purchased water shows maximum returns per hectare. For cabbage and jowar crops, one household reported unrealistic input costs per hectare. For paddy and vetch the net returns per hectare are negative for purchased water households in kharif season.

Bajra crop in kharif season grown by only two households and their irrigation cost per hectare and total input cost per hectare are less than the purchased water and canal water households. Market value of the well owners output per hactare is higher than the other two water sources.

Table 6(b) shows that canal water is the cheapest water source in summer season as compared to the other two sources. The irrigation cost per hectare of all crops in summer are higher than kharif and rabi crops for all water resources. Bajra crop irrigated by canal water has higher yield than well owners, but the market value of per kilogram for canal water farmers is 43 percent less than well owners. Therefore, the well owners net returns are 5.5 times higher than canal water returns per hectare. For maize and pasture crop, the farmers have not reported the market value of their output.

For Bajra, jowar, castor, and mustard crops irrigated by any water resources, farmers are receiving negative returns per hectare in rabi season (Table 6(c)). In wheat crop, purchased water farmers and well owners are receiving negative returns and market value of their output compared to canal water farmers is lower. For tobacco crop, purchased water farmers' returns are better than well owners. Radish crop is a cash crop, where returns per hectare are positive. But, if its price in Anand or Ahmedabad vegetables wholesale market is considered, then farmers

are receiving negative returns per hectare.

Overall, in all season when irrigation is purchased from tubewells cost per hectare vary between 2 and 4 times than the other two sources. In few of the crops, farmers have reported unusually high cost of fertilizer and/or hired labour cost per hectare. While in some cases well farmers are receiving less value of their output compared to other water resources users.

ADOPTION OF FARM TECHNOLOGY

Besides enabling farmers to practice multiple cropping and raise remunerative crops, the provision of irrigation facilitates adoption of improved farm practices, which include the use of improved or high yielding seeds, fertilisers, chemicals, and pesticides. Thus, the spread of irrigation paves the way for modernisation of farming practices and more efficient utilisation of resources. Progress achieved in the application of modern farm input is one measure of the impact of irrigation.

Inputs used for modern and traditional seed varieties are shown in Table 7, which reveals that more number of households are still using traditional seed varieties. From this it seems that farmers are not intersted in replacing these varieties. Area sown under modern varieties varied from season to season for the same crops. Usage of urea fertilizer has varied from season to

season for the same crop. The level of input use is generally higher when improved varieties are planted. Use of chemicals/ pesticides in the sample farmers is very low.

Chapter 3: Income per Household

Provision of irrigation leading to more intensive use of land and adoption of modern farming practices is expected to create additional demand for labour. To assess the impact of irrigation on employment both of family and hired labour, the relevant data were collected from the sample households. Data regarding the number of persons employed for wages, days of the employment, and monthly income from employment were collected. The households were vague about the days of employment and monthly income. As it is, farmers have a tendency to exaggerate the role of family labour in agriculture as most of the adult family members are engaged in one or other farm operations throughout the year. Hence, the data on family members engaged in own farm and family members engaged on other's farms were collected. Monthly income and number of months employed as hired labour on other farms were analysed. An attempt to assess the family size and education of the households was also made.

HOUSEHOLD SIZE AND EDUCATION

Besides being poor, most of the sample households are also socially backward. It can be seen from Table 8 that the average

family size was 7 members. out of which 5 members were above 16 years of age. Fifty-one percent of the heads of the households reported having primary education. But illiteracy was rampant; seventy three percent of family members being illiterate.

OCCUPATIONS

It was observed during the field survey that the income of the households was derived from more than one occupation . In order to compute family income including income from non-agricultural occupations, it was necessary to acertain the occupations of family (adult) members and the income earned by them from differnt source during 1987-88. The survey data revealed that 13 of the 80 sample households depended entirely on farm income, as no adult members in these households was engaged in occupation outside their own farms. While in 24 households had income generated through dairy as well as from agriculture, and 28 households had income from employment and agriculture. Fifteen households engaged in all above mentioned activities.

AVERAGE AGRICULTURAL INCOME PER HOUSEHOLD

Table 9 gives the details of information on agricultural income per household for each of the existing water resources. Seventy percent of households were purchasing water from well owners and

only 24 percent of households were availing canal water. The households who were purchasing water were incurring more input costs per households with less irrigated area. But, at the same time purchasing water households were receiving higher gross yield than canal water households. The net returns per household for purchased water households were negligible. As far as well owners are concerned, their gross cropped area was 3.77 times that of the canal water households and their net returns per households were 518 times that of the canal water households. The overall average net returns per household was Rs.1822.

Table 10 indicates that 16 percent of the sample households were totally depending on agriculture, whose average land holding was 0.57 ha. The average agricultural income per households yielded Rs.141 per annum, which is very low in comparision to other groups of income. For this the most interesting reason was that all these households depending on agriculture were not cultivating their land in kharif season except one household. This household cultivated only 0.1 ha land in kharif.

DAIRY AND OTHER SOURCE OF INCOME

Apart from agriculture income, 28 percent households had dairy income and 36 percent of households had income from employment. Employment was in agricultural labour jobs, government, private.

and other jobs like trading, etc. Also, 18 percent of households were involved in agricuture, dairy, and employment type of actvities. Income generated through agriculture, dairy, and employment per households are analysed in following sections.

DAIRY INCOME

In this section dairy income per household is analysed for those households which were keeping cattle and for the total sample households. Net gain per dairy animal is based on cost of feeding and quantity of milk sold, which also includes the household consumption of milk. Cattle require straw, green grass, and concentrated feed. The cost of feeding of cattle collected from the sample of households does not indicate that all the above costs are included. Also, in agriculture income per household, the income from by-product is not reported. Hence, for the purpose of analysis, it was assumed that all costs were included in the cost of feeding(Table 11). Net gain through the dairy bussiness are negative per cattle as well as per household. Results of the households survey (1981) conducted by the State Bank of India on "Dairy Development in Banaskantha", are given below for one lactation cycle of buffalos. The lactation cycle was considered to be consisting of 482 days cycle, on an average.

Cost of feeding	Rs.781
Cost of Medical Care	Rs. 8
Cattle Insurance premium	Rs.123
Total cost	Rs.912
Gross value of milk	Rs.1,512
Net income	Rs.605

Citing the above data, the cost of feeding for buffalo given by the Hadgood village households appear to be high, and therefore the gains are negative.

Further, the average dairy income per household from total sample was Rs. -1,333 for all types of cattle, while for buffalo the net gain per household was Rs.-1,181. Hence, the dairy bussiness in Hadgood village was running at a loss.

The maintenance of draught animals is a major items of expenditure. But, from the total sample only two households have one on each, and the average maintenance expenditure incurred by the households per is about Rs.12,000/-.

INCOME GENERATED THROUGH EMPLOYMENT

Out of the total of 43 households which had income from employment except three households, all other 40 households were involved in single job activity. Only 10 percent of the total

population was employed, and 27 percent of the population was working on their own farm or approximately 2 persons per households were engaged in their own land. Agricultural labour job was performed by 67 percent of the total employed popluation, while 24 percent of members were involved in government services. The income generated through employment per household in a year is given below.

Particulars	Income per household(Rs.)
Average income for 43 households	
Agricultural labours	1,271 [28]
Government service	27,400 [10]
Private service	3,600 [2]
Other activities	10,067 [3]
Average income per household	8,069 [43]
Average income for 80 households	
Agricultural labours	495
Government service	3,213
Private service	90
Other activities	540
Average income per household	4,337

Figures in paranthesis indicates number of households.

Looking at the earlier Table 10, the income generated per household from agriculture is very low, for those are totally depending on the agriculture. But, those households which have

two occupations, like agriculture and dairy, earn more in agriculture lose some part of their income in dairy. This indicates that agriculture is main occupation for them, because their average land holding size is greater than other categories and dairy has become their part time job activity. There is the third category, where employment has become the main activity and agriculture has become their part time job activity, in which they are losing 8 percent of their income earned through employment. The last category is where households have employment as their major job activity and agriculture and dairy are the secondary jobs. These households are losing 50 percent of their income in dairy occupations, which they earned through employment and agriculture. Even from the total sample of 80 households, 54 percent of households are employed, which indicates that employment has become their major job activity, and agriculture has become secondary job activity. This confirms what has been said earlier, that in this village people are more engaged in jobs such as plumbers, painter and masons.

AVERAGE INCOME PER HOUSEHOLD

Average income per household from all sources from the sample is given below.

	Per household(Rs.)
Agricultural income	1,822
Dairy income	-1,333
Income from employment	4,337
Total	4,826

Results obtained for average income per household are not encouraging for the establishment of an irrigation cooperative society. Earlier, we have seen the economics of canal water, bought water, and well owners water users' , where bought water was receiving negative returns per household and canal water users households were gaining marginally. Well owner's income per household was very high.

CHAPTER 4 : CONCLUSION

First, we tried to analyse the data with and without investment in irrigation, where we were able to compare with only one crop in kharif season. This indicated that the net returns per hectare for irrigated bajra crop were better than rainfed bajra. Second, we tried to assess bringing more land under cultivation through multiple cropping pattern and found that only 65.9 ha land could be brought under additional irrigation. In kharif, 50 percent of

this additional land which could be brought under cultivation was not being cultivated for some other reason. Third, we tried to analyse the data on basis of farm technology adopted by farmers. It was found that most of the farmers were using only traditional seed varieties and very low percentage were using chemicals and pesticides. Around the year most of the households were cultivating bajra, which was not giving good returns. So, households would have to adopt other crops which would give them better returns.

More than 54 percent of households were employed with a major part of the per household income coming from employment and a much smaller part coming from agriculture. This indicates that the employment is their first priority for income and agriculture and dairy become their secondary or part time income source.

The above analysis shows that the potential for improving the productivity of agriculture through either :

a) irrigating more land, or

b) increasing cropping intensity, or

c) changing the cropping pattern, or

d) adoption of modern farming practices, is rather low.

It can, therefore, be concluded that keeping the overall -

situation of the village in view, the setting up of an irrigation cooperative society in Hadgood village is not feasible.

Table 1: Land holding of the farmers in the sample.

Class (ha)	Number of Farmers	Total Land holding (ha)	Average land holding per household (ha)
< 0.5	42 (53)	13.20 (21.5)	0.31
0.5 - 1.0	16 (20)	12.57 (20.5)	0.79
1.0 - 2.0	20 (25)	27.98 (40.5)	1.40
2.0 - 3.0	1 (1)	2.88 (4.7)	2.88
> 3.0	1 (1)	4.80 (7.8)	4.80
Total	80 (100)	61.42 (100)	0.77

Table 2: Seasonwise gross cropped area

Class	Total house-holds	Total area (ha)	Kharif (ha)	Summer (ha)	Rabi (ha)
< 0.5 ha	42	13.20 (100)	5.27 (40)	7.02 (53)	11.50 (86)
0.5 - 1.0 ha	16	12.57 (100)	6.53 (51)	8.97 (71)	9.99 (79)
1.0 - 2.0 ha	20	27.98 (100)	10.80 (39)	12.57 (44)	20.13 (72)
2.0 - 3.0 ha	1	2.88 (100)	0.84 (29)	0.84 (29)	0.84 (29)
> 3.0 ha	1	4.80 (100)	4.80 (100)	4.80 (100)	4.8 (100)
Total	80	61.42 (100)	28.24 (96)	33.90 (55)	47.34 (77)

Table 3: Irrigation and crop intensity

Season	Unirrigated (ha)	Irrigated (ha)	Total (ha)
Kharif	5.21	23.03	28.24
Summer	0.96	32.94	33.90
Rabi	2.00	45.34	47.34
Total	8.17	101.31	109.48

	Total	Per household
Net sown area(ha)	52.35	0.65
Gross sown area(ha) (unadjusted)	109.48	1.37
Gross sown area(ha) (adjusted) *	118.33	1.48
Cropping intensity - unadjusted		2.09
- adjusted		2.26

* Includes two times and three times area sown for two seasonal and perennial crops respectively.

Table 4: Cropping Pattern

Crop	Cropped Area (ha)								
	Kharif			Summer			Rabi		
	Unirri	Irri	Total	Unirri	Irri	Total	Unirri	Irri	Total
Pasture	2.84	1.77	4.61	0.96	5.14	6.10	2.00	4.98	6.98
Bajra	2.84	17.04	19.88		25.72	25.72		4.72	4.72
Paddy		2.18	2.18						
Wheat								15.42	15.42
Tobacco		1.14	1.14					2.60	2.60
Castor								2.74	2.74
Radish								9.57	9.57
Maize					2.08	2.08		2.06	2.06
Juwar		0.04	0.04					1.93	1.93
Cabbage		0.28	0.28						
Lemon								0.30	0.30
Mustard								0.44	0.44
Vetch		0.58	0.58						
Peaionpea								0.58	0.58
Total	5.68	23.03	28.71	0.96	32.94	33.90	2.00	45.34	47.34

Table 5(a): Cost and Returns from - Kharif crops.

(Rs/Ha)

Particulars	Unirri. Bajra	Irri. Bajra	Irri. Paddy	Irri Paddy	Irri Tobacco	Irri. Juwar	Irri Cabbage	Unirri Vetch	Irri Pasture	Pasture
Croped area(ha)	3.14	17.04	2.18	1.14	0.04	0.28	0.58	2.07	1.77	
No. of farmers	6	24	5	2	1	1	2	4	3	
Irrigation cost	0	662	2654	1160	5000	1429	607	0	630	
Seed cost	155	159	816	24	1000	36	25	0	13	
Fertilizer cost	843	469	1139	635	3125	670	1114	0	0	
Farm manure cost	163	730	397	417	0	750	313	0	144	
Chemicals/Pesticides cost	0	5	0	35	0	107	0	0	0	
Hired tractor/ bullocks cost	142	421	2396	208	0	714	294	0	314	
Hired labour cost	494	1075	5383	972	2500	1429	974	0	264	
Other cost	46	47	38	0	15000	0	0	0	0	
Total cost	1843	3568	12823	3451	26625	5135	3327	0	1365	
Yield (kg)	715	1624	1640	640	10000		276	0	160	
Gross returns	1215	4685	6560	5513	15000		1440	0		
Net returns	-628	1117	-6263	2062	-11625	-5135	-1887	0	-1365	

Table 5(b): Cost and returns from summer Crops - (Rs/ha)

Particulars	Crop Irri. Bajra	Irri. Maize	Irri. Pasture	Unirri. Pasture
Cropped Area (ha)	25.72	2.08	5.14	0.96
No. of farmers	40	3	8	2
Irrigation cost	1174	712	1289	0
Seed cost	90	168	40	0
Fertilizer cost	503	185	117	0
Farm manure cost	0	0	0	0
Chemicals/Pesticides cost	3	0	0	0
Hired tractor/bullloc cost	297	138	263	0
Hired labour cost	750	1072	286	0
Other cost	67	0	31	0
Total cost	2884	2275	2026	0
Yield(Kg)	1083	83	83	0
Gross returns	2934			0
Net returns	50	-2275	-2026	0

Table 5(c): Cost and Returns from Rabi crop -(Rs/Ha)

Particulars	Rabi crops											
	Irri. Bajra	Irri. Wheat	Irri Tobacco	Irri. Castor	Irri Radish	Irri Maize	Irri Juwar	Irri Lemon Plants	Irri Mustard	Irri Peajon-pea	Unirri Pasture	Irri Pasture
Crooped area(ha)	4.72	15.42	2.60	2.74	9.57	2.06	1.93	0.30	0.44	0.58	2.00	4.98
No. of farmers	11	31	6	4	9	5	4	1	2	2	2	8
Irrigation cost	813	1099	2201	357	997	328	430	417	1813	875	0	1301
Seed cost	70	372	35	47	173	77	149	500	271	329	0	67
Fertilizer cost	794	718	804	727	673	941	378	500	1000	1455	0	616
Farm manure cost	34	25	0	0	0	0	375	0	0	0	0	0
Chemicalc Festicides cost	0	31	0	35	60	15	0	0	0	450	0	214
Hired tractor/bullock cost	169	360	346	144	302	200	216	0	542	356	0	302
Hired labour cost	858	1382	2400	1014	617	647	853	500	3333	3521	0	382
Other cost	108	41	0	0	51	42	0	0	0	104	0	23
Total cost	2790	4028	5785	2323	2873	2250	2401	1917	6959	7090	0	2905
Yield(kg)	871	1772	1689	908	1178	875	646		1433	3546	0	198
Gross returns	1793	5691	13044	5242	10597			2333	6517	32977.	0	
Net returns	-1160	1480	5085	2919	7724	-2250	-2401	416	-441	24529	0	-2905

Table 6(a): Cost and returns of Kharif crops by irrigation source

Prticulars	Kharif crops											
e	Bajra	Bajra	Bajra	Paddy	Paddy	Tobacco		Juwar	Cabbage	Vetch	Vetch	Pasture Pastur
Cropped area(ha)	3.04	7.00	6.00	1.10	1.08	1.14	0.04	0.28	0.34	0.24	1.56	0.21
No. of farmers	4	17	2	3	2	2	1	1	1	1	2	1
Source of irrigation	Canal	Bought	Own well	Canal	Bought	Bought	Bought	Bought	Canal	Bought	Canal	Bought
Irrigation cost	333	818	219	3821	903	1160	5000	1429	588	625	119	1651
Seed cost	61	208	11	1190	256	24	1000	36	0	50	0	40
Fertilizer cost	431	499	344	1644	382	635	3125	670	1103	1125	0	0
Farm manure cost	1432	632	349	162	750	417	0	750	0	625	217	0
Chemicalc Festicides cost	31	0	0	0	0	35	0	107	0	0	0	0
Hired tractor/bullock cost	138	466	542	3878	174	208	0	714	588	0	0	943
Hired labour cost	579	1233	840	6148	4236	972	2500	1429	1324	625	42	708
Other cost	0	57	56	63	0	0	15000	0	0	0	0	0
Total cost	3005	3913	2361	16906	6701	3451	26625	5135	3603	3050	378	3342
Yield(kg)	1101	1677	2021	2040	1037	630	10000	0	2360	500	167	0
Gross returns	2413	4520	6608	8160	4249	5513	15000	0	2360	500	0	0
Net returns	-592	607	6247	-8746	-2552	2062	-11625	-5135	-1243	-2550	-378	-3342

Table 6(b): Cost and returns of Summer crops by irrigation sourcewise-(Rs/Ha)

Particulars	Summer crops						
	Bajra	Bajra	Bajra	Maize	Maize	Pasture	Pasture
Cropped area(ha)	5.04	13.88	6.80	0.64	1.44	3.00	2.14
No. of farmers	8	29	3	2	1	4	4
Source of irrigation	Canal	Bought	Own well	Canal	Own well	Canal	Bought
Irrigation cost	470	1427	597	408	1319	145	2432
Seed cost	89	99	11	165	174	47	44
Fertilizer cost	497	512	429	234	87	78	208
Farm manure cost	0	0	0	0	0	0	0
Chemicalc Pesticides cost	16	0	0	0	0	0	0
Hired tractor/bullock cost	276	298	347	154	104	36	653
Hired labour cost	605	730	1326	1400	417	209	465
Other cost	6	86	56	0	0	0	83
Total cost	1959	3152	2766	2361	2101	515	3905
Yield(kg)	1282	1063	1100	0	83	292	0
Gross returns	2856	2203	7722	0	0	0	0
Net returns	897	-949	4956	-2361	-2101	-515	-3905

Table 6(c): Cost and returns of Rabi season by Irrigation sourcewise -(Rs/Ha)

Particulars	Bajra	Bajra	Bajra	Wheat	Wheat	Wheat	Tobacco	Tobacco	Castor	Castor	Rabi crops Radish	Radish
Cropped area(ha)	0.76	2.18	1.78	4.08	10.54	0.80	2.20	0.40	2.54	0.20	3.97	5.6(
No. of farmers	2	6	3	8	22	1	5	1	3	1	7	2
Source of irrigation	Canal	Bought	Own well	Canal	Bought	Own well	Bought	Own well	Bought	Own well	Bought	Own we
Irrigation cost	269	1107	500	687	1275	500	2441	1000	410	200	1202	28:
Seed cost	76	102	37	411	370	106	42	0	62	0	219	1:
Fertilizer cost	1242	591	1097	777	712	375	811	768	594	1125	851	3:
Farm manure cost	96	35	65	96	0	0	0	0	0	0	0	
Chemicalc Pesticides cost	0	0	0	0	44	0	0	0	46	0	76	
Hired tractor/bullock cost	369	219	106	369	367	125	315	500	59	400	239	52
Hired labour cost	1082	802	787	1082	1531	500	2679	1000	685	2000	541	88
Other cost	0	116	185	0	58	0	0	0	0	0	65	
Total cost	3134	2972	2777	3422	4357	1606	6288	3268	1856	3725	3193	175
Yield(kg)	635	1071	694	2005	1665	500	2048	250	139	0	911	211
Gross returns	1269	2042	2777	10096	4125	1250	12544	2500	694	0	7769	886
Net returns	-1865	-930	0	6674	-232	-356	6256	-768	-1162	-3725	4576	712

Table 6(C):(Continue)

Particulars	Maize	Maize	Juwar	Juwar	Lemon plants	Mustard	Peajon pea	Peajon pea	Pasture	Pasture
Cropped area(ha)	1.34	0.72	1.69	0.24	0.30	0.44	0.10	0.48	2.44	2.54
No. of farmers	3	2	3	1	1	2	1	1	3	5
Source of irrigation	Canal	Bought	Bought	Own well	Bought	Bought	Canal	Bought	Canal	Bought
Irrigation cost	213	500	434	417	417	1813	500	1250	73	2038
Seed cost	59	104	143	167	500	271	450	208	63	70
Fertilizer cost	1412	233	295	625	500	1000	2650	260	137	904
Farm manure cost	0	0	0	1500	0	0	0	0	0	0
Chemicals Pesticides cost	25	0	0	0	0	0	900	0	0	342
Hired tractor/bullock cost	167	250	219	208	0	542	400	313	111	417
Hired labour cost	801	417	304	2500	500	3322	6000	1042	450	341
Other cost	0	104	0	0	0	0	0	208	0	36
Total cost	2677	1608	1395	5417	1917	6959	10900	3281	834	4148
Yield(kg)	719	208	431	0		1433	6800	292	528	0
Gross returns	6468	0	0	0	2333	6517	63240			
Net returns	3791	-1608	-1395	-5417	416	-442	52340	-3281	-834	-4148

Table 7: Adoption of 'Package of Practices'.

Particulars	Bajra(K)		Bajra(S)		Bajra(R)		Wheat		Radish
	M	T	M	T	M	T	M	T	T
No. of farmers	12	18	15	26	7	4	2	29	5
Area sown(ha)	7.24	12.94	13.36	12.61	3.02	1.96	0.19	15.23	9.57
Irrigation cost (Rs/ha)	759	377	1038	1263	966	395	1886	1044	997
Seed quantity(kg/ha)	49	12	6	?	7	6	270	86	13
Fertilizer(kg/ha)									
DAP	10		6		18			39	7
Sulphate	27	9		2		43	250	45	66
Urea	86	282	183	202	263	222	818	199	144
Potash									
Farm mannure(Rs/ha)	873	446			28	44		27	
Chemical/Pesticides (kg/ha)									
Gemaciyn	1.04							5.79	4
Folidon								0.04	8
Dust								0.02	
Aldrin				0.04		0.26		0.2	
Hired tractor/ Bullocks cost(Rs/ha)	262	421	218	331	135	228	705	336	302
Hired labour cost (Rs/ha)	1181	810	838	694	957	684	4409	1173	618
Yield (Kg/ha)	1739	1244	1346	939	1110	512	6045	1416	1175

M - Modern T - Traditional

Table 6 : Education of households

Particulars	Total	Per household
Population	556	7
Above 16 years old	361	5
Education	Head of the household (%)	other family members (%)
Illiterate	16	73
Primary	51	20
High school	24	6
Up to graduation	9	1

e 9: Average agricultural income per household

Particular	Average per household income				
	Canal	Bought	Well	Owners	Overall
No. of households	20	56	4	80	
Gross cropped area(ha	1.46	1.08	5.50	1.38	
Irrigation cost	574	1010	2098	951	
Seed cost	170	148	80	150	
Fertilizer cost	517	470	1831	545	
Farm manure cost	159	126	449	150	
Chemicals/pesticides cost	69	4	539	47	
Hired tractor/bullock cost	285	278	3800	447	
Hired labour cost	859	811	3250	945	
Other cost	45	64	2358	166	
Total cost	2678	2913	14405	3401	
Gross returns	2746	2921	49657	5223	
Net returns	68	8	35252	1822	

Table 10: Household income by source.

Category	NO. of house-holds	Average holding size(ha)	Income per household (Rs) Agriculture	Dairy	Employment	Land
Agriculture	13	0.57	141			
Agriculture + Dairy	24	1.05	6314	-1225		
Agriculture + Emp-loyment	28	0.71	-569		7191	
Agriculture + Dairy + Employment	15	0.59	-579	-5147	9710	
Average			1822	-2734	8069	

Table 11: Cost and returns from Dairy farming.

Cattle	No.of cattles	Cost of feeding (Rs.)	Quantity of milk (lts)	Value of milk sold (Rs.)	Net gain (Rs.)
			Per cattle		
Cow	16	6626	2110	5752	-874
Buffalos	60	6939	1033	5362	-1577
Goats	8	963	Not reported		
Ox	2	1825	Not reported		
			Per household		
Cow	2	13516	4623	13147	-369
Buffalos	2	10956	1819	8697	-2259
Goats	2	1925	Not reported		
Ox	1	1825	Not reported		