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ESTIMATION OF SEED FEED AND WASTAGES RATIO OF MAJOR FOOD GRAIN CROPS IN HARYANA

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EXECUTIVE SUMMARY

Of the report

Estimation of Seed, Feed and wastage ratio of major food grain crops in Haryana by D.S.Bhupal, Fellow, Agricultural Economics Research Centre, University of Delhi, Delhi –110007

Abstract: For over two decades, no scientific estimates of production of food grains, cereals as well as pulses, being used as seed and animal feed and also wasted during production, marketing, storage, transportation etc. were ever made. It was therefore, not possible to accurately estimate availability of food grains for human consumption. This study is an effort in that direction. Being a part of the all India coordinated study, the AERC, Delhi has conducted this study in Haryana.

This study has been conducted by selecting 600 farmers from 40 villages of two districts viz. Kurukshetra (for paddy) and Bhiwani (for gram). The study finds that about, 90 to 91% of gram and about 96% of paddy remain available for market. For the purpose of seed, about 5% of gram and about 0.22% of paddy is retained, for home consumption of the growers about 2-3% of gram and 3-4% of paddy is used. Losses during harvesting of gram work out about 1% and of paddy about 0.58%. Threshing losses are found to be 4.5% of gram and about 1% of paddy. For animal feed paddy is not used and about 0.25% to 0.30% of gram is used. However, the small size farms use a larger portion of both gram and paddy for home consumption, signifying agriculture being a source of their livelihood and subsistence.

Introduction: After 1986 when an expert committee was set up to estimate ratios of seed, feed and wastage of food grains, no serious effort has been made to find out as to what proportion of food grains is lost in various production processes, distribution and marketing, what proportion is fed to animals, what proportion is retained for seed and what ultimately should be available for human consumption, though agriculture during the two decades has undergone many changes in cropping pattern, production/availability of various crops, input uses, soil conditions etc.

This will be clear when we look for such estimates for horticulture crops. Since, the market regulation days, we are told from Rs. 3000/- crores to Rs. 50,000/- crores worth of horticultural produce is wasted every year due to lack of transport, improper marketing,

storage etc., and we do not find even such crude figures for food grains. Such an exercise, therefore, was long over due.

Objectives of the Study: The study mainly focuses on two aspects of the problem.

(a) to estimate proportion of seed, feed and wastages of total production of cereals and pulses, and

(b) to estimate proportion of production available for human consumption.

Methodology: The study design as suggested by the coordinator was to be prepared keeping in mind the area under major food grain crops in each district of the state of Haryana. It was to be a multi-stage sampling with Tehsil/ Block as strata, villages growing main crops selected for the study as primary unit, cultivators growing the selected crop as secondary stage unit. Two districts – one for cereals,- Kurukshetra and one for pulses – Bhiwani, were selected on the basis of highest density of area under the respective crops. District Kurukshetra was selected for Paddy and District Bhiwani for Gram

From two districts, 8 blocks/ tehsils and from each block/ tehsil 5 villages (total 40 villages) and from each village at random 15 farmers, total 600, were selected. For the selection of farmers total number of farmers in each villages were divided on the basis of their size of land holdings – small size with 0-2 hectares of land, [S]; medium size with (2- 4 hectares)[M]; and large size with 4 hectares an above of land [L]. From each group, 5 farmers were selected at random. Thus overall 600 farmers were selected for this study.

For detailed analysis, the data were to be analysed on the basis of size of holdings, as to whether there was any difference in these ratios and pattern of disposal of production by different size groups of land holdings. Also, for the policy purpose, it was decided to work out such ratios and disposal of production in different social groups, particularly the socially deprived sections, categorized on the basis of their caste composition.

Data were collected with the help of two separate schedules- village level schedule and household schedule for the crop year 2004(paddy), and crop year 2005-06 (gram).

Main findings:

Size class wise distribution of farmers: Average size, number of farmers (both in the village and of sample) in Bhiwani and Kurukshetra districts, are given in the following table.

Number of farmers in district Bhiwani

Number of	small	medium	large	total
village	47%	29.3%	23.7%	3006
Vill.Average size(ha)	1.29	3.11	7.47	3.29
Sample farmers	100	100	100	300
Avg. size (ha) (sample hh)	1.47	3.2	8.48	4.38

Number of farmers in district Kurukshetra

Number of	small	medium	large	total
village	60.4%	23.1%	16.5%	2021
Vill.Average size(ha)	1.16	3.02	7.39	2.62
Sample farmers	100	100	100	300
Avg. size (ha) (sample hh)	1.37	3.11	7.78	4.08

Irrigated area in sample households: Gram as we know is mostly rain fed crop, or mostly grown where irrigation facilities are not fully provided. Bhiwani in Haryana is such a district. Therefore, only a miniscule area 0.61 hectares or 0.8% is irrigated. On the other hand paddy requires a lot of irrigations and a certain level of standing water in the field during the entire life of the crop. As rainfall is not sufficient in the area to grow paddy hence, entire paddy area is irrigated. In fact, district Kurukshetra is 100% irrigated.

Cropping pattern: Though the number of selected farmers in each group is same, i.e., 100 farmers, the percentage of crop area is significantly different in each group. For example, in Bhiwani, small farmers cultivated about 14% of gram, 6% of wheat and about 8% of mustard, whereas the respective figures for medium size farms were about 28%, 23% and 19% respectively as compared to huge percentage of area cultivated by large framers. Their share in the rabi crops was about 57% of gram, 72% of wheat and 74% of mustard.

Similar type of cropping pattern (particularly related with the selected main crop) is visible in Kurukshetra, where small farmers cultivated about 12% area of paddy, 17% of chari (fodder crop) and 5% area of sugarcane, as compared to 26% of paddy, 31% of chari and 16% of sugarcane area by middle size farms. Whereas figures for the large size farms were 62%, 53% and 79% respectively for three main crops.

Productivity and value of production: Yield of gram, in District Bhiwani, semi-arid area, is more (though marginally) in the case of small farms as compared to medium and large farms. But where irrigation facilities are available and size of holdings is relatively smaller (for example, the case of Kurukshetra) due to availability of more facilities, like

tractors, improved seed varieties, fertilizers, pesticides etc., yield per hectare of paddy is more in larger farms as compared to smaller farms.

Yield of gram is more than over all average yield by 0.91% in small farms and in medium size farms by about 0.78% points, whereas it is less by 0.52% points in large size farms. Per hectare production of gram in small size households is 7.8 quintals as compared to 7.79 quintals in medium holdings. Whereas figures for large size households are 7.69 quintals per hectare while overall average is 7.74 quintals.

In the case of paddy per hectare production increases with the increase in the size of holdings. For example, in small size holdings per hectare production is 55.22 quintals as compared to 55.82 quintals in medium size households, whereas production in larger holdings is 56.77 quintals, and the overall average 56.33 quintals.

But due to area under gram, the large size farms receive about half of the gross value of the produce, whereas small size farms get only 14% and medium size farms about 28%. Contrarily, in the case of paddy in Kurukshetra, due to higher yield in large size farms and more due to area under their operation, their share in total value of produce is more than 62%, share of medium and small farms is reduced to 26% and about 12% respectively.

In sum, it can be argued that land ownership in the state is highly skewed, with larger number of small farmers having a little agricultural area and less irrigation facilities in comparison to large farmers who are less in number but possess not only substantial part of land but also irrigation facilities and that determines the cropping pattern of different size classes. But productivity, i.e., yield is in favour of small farmers in district Bhiwani as compared to fully irrigated paddy growing district Kurukshetra due to role of irrigation and other inputs such as fertilizers, pesticides, mechanization etc. Thus, development facilities (irrigation particularly) seem to have benefited the large farms more than small and medium farms.

Utilization of gram: Farmers used 37.30 kg/ha gram and 12.04kg/ha paddy as seed to produce 773.34 kg/ha gram and 5633.50 kg/ha paddy. However, for the next year's crop per hectare seed retained is a little higher for both the crops, 39.9 kg/ha of gram and 12.67 kg/ha paddy. And that is the case with all size groups. For example, 5.19% of production is retained by small farmers, 5.29% by medium farms and 5.1% by large size

farms. Overall seed requirement increases to 5.16%. If we look at the figures of marketable and marketed surplus, it is about 91% of production of gram. Though it is slightly less in size group I, less than 90%, whereas in medium size farms and large size farms it crosses the 90% mark, reaching to about 92% in large size farms. In other words, with the increase in size of holdings, percentage of gram available for market increases. Interestingly, percentage for home consumption decreases as the size of holdings increases from about 5% in small size farms to slightly higher than 3% in medium size farms. But in the case of large size farms, it reduces to less than 3%.

In other words, protein requirement of the poor farmers is met largely by home produced pulses, gram in this case, though they also sell to meet other financial requirements. Therefore, it becomes necessary to look into total food consumption pattern of rural households for policy matters.

Payment in kind by small and medium farms is nil. A small portion (negligible) is paid in kind by large size farms.

So far as gram needed for animal feed is concerned, all the size groups have used, though requirement increases with the increases in the size of holdings from 0.13% in small farms to 0.25% in medium size farms to 0.58% in large size farms. It is but natural as the proportion of animal reared increases with the increase in size of holdings.

Utilisation of paddy: Requirement of seed for paddy works out as 0.21% of production. Inter size group variation is almost nil. Paddy kept for (future crop) seed is slightly higher. And that is the case with all size groups. For example, 0.23% of production is retained by both small farmers and medium farms, and 0.22% of production was retained for seed purpose by large size farms.

The marketable surplus is about 96% of production. It significantly varies among size groups. In size group I, it is less than 93%, whereas in medium size farms it is about 95%, reaching to about 97% in large size farms. In other words, with the increase in size of holdings percentage of paddy available for market increases. As expected, percentage for home consumption decreases with the increase in the size of holdings from about 5% (exactly 4.62%) in small size farms to slightly less than 3% in medium size farms. But in the case of large size farms, it reduces to less than 2% (1.64% to be exact).

In other words, food grain requirement of the poor farmers is met largely by home produced paddy, though they also sell to the market to meet other financial requirement. Payment in kind also decreases with the increase in the size of holdings from 2.43% in small households to less than 2% by medium farms and about 1.33% in large size farms. The obvious reason is the total quantity produced by different size groups. Paddy is not found to be used as animal feed and poultry feed.

Wastage during harvesting and distribution: In the case of gram it is noticed that during harvesting losses increase, though marginally with increase in the size of the holdings. The reason for that may be that in the smaller holdings to save on labour costs as well on harvesting losses many times farmers themselves do harvesting operations. We have personally observed that if farmers themselves harvest, they do it more cautiously whereas hired labour, whether on piece rate, or on daily wages or on total quantity of harvested produce basis, is least concerned about harvest losses. Total harvesting losses count as much as 1% of production, which are 0.75% in the case of small farmers and go up 1.06% in the case of large farms.

But that variation among the groups is not noticed in the case of paddy harvesting. The losses remain more or less the same irrespective of the farm size. The reason lies in the fact, that in all cases paddy harvesting is done by hired labour. Farm owners irrespective of size do not do harvesting and threshing. Hence the losses remain almost same, i.e., 0.58% of production.

Gram losses during threshing work out about 4.5 % of total production with little variation among size classes starting from 4.55% in small size and going down to 4.34% in large size farms, whereas in the case of paddy threshing losses are found to be 1% of production, a little more than1% are noticed in small size holdings. Wastages in straw in the case of gram are negligible and in the case of paddy about 1% of production. Transportation losses are negligible in the case of gram but about 1% in the case of paddy. It is because gram is transported mostly in gunny bags whereas paddy in open trolleys. There is no significant variation across size classes.

Storage losses in both the crops are negligible. Home consumption in the case of both the crops is about $1/6^{th}$ of 1% of production. It goes on declining with the increase in the size of holdings from about $1/3^{rd}$ of 1% of production in both the crops in small size groups to

about 1/7th of 1% in the large farms. Obviously it is due to scale of production, because size of family may not be significantly different whereas size of holdings and total production are.

In sum, about 5% of gram production is retained for seed purpose for the next year, which varies between 5.1% and 5.29% among three size classes. About 1% of gram is lost in harvesting process, varying between 0.75% and 1.06%, and about 4.5% gram is lost in threshing, varying between 4.34% to 4.55%. Losses of gram in transportation and storage are negligible. About 1/6th of 1% of production is used for animal feed. Between 2 and 3% is used for home consumption. Thus about 91% of gram is available in the form of marketable surplus, which in the case of small farmers is less than 90% and a little more than 91% in the case of medium and large farmers.

So far as paddy is concerned, less than 0.25% of production is retained as seed for next year's crop, about 0.6% is lost in harvesting, less than 1% of paddy production is lost in transportation and marketing and about 2.5 – 3 % is retained for home consumption, more than 4% in the case of small farmers and about 2% in the case of large farmers. About 1% is paid in kind. Thus about 96% of paddy is available in the form of marketable surplus, about 93% in the case of small farmers and about 97% in the case of large farmers. Use of paddy as animal feed was not found.

CHAPTER – I

Introduction

1.1 History and back ground: About 2 decades back, in1986 an expert committee from organizations such as DES, NSSO, CSO, IASRI, Ministry of Civil Supplies and Ministry of Agriculture was set up to estimate ratios of seed, feed and wastage of food grains. Based on the available data, the committee reported that 12.5% of total production was used as seed, feed and it included wastage of food grains also. The committee was of the view that a fresh study be taken up to get reliable estimates of the quantity of seed, feed and wastages to work out net available quantity for human consumption. Accordingly planning commission got these estimates worked out for Haryana, Punjab and Western Uttar Pradesh in 1986-87. The results of this study pointed out that 10.32% of production was used as seed, feed and wastage on the whole, whereas figures for the three states were 10.84%, 8.22% and 12.01% respectively. Another important recommendation of this report was that the study be extended to other selected regions of the country.

1.2 Need of the study: Along with the above argument, it is not known how much food grains are wasted in field while harvesting, transportation and in marketing and storage. This will be clearer when we look for such estimates for horticulture crops. Since, the market regulation days, one is told that about Rs. 3000/- crores to Rs. 50,000/- crores worth of horticultural crops are wasted every year due to lack of transport, proper marketing, storage etc., and we do not find even such crude figures for food grains. In such circumstances, it is but necessary to carry out such an exercise.

The importance of this exercise further increases when one looks back to the history of seed feed wastages estimation in the state of Haryana. After the formation of the state in 1966, only one report as mentioned above by the planning commission is reported to be carried out. To explore and dig out any literature on the subject, we personally contacted State Directorate of Economics and Statistics, State Planning Board, Directorate of Agriculture, Budget papers of the State, Economic Surveys of the State, well read/ quoted

papers on the state domestic product, publications in the local press (three languages – English, Hindi and Punjabi) and the State Agricultural University, viz. CCS HAU, Hissar, barring one or two M.Phil. / Ph.D. dissertations at CCSHAUm we could not find even a single study to compare methodologies of estimation of seed feed wastages ratios and impact thereof on state income accounting. Therefore, we appreciate the efforts made by ADRT, Bangalore and IASRI, New Delhi who took initiative to get this study started through out the country. The AERC, Delhi was entrusted with this study for the state of Haryana.

1.3 Objectives of the Study: The study mainly focuses on two aspects of the problem. How much proportion of total production of cereals and pulses is wasted during production, storage, transportation and marketing processes, how much is used for feed and how much is retained by the farmers in the form of seed for the next crop? Secondly, related with the first aspect is how much proportion is available for human consumption? For further detailed analysis, the data were to be analysed on the basis of size groups of holdings, as to whether there was any difference in these ratios and pattern of disposal of production by different size groups of land holdings. Also, for the policy purpose, it was decided to work out such ratios and disposal of production in different social groups, particularly the socially deprived sections, categorized on the basis of their caste composition.

1.4 Organisations responsible for the study: The study was proposed by the Institute of Social and Economic Change, Bangalore along with Indian Agricultural Statistics Research Institute, New Delhi. It was sponsored by the Ministry of Agriculture, Government of India. This study was supposed to be carried out in the entire country by different Agricultural Economics Research Centres in their respective areas. Therefore, the AERC, Delhi conducted this study in Haryana.

Chapter – II

Description of Survey

2.1 Sampling design and profile of regions: The study design as suggested by the coordinator was to be prepared keeping in mind the area under major food grain crops in each district of the state of Haryana. It was to be a multi-stage sampling with Tehsil/ Block as strata, villages growing main crops selected for the study as primary unit, cultivators growing the selected crop as secondary stage unit. Therefore, two districts – one for cereals,- Kurukshetra and one for pulses – Bhiwani, were selected on the basis of highest density of area under the respective crops. Highest in the sense of two crops were to be studied – one each for kharif and rabi – to save resources, i.e., time, man power and money, on enumeration of entire farming community from each selected village. To avoid that districts were to be selected in such a way so that our purpose could be served for the second round of survey also. Therefore, district Kurukshetra was selected for the purpose of Wheat and Paddy and District Bhiwani for Gram and Moong. First it was decided to select two crops for each season, one cereal and one pulse crop for rabi and one pulse and cereal crop for kharif. Later on due to huge amount of field work involvement vis-à-vis limited resources in each centre, only one crop for each district was asked by the coordinator to be retained. As by that time we already have carried out some field work, we retained the selected districts, tehsils and villages.

District wise crop area density was worked out for paddy and wheat in the state. Kurukshetra was having maximum density for the two crops. Details of which are given in annexure table 1. For example, it ranked first in the case of wheat with 99.7% and second in paddy with 50.5% density. For the sake of saving on resources it was decided to select such districts from where same villages and respondents for both the crops could be selected. Similarly for the selection for pulses density was worked out and district Hissar was selected for two pulse crops viz. gram and moong. But later on when only one crop was decided to be retained, district Bhiwani with 98.5% density for gram was selected and district Kurukshetra was retained for paddy. Further details of area, production and yield of cereals, pulses and total food grains in Haryana (from 1993-94 to

2003-2004) are given in (Annexure table 2 –a.). Area under cereals in the state grew at the compounded rate of 1.02% annually between 94-95 and 2003-04, production @ of 1.03%, yield @ 1.01%. However, growth rate of pulses in area, production and yield were even less than 1% in each parameter. During the same period, area under pulses grew @ of 0.86%, production @0.82% and yield @0.95%. Total food grain production grew @ of almost 1%. The same growth rate in area as well as in yield is also noticed. Details of area, production and yield of cereals and paddy in district Kurukshetra are given in (Annexure Table 2-b). In the district of Kurukshetra, there is not much difference in the growth rates of area, production and yield of cereals as well as those of paddy. Almost uniform growth rate of about 1% is observed. The details of area, production and yield of pulses and gram for district Bhiwani are given in (Annexure table 2-c). Total area, production and yield of pulses and of gram in Bhiwani grew between 0.8% and 0.95%. Percentage of gross area sown under food grains to total cropped area for the period from 1970-71 to 2003-04 in Haryana and both the selected districts, gross value of agricultural output per hectare at current prices for the above stated period and for both the districts and the state, gross value of agricultural output and percentage of food grains in gross value of agricultural output at current prices are given in Annexure table 3. Finally, area in square kms., rural and urban population and total population in the state, both the districts and selected blocks for the latest census, 2001 are given in Annexure table 4.

2.2 Selection of respondents: From each district, four blocks/ tehsils with the same criterion were selected and from each block/ tehsil five villages on the same basis with equal probability without replacement were selected. Finally from each village 15 cultivators equally divided into three categories – small size with 0-2 hectares of land, [S]; medium size with (2- 4 hectares)[M]; and large (more than 4 hectares of land), [L] were selected at random after preparing frame of small, medium and large farmers growing selected crops. The final stratum wise selection details of farmers, villages, tehsils and districts are given in Table-1.

2.3 Period of survey: In the beginning, as stated above, the sample size was double , i.e., two districts, two crops from each district- one kharif and one rabi, then 300 sample of respondents from each district, thus over all 600 respondents were to be studied. With

the center getting no replacement for the past few years due to overall policy consideration, there were not much investigators left in the center. Therefore, the investigation work was started in December 2004 and continued for quite a considerable time till the completion. Moreover, in between field work for other projects was also to be covered. Finally, data for two crops paddy in Kurukshetra for the season 2004 and gram in Bhiwani for the crop season 2005-6 were collected and have been used for this study.

CHAPTER - III

Data collection and methodology for working out of ratios

3.1 Data Collection: As stated earlier, after selection of districts on the basis of crop area density, 4 tehsils and blocks in each district, i.e., tehsils/blocks Shiwani, Tosham, Loharu and Kairu in District Bhiwani and tehsils/ blocks Shahbad, Pehowa, thaneshwar, and Ladwad/ Babain in District Kurukshetra were selected following the same criterion. And finally on the basis of area under selected crop, 5 villages from each tehsil/ block (for details see table 1) were selcted. Thus over all 40 villages from two districts were selected for the study.

After selection of villages, with the help of village level agricultural worker, village Pardhan of each village was contacted and requested to call the well known /knowledgeable persons of each mohalla. With their help all the cultivators of the village were listed and their broad details were noted. Finally, from the final list, the farmers were segregated on the basis of size of holdings, viz, up to 2 hectares (S), 2- 4 hetares(M), and 4 and above (L) size farmers. Form each category of farmers 100 farmers in each size group from each district were selected at random without replacement. Thus over all the sample size consists of 600 farmers, 300 farmers from each district.

Farmers name/ father's name, caste, land owned, cultivated and area under the selected crop were noted down on the pre-tested village schedule. Then at random 5 farmers from each size group were selected and interviewed in detail on another pre-tested questionnaire.

Table-1: Stratum-wise list of Selected Name of Villages and Total Number of Farmers for Selected Crop

Stratum No.	Crop : GRAM District : BHIWANI		
	Name of Taluka / Block	Name of the Selected Village	Total No. of Farmers in the village
1	Shivani	1. Dhulkot	162
		2. Khera	105
		3. Gadwa	108
		4. Mohila	95
		5. Gandawas	143
2	Tosham	6. Alkapura	181
		7. Nigana	239
		8. Dharan	119
		9. Dhanibiran	106
		10. Baganwala	271
3	Behal / Loharu	11. Sorda Kadim	113
		12. Sudhiwas	144
		13. Obra	237
		14. Kasni Khurd	72
		15. Sarda Jadid	136
4	Kairu	16. Simliwas	216
		17. Khariawas	182
		18. Mansarwas	152
		19. Khaperwas	165
		20. Ladianwali	60

Stratum No.	Crop : PADDY District : KURKSHERTRA		
	Name of Taluka / Block	Name of the Selected Village	Total No. of Farmers in the village
1	Shahbad	1. Surajpur	76
		2. Dawoo Majra	152
		3. Landi	249
		4. Madanpur	83
		5. Tigri	81
2	Pehowa	6. Harigarh Barakh	129
		7. Dunia Majra	89
		8. Bherian	42
		9. Megha Majra	98
		10. Jurasi Kalan	118
3	Thaneswar	11. Raogarh	34
		12. Manjda Khera	45
		13. Udarsi	109
		14. Jhimar Hedi	120
		15. Singpura	64
4	Ladwa / Babain	16. Ban	131
		17. Banot	134
		18. Budha	137
		19. Jhandola	57
		20. Bhukhri	73

District Code : Bhiwani - (1), Kurkshetra - (2)

Four investigators were deputed to collect information from each farmer on a pre tested and common schedule. The schedules then were scrutinized for minor corrections regarding units of measurement, totals and other such minor details. After scrutiny, the data were directly transferred to computer in excel, format for which was provided by the coordinator and final tables as designed by the coordinator were prepared and the entire data along with final tables were sent to the coordinator as desired.

For calculation of seed , feed and wastages, simple arithmetic tools were used to reach final calculations. For example, data for the seed used to grow crops were asked from the respondents, then part of production kept for next year's crop was also enquired. Similarly, data for the production used for various ither purposes, like, feed, marketed, retained for home consumption etc. were asked and tabulated and final ratios with regard to total output were worked out.

CHAPTER - IV

Results and Discussion

4.1 Size class wise distribution of farmers: Total number of farmers and average size of holdings in each district are given in Table-2.

Table 2: Size-class wise Distribution of Number of Farmers and Average Size of Holdings (in Ha.)

Size-class wise Distribution of Number of Farmers and Average Size of Holdings (in Ha.)

	VILLAGE LEVEL DATA			SAMPLED HOSEHOLDS			
Size of Holdings	No. of Farmers in the Village	Average Size of Holdings in Village	Leased in / out Area as % of Total Area	Net Cropped Area (Ha./ Household)	Gross Cropped Area (Ha./Household)	No. of Sample Farmers Selected	Average Size of Holding Sample
	GRAM (BHIWANI)						
Small	1413	1.29		1.43	1.43	100	1.47
Medium	881	3.11		3.18	3.18	100	3.20
Large	712	7.47		8.22	8.22	100	8.48
All	3006	3.29		4.28	4.28	300	4.38
	PADDY (KURKSHETRA)						
Small	1221	1.16		1.36	1.36	100	1.37
Medium	467	3.02		3.00	3.00	100	3.11
Large	333	7.39		7.68	7.68	100	7.78
All	2021	2.62		4.01	4.01	300	4.08

In Bhiwani district total number of farmers in 20 villages were 3006, out of which 1413 or 47% were small farmers, 881 or 29.3% were medium and the remaining 712 or 23.7% were large farmers with average size of holdings 1.29 hectare in small size, 3.11 in medium and 7.47 hectares in large size farms. Overall average size of holding in the selected villages was 3.29 hectares. However, the selected farmers' size in the selected villages works out as 1.47 hectares, 3.2 and 8.48 hectares for small, medium and large size groups respectively. Average size of sample households in aggregate works out as 4.38 hectares. In Kurukshetra district total numbers of farmers from 20 villages in all the groups was 2021, out of which small size farmers were 1221 or 60.4%, medium size 467 or 23.1% and large size 333 or 16.5%. The average size of holdings in three groups was 1.16 hectares in small size, 3.02 hectares in medium and 7.39 hectares in large size holdings. Whereas average size of selected farmers in three size classes was 1.37, 3.11 and 7.78 hectares respectively. As district Bhiwani is a semi- arid area, therefore, size of

holdings is relatively larger in each size class as compared to those in district Kurukshetra which is a totally irrigated district (table 3).

4.2 Irrigated area in sample households: As data for the selected crop were mainly collected as per the schedule provided by the coordinator, we have data for irrigated area under gram in Bhiwani and for paddy in Kurukshetra. Gram as we know is mostly rain fed crop, or mostly grown where irrigation facilities are not fully provided. Like other pulses and oilseed crops it requires a few irrigations, if grown in irrigated area. But alongwith that it also is highly susceptible to weather conditions. In fact, all the pulse crops are mostly rain fed and require least number of irrigations. Therefore, only a miniscule area 0.61 hectares or 0.8% is irrigated under gram. On the other hand paddy requires a lot of irrigations and a certain level of standing water in the field during the entire life of the crop. As rainfall is not sufficient in the area to grow paddy, hence, entire paddy area is irrigated or paddy in Northern India is grown only where irrigation facilities are fully provided (table number 3).

Table 3: Size-class wise Distribution of Agricultural Land

Size of Holdings	Area (Hectare)		
	Irrigated	Unirrigated	Total
GRAM (BHIWANI)			
Small	0.61	103.70	104.31
Medium	0.00	208.82	208.82
Large	0.00	423.11	423.11
All	0.61	735.63	736.24
PADDY (KURKSHETRA)			
Small	107.20	0	107.20
Medium	232.90	0	232.90
Large	554.94	0	554.94
All	895.04	0	895.04

Table 3a: Size-class wise Distribution of Agricultural Land
Revised

Size of Holdings	Area (Hectare)		
	Irrigated	Unirrigated	Total
(BHIWANI)			
Small	17.81	125.66	143.46
Medium	57.67	260.72	318.39
Large	229.36	592.17	821.53
All	304.84	978.55	1283.39
(KURKSHETRA)			
Small	136.28	0.00	136.28
Medium	299.88	0.00	299.88
Large	767.91	0.00	767.91
All	1204.07	0.00	1204.07

4.3 Cropping pattern: The irrigation pattern mentioned above can give sound indication of the cropping pattern which could take place. Crops require a certain degree of water whether through rain fall or through irrigation depending upon the variety, nature, seasonality of the crop and the weather conditions. As data for one crop were collected from each district, we have cropping pattern of two districts for two crop seasons- District Bhiwani Rabi crops and District Kurukshetra- Kahrif crops. Table 4 provides details of cropping pattern of the selected farmers. Though the number of farmers in each group is same, i.e., 100 farmers in each group, the percentage of crop area is significantly different in each group. For example, small farmers cultivated about 14% of gram, 6% of wheat and about 8% of mustard, whereas the respective figures for medium size farms were about 28%, 23% and 19% respectively as compared to huge percentage of area cultivated by large framers. Their share in the rabi crops was about 57% in gram, 72% in wheat and 74% in mustard. Similar type of cropping pattern is visible in the case of kharif crops in Kurukshetra, where small farmers cultivated about 12% area of paddy, 17% of chari (fodder crop) and 5% area of sugarcane, as compared to 26% of paddy, 31% of chari and 16% of sugarcane area by middle size farms. Whereas figures for the large size farms were 62%, 53% and 79% respectively for three main crops. But the sample data cannot be representative as the percentage of small, medium and large farms is hugely different in population as compared size of their owned and cultivated holdings. In other words numbers of holding go on decreasing with the increase in the size of holdings, whereas in the sample we have been asked to give equal weights to all the size groups. Therefore, per farm share of cropped area is likely to be significantly different in population data as compared to sample data.

Table 4: Cropping Pattern of the Sample Farmers

Size of Holdings	Gram		Wheat		Mustard		Paddy		Chari		Sugarcane	
	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%
	BHIWANI:						KURKSHETRA:					
Small	104.31	14.17	10.72	5.93	28.43	7.76	107.20	11.98	19.67	16.68	9.41	4.92
Medium	208.82	28.36	41.58	23.00	67.99	18.56	232.90	26.02	36.02	30.55	30.96	16.20
Large	423.11	57.47	128.49	71.07	269.93	73.68	554.94	62.00	62.22	52.77	150.75	78.88
All	736.24	100.00	180.80	100.00	366.35	100.00	895.04	100.00	117.91	100.00	191.12	100.00

4.4 Productivity and value of production: In early sixties during debates on land reforms, (A.K Sen) and in late seventies (G.R. Saini), a number of comprehensive studies pointed out higher productivity in small size farms as compared to large size farms due to obvious reasons. In the case of semi arid areas, the argument still seems valid. For example, when we look at data from Bhiwani, where less irrigation is available to the farmers and the size of holdings is comparatively large, yield of gram is more (though marginally) in the case of small farms as compared to medium and large farms. But where irrigation facilities are available and size of holdings is relatively smaller (for example, the case of Kurukshetra) due to availability of more facilities, like tractors, improved seed varieties, fertilizers and pesticides etc. yield per hectare of paddy is more in larger farms as compared to smaller farms. Table 5 demonstrates this. Yield of gram is more than over all average yield by 0.91% in small farms and in medium size farms by about 0.78% points, whereas it is less by 0.52% points in large size farms. But due to area under operation, the large size farms receive more than half of the gross value of the produce, whereas small size farms get only 14% and medium size farms about 28%. Contrarily, in the case of paddy in Kurukshetra, due to higher yield in large size farms and more due to area under their operation, their share in total value of produce is more than 62% and this at the cost of both the small and medium size farms, share of which is reduced to 26%in the case of medium size farms and about 12% in the case of small size farms. The difference in total receipt is more than difference in yield, obviously due to more production and also may be due to timings of sale and therefore, may be due to price difference also.

Table 5: Productivity Per Hectare and Value of Production at FHP (Rs.'000)

Size of Holdings	G r a m (BHIWANI)				P a d d y (KURKSHETRA)			
	Productivity	% to All	Gross Value	% to All	Productivity	% to All	Gross Value	% to All
Small	7.80	100.90	1248	14.29	55.22	98.02	3493	11.74
Medium	7.79	100.69	2493	28.56	55.82	99.08	7670	25.78
Large	7.69	99.44	4989	57.15	56.77	100.77	18586	62.48
All	7.73		8731		56.34		29749	

Haryana: FHP of Gram Rs.1533.38/ qtl., FHPof Paddy (2004-05) Rs. 590/qtl

4.5 Utilisation of grain for seed: In table no.6, area under both the crops, 736.24 hectares under gram in Bhiwani district for all the respondents and 895.04 hectares under paddy in district Kurukshetra for all the respondents are given. Also given is total production 569365 kg of gram in Bhiwani or 773.34 kg/ha and 5042235 kg of paddy in Kurukshetra or 5633.50 kg/ha. To produce that much per hectare gram and paddy, 27458 kg of gram or 37.30 kg/ha seed was used and for paddy production per hectare 12.04 kg of paddy or 10774 kg in total seed was used. However, for the next year's crop per hectare seed retained is a little higher for both the crops, 39.9 kg/ha of gram and 12.67 kg/ha paddy.

In percentage terms, 4.82% of production of gram is used as seed and figures for paddy used for seed are 0.21% of total production. Percentage of seed kept for future use is slightly on the higher side than used. May be due to risk factor, may be due to enhanced area consideration. But the common thinking is to keep a little extra considering the concurrent area under the crop. The larger question which arises is how the remaining crop is disposed of or used for different purposes.

Table 6: Seed requirement for Gram and Paddy

District	Crop/ SIZE	Area	Area	Prod	Prod	Quantity of Seed				%-age qty. of seed with prod.	
						Used	Used	Kept	Kept		
		(ha.)	per HH	(kg.)	per Ha.	(kg.)	(kg./Ha)	(kg.)	(kg./Ha.)	Used	Kept
Bhiwani	Gram SMALL	104.31	1.04	81390	780.27	3996	38.31	4225	40.50	4.91	5.19
Bhiwani	Gram MEDIUM	208.82	2.09	162600	778.65	7937	38.01	8603	41.20	4.88	5.29
Bhiwani	Gram LARGE	423.11	4.23	325375	769.01	15525	36.69	16550	39.12	4.77	5.09
Bhiwani	Gram ALL	736.24	2.45	569365	773.34	27458	37.29	29378	39.90	4.82	5.16
Kukshetra	Paddy SMALL	107.20	1.07	591985	5522.06	1360	12.69	1347	12.56	0.23	0.23
Kukshetra	Paddy MEDIUM	232.90	2.33	1300000	5581.75	2783	11.95	2972	12.76	0.21	0.23
Kukshetra	Paddy LARGE	554.94	5.55	3150250	5676.77	6631	11.95	7020	12.65	0.21	0.22
Kukshetra	Paddy ALL	895.04	2.98	5042235	5633.51	10774	12.04	11339	12.67	0.21	0.22

4.6 Production and disposal of gram and paddy: In table no. 7 we present size group wise data about production and disposal details of gram and paddy. As stated earlier, production of gram in semi-arid areas is slightly more in smaller holdings in comparison to lager size holdings. For example, per hectare production of gram in small size households is 7.8 quintals as compared to 7.79 quintals in smaller holdings. Whereas figures for large size households are 7.69 quintals per hectare while overall average is

7.74 quintals. The case of paddy production is totally different, where per hectare production increases with the increase in the size of holdings. For example, in small size holdings per hectare production is 55.22 quintals as compared to 55.82 quintals in medium size households, whereas production in larger holdings is 56.77 quintals, and the overall average 56.33 quintals.

Table 7: Production and Disposal of Gram (Bhiwani) & Paddy (Kurkshetra)

District	Size of Holding	Crop	Total Prod. Qtls.	Quantity (Qtls.) for							
				Previous year's seed used	Kept for seed for next time	Exchange as seed	Sold* and later disposal	Home consumption	Kind wages to labour	Used as Animal feed	Used as Poultry feed
Bhiwani	Small	Gram	814	39.96	42.25	0	732.00	38.60	0.00	1.05	0.00
				(4.91)	(5.19)		(89.94)	(4.74)		(0.13)	
Bhiwani	Medium	Gram	1626	79.37	86.03	0	1483.37	52.55	0.00	4.05	0.00
				(4.88)	(5.29)		(91.23)	(3.23)		(0.25)	
Bhiwani	Large	Gram	3254	155.25	165.5	0	2981.20	87.90	0.20	18.75	0.00
				(4.77)	(5.09)		(91.62)	(2.70)	(0.01)	(0.58)	0.00
Bhiwani	All	Gram	5694	274.58	293.78	0	5196.57	179.05	0.20	23.85	0.00
				(4.82)	(5.16)		(91.27)	(3.14)	(0.00)	(0.42)	0.00
Kurkshetra	Small	Paddy	5920	13.6	13.47	0	5488.98	273.40	144.00	0.00	0.00
				(0.23)	(0.23)		(92.72)	(4.62)	(2.43)		
Kurkshetra	Medium	Paddy	13000	27.83	29.72	0	12324.28	388.90	257.10	0.00	0.00
				(0.21)	(0.23)		(94.80)	(2.99)	(1.98)		
Kurkshetra	Large	Paddy	31503	66.31	70.2	0	30496.50	515.85	419.95	0.00	0.00
				(0.21)	(0.22)		(96.81)	(1.64)	(1.33)		
Kurkshetra	All	Paddy	50422	107.74	113.39	0	48309.76	1178.15	821.05	0.00	0.00
				(0.21)	(0.22)		(95.81)	(2.34)	(1.63)		

Figure in parantheses are % to production.

4.6.1 Seed as proportion of production (case of gram): In Bhiwani district, requirement of gram for seed purpose works out as 4.82% of production. It slightly varies among size groups. For example, in small size holdings, the percentage of seed used is around 5 (4.91% to be exact), whereas in medium size house holds, it is 4.88% of production and in large size farms, it is 4.77%. Overall for seed purpose 4.8% of

production of gram was used. As mentioned earlier, gram kept for future (next crop) seed purpose is slightly in higher quantity. And that is the case with all size groups. For example, 5.19% of production is retained by small farmers, 5.29% by medium farms and 5.1% by large size farms for seed purpose. Overall seed requirement, therefore, increases to 5.16%. Thus about 95% of total production is available for human and animal consumption, irrespective of family consumption or consumption by general public through the market route. If we look at the figures of marketable and marketed surplus, it is about 91% of production of gram. Though it is slightly less in size group I or small size households, with less than 90%, whereas in medium size farms and large size farms it crosses the 90% mark, reaching to about 92% in large size farms. In other words, with the increase in size of holdings, percentage of gram available for sale increases. Interestingly, percentage for home consumption decreases as the size of holdings increases from about 5% in small size farms to slightly higher than 3% in medium size farms. But in the case of large size farms, it reduces to less than 3%. In other words, protein requirement of the poor farmers is met largely by home produced pulses, gram in this case, though they also sell to meet other financial requirements. Therefore, it becomes necessary to look into the total food consumption pattern of rural households for policy matters. Payment in kind by small and medium farms is nil. It means they themselves have grown and harvested the crop or they might have paid in cash, which is rare possibility looking into their financial and size of holding positions. A small portion (negligible) is paid in kind by large size farms. So far as gram needed for animal feed is concerned, all the size groups have used, though requirement increases with the increases in the size of holdings from 0.13% in small farms to 0.25% in medium size farms to 0.58% in large size farms. It is but natural as the proportion of animal reared increases with the increase in size of holdings. Hence, there may not be much difference in per animal feed requirement, though possibility of even that also remains.

4.6.2 Seed as proportion of production (case of paddy): In Kurukshetra district, requirement of paddy production for seed purpose works out as 0.21% of production. It slightly varies among size groups. For example, in small size holdings, percentage of seed used is around 0.23% of production, whereas in medium size house holds, it is 0.21% of production and in large size farms, it is 0.21%. Overall for seed purpose 0.21%

production was used. As mentioned earlier, paddy kept for future (next crop) seed purpose is slightly in higher quantity. And that is the case with all size groups. For example, 0.23% of production is retained by both small farmers and medium farms, and 0.22% of production was used for seed purpose by large size farms. Overall seed requirement increases to 0.22%. Thus more than 99% of total production is available for human and animal consumption, irrespective of family consumption or consumption by general public through the market route. If we look at the figures of marketable and marketed surplus, it is about 96% of production. Though it is slightly less in size group I or small size households, with less than 93%, whereas in medium size farms and large size farms it is about 95%, reaching to about 97% in large size farms. In other words, with the increase in size of holdings percentage of paddy available for sale increases. Interestingly, percentage for home consumption decreases as the size of holdings increases from about 5% (exactly 4.62%) in small size farms to slightly less than 3% in medium size farms. But in the case of large size farms, it reduces to less than 2% (1.64% to be exact). In other words, food grain requirement of the poor farmers is met largely by home produced paddy, hough they also sell to the market to meet other financial requirement. Therefore, it becomes necessary to look into the total food consumption pattern of rural households for policy matters. Payment in kind also decreases with the increase in the size of holdings from 2.43% in small households to less than 2% by medium farms and about 1.33% in large size farms. The obvious reason is the total quantity produced by different size groups. So far as paddy needed for animal feed and poultry feed is concerned, none of the size groups have used. In fact, paddy is not used as animal feed and poultry feed.

However, details of grains (gram particularly) used to feed different types of animals are given in table no.8.

4.6.3 Grains used for animal feed: In table 8 district wise, possession of animal types by the selected farmers is given. Due to obvious reasons (mainly semi-arid nature of the area), farmers in district Bhiwani posses lesser number of animals. Not only female milk animals, but dry and draught animals are also shown in the table. For example, only 61 cows are owned by farmers in Bhiwani in comparison to 120 in district Kurukshetra. Similarly, number of buffaloes owned is 408 in Bhiwani as compared to 619 in district

Kurukshetra. Barring other animals which are only noticed in Bhiwani, possession of dry animals is about two times less in Bhiwani than in Kurukshetra. Other animals include goats and sheep which require pastures for grazing and such type of land in 100% irrigated areas is difficult to find. As stated earlier, paddy is not used for animal feed, therefore, we do not find any portion of paddy production left for animal feed. It is only gram used to feed cows to the extent of 1.65kg per animal, buffaloes about 4 kg. per animal and calves about 1/4th of a kg.. It can be safely argued, gram is fed to animals in Bhiwani because it is grown there. Otherwise, we should have noticed gram being fed to animals (particularly to cows and buffaloes in milk) in district Kurukshetra also. Because the grains (particularly gram being a pulse crop) are costly, so no body wants to buy from the market and feed to animals. Of course, it would be interesting to find out economics of gram being used to provide nutrition to milk animals vis-à-vis quantity of milk obtained from such animals and then looking into prices of both milk on the one side and cost and general health of the animals on the other.

Table 8: Crop consumed as feed by live-stock

S. No.	District	Crop	Name of Animal	In Milk			Dry			Total Cons. Kgs.	Consumption Crop/animal (kg)
				No.	Total Qty. (kg)	Qty kg./ Animal	No.	Total Qty. (kg)	Qty kg./ Animal		
1	Bhiwani	Gram	Cow	61	145	2.38	27	0		145	1.65
	Kurkshetra	Paddy		120	0		52	0		0	0
2	Bhiwani	Gram	Buffaloe	408	1975	4.84	137	165	1.20	2140	3.93
	Kurkshetra	Paddy		619			317	0		0	0
3	Bhiwani	Gram	Bullock*				36	0		0	0
	Kurkshetra	Paddy					172	0		0	0
4	Bhiwani	Gram	Calves				495	100	0.20	100	0.20
	Kurkshetra	Paddy					773	0		0	0.00
5	Bhiwani	Gram	Others				232	0		0	0.00
	Kurkshetra	Paddy									

* Includes He-buffalo

4.6.4 Consumption of gram and paddy as feed for poultry: In table 9 data related to poultry feed is given. As we have noticed earlier, there are hardly any poultry units in district Bhiwani, mainly because of hot weather conditions, almost non-existent irrigation and due to local food habits etc.. In fact, Haryana mostly is vegetarian state. There is famous proverb, " Deshon main Desh Haryana, Jahan Doodh Dahi ka Khana." Roughly

translated it goes like this: Haryana is such a state where main food is milk and curd (dairy products). In other words, non-vegetarian food due mainly to religious feelings is not appreciated. Therefore, poultry and pisces-culture are not well liked professions. We could found one poultry farm in Kurukshetra district with only 2000 birds. Poultry feed mainly is bought from the market and almost no food grains grown locally, paddy and gram particularly, are fed to poultry. Though paddy (broken rice is used as poultry feed. Therefore, no data could be traced regarding selected crops being fed to poultry by the sample households.

Table 9: Comsumption of Gram as feed by poultry

SIZE.	District	Crop	No. of birds in thousands	Comsumption of Crop (kg.)	Consumption per bird (grams)
Small	Bhiwani	Gram	0	0	0
Medium	Bhiwani	Gram	0	0	0
Large	Bhiwani	Gram	0.002	0	0
All	Bhiwani	Gram	0.002	0	0
Small	Kurkshetra	Paddy	0	0	0
Medium	Kurkshetra	Paddy	0	0	0
Large	Kurkshetra	Paddy	0	0	0
All	Kurkshetra	Paddy	0	0	0

4.7 Value of Crop Output Gram (Bhiwani) and Paddy (Kurukshetra): Total output has been valued in monetary terms at farm harvest prices. It would have been better to find out total receipts of the farmers from sales of their produce at different stages of marketing and at the actual prices received by them. But probably for the sake of saving time and resources, it would have been deemed by the coordinator to use farm harvest prices. Data about value (table 10) presents very interesting results. For example, if we work out per farm receipts, total value increases with the size of holdings and interestingly with the multiple of 2 in the case of gram in Bhiwani. As total number of farmers was 100 in each group. Receipts in the case of small size farms works out about Rs. 12,500, in the case of medium size farms about twice of that, i.e., about 25,000 and in the case of large size farms twice of medium size farms, i.e., about 50,000/-. Similarly, in the case of paddy value increases with multiple of 2 in the case of medium size farms and further with a multiple of about 3 in the case of large size farms. The details as to how much it is due to size of holdings and due to prices received needs to be found out.

In case the sale were at the MSP, then the entire difference should be due to size and in case the sale were different than MSP, then surely, price policy will be needed to be looked into. Gross value is simply addition of the two crop receipts. But if we look at the receipts in per hectare terms, the difference is marginal, though the per hectare receipts decline with the increase in the size of holdings. Per hectare receipt of gram for small size farms works out Rs. 11.96 thousand, for medium size farms Rs. 11.94 thousand and for large size farms Rs. 11.79 thousand and for all the groups Rs. 11.86 thousand. Similarly, difference in per hectare receipts for paddy crop among the size groups is marginal. But unlike the case of gram the receipts per hectare increase with the increase in the size of holdings from Rs. 32.58 thousand in the case of small size farms to Rs. 32.93 thousand to finally Rs. 33.49 thousand in the case of large size farms. For all the groups together it works out Rs 33.24 thousand per hectare.

Table 10: Value of Crop Output Gram (Bhiwani) and Paddy (Kurkshetra)

Size of Holding	Value of Crop Output (Rs.000)				Gross Value (Rs.000) of Crop output
	Gram (Bhiwani)		Paddy (Kurkshetra)		
	Total Value	Value/Ha.	Total Value	Value/Ha.	
Small	1248	11.96	3493	32.58	4741
Medium	2493	11.94	7670	32.93	10163
Large	4989	11.79	18586	33.49	23576
All	8731	11.86	29749	33.24	38480

But the question here is neither of receipts per hectare or total or per farm nor of costs and nor the economics, what we are looking for is how much produce is actually used in different utilisation processes, viz. human consumption, animal feed etc. and how much produce is actually realized during the different process of harvesting, threshing, storage, marketing etc. In other words, how much produce is lost or wasted which may need to be curbed to increase the value for the farmers and thereby to the agricultural economy as such. Table 11 provides the needed information.

4.8 Wastage at different harvest and post harvest stages: The data presented on wastage of grains in different processes of harvesting and utilizations are simply those reported by the respondents and explanation is based upon the experiences of the

investigators and the report writer as all of them belonged to farming families and were experienced in crop production and animal management.

4.8.1 Wastage during harvesting and distribution: During harvesting, in the case of gram it is noticed that losses increase with increase in the size of the holdings, though marginally. The reason for that may be that in the smaller holding many times farmers themselves do harvesting operations. Purpose is duel, to save on labour costs as well on harvesting losses. We have personally observed that if farmers themselves harvest they do it more cautiously whereas hired labour if they are on piece rate, their purpose remains to finish total area harvesting without botheration of losses or if on daily wages then purpose remains to see the days passing and doing as less work as possible without botheration of area coverage or saving on harvest losses. Even if the wages are based on total quantity of harvested produce, purpose remains to finish as much harvesting as possible without loss botheration. Therefore, take on hired labour in any form of payment, the popular Punjabi saying that, ***"Beganey Haath Kheti, Kabhi Na Ho Battis Se Teti",*** crudely translated it means, agriculture in other hands will never be that much profitable.

Total harvesting losses (table 11) count as much as 1% of production, which are 0.75% in the case of small farmers and go up 1.06% in the case of large farms. But that is not the case of paddy harvesting. The losses remain more or less the same irrespective of the farm size. The reason lies in the fact, that in all cases paddy harvesting is done by hired labour. Farm owners irrespective of size do not do harvesting and threshing. Hence the losses remain almost same, i.e., 0.58% of production. Gram losses during threshing are noticed about 4 and half % of total production with little variation among size classes starting from 4.55% in small size and going down to 4.34% in large size farms. whereas in the case of paddy threshing losses are found to be 1% of production, a little more than1% are noticed in small size holdings. Wastages in straw in the case of gram are negligible and in the case of paddy about 1% of production. Transportation losses are negligible in the case of gram but about 1% in the case of paddy. There is no significant variation across size classes. Storage losses in both the crops are negligible. Home consumption in the case of both the crops is about $1/6^{th}$ of 1% of production. It goes on declining with the increase in the size of holdings from about $1/3^{rd}$ of production in both

the crops to about 1/7th in the large farms. Obviously it is due to scale of production, because size of family may not be significantly different whereas size of holdings and total production are. Paddy is not fed to animals therefore, no question of being left over in animal feed whereas gram is noticed to be, though negligible. Because animals are wise enough not to leave grain mixed straw unconsumed. This we can write with our own experience also.

Table 11 : Wastage at different harvest and post harvest stages

Size of Holding	Production (kg.)	Wastage							
		Harvesting		Threshing&Shattered		Straw		Transportation	
		(kg.)	% to Prod.	(kg.)	% to Prod.	(kg.)	% to Prod.	(kg.)	% to Prod.
Bhiwani (GRAM)									
Small	81390	609	0.75	3708	4.56	72	0.09	153	0.19
Medium	162600	1697	1.04	7658	4.71	156	0.10	361	0.22
Large	325375	3441	1.06	14135	4.34	274	0.08	622	0.19
All	569365	5747	1.01	25501	4.48	502	0.09	1136	0.20
Kurkshetra (Paddy)									
Small	591985	3448	0.58	7756	1.31	8685	1.47	6673	1.13
Medium	1300000	7814	0.60	13847	1.07	15555	1.20	15445	1.19
Large	3150250	17910	0.57	33379	1.06	28610	0.91	31395	1.00
All	5042235	29172	0.58	54982	1.09	52850	1.05	53513	1.06

…….Continued Table-11

Size of Holding	Wastage					
	Storage		Home consumption		Left in Animal/Poultry Feed	
	(kg.)	% to Prod.	(kg.)	% to Prod.	(kg.)	% to Prod.
Bhiwani (GRAM)						
Small	27	0.03	218	0.27	4	0.005
Medium	154	0.09	280	0.17	11	0.007
Large	244	0.07	432	0.13	46	0.014
All	425	0.07	930	0.16	61	0.011
Kurkshetra (Paddy)						
Small	411	0.07	1824	0.31	0	
Medium	950	0.07	2526	0.19	0	
Large	2172	0.07	3654	0.12	0	
All	3533	0.07	8004	0.16	0	

4.9 Percentage of seed, feed and wastage in production: Total production as stated earlier is distributed among three four heads: kept for seed purpose for the next season, used as animal feed, retained for home consumption, lost in various processes and finally sold in the market at different intervals as per the need of the farmers or if farmer can afford, in a few cases, to sell at times when market prices are assumed to be highest. In table 12 we present data on these heads. And in table 13 consolidated data on these heads are presented. Seed used to grow crop, though not a part of current year's production works out (4.82%) in aggregate in the case of gram and 0.21% in the case of paddy. However, current year's production retained for seed purpose works out little more than it was actually used for the current crop, 5.16% in the case of gram and 0.22% in the case of paddy. Proportion used and retained by small size farms is less than large size farms in the case of gram and size neutral in the case of paddy. Only gram is used in the form of animal feed and that works out less than half % of production in aggregate. In the small size farms it is about 1/8th of 1% and 0.58% in the case of large size farms. Total wastage works out about 6% in the case of gram and about 4% in the case of paddy.

Table 12: Percentage of seed, feed and wastage in production of Gram (Bhiwani) and Paddy (Kurkshetra)

Size of Holding	Area (ha.)	Prod. (kg.)	Seed used		Seed kept		Used as Feed		Wastage	
			Qty. (kg.)	%	Qty. (kg.)	%	Qty. (kg.)	%	Qty. (kg.)	%
Bhiwani (GRAM)										
Small	104.31	81390	3996	4.91	4225	5.19	105	0.13	4790.5	5.89
Medium	208.82	162600	7937	4.88	8603	5.29	405	0.25	10317	6.35
Large	423.11	325375	15525	4.77	16550	5.09	1875	0.58	19194	5.90
All	736.24	569365	27458	4.82	29378	5.16	2385	0.42	34302	6.02
Kurkshetra (Paddy)										
Small	107.20	591985	1360	0.23	1347	0.23	0.00	0.00	28797	4.86
Medium	232.90	1300000	2783	0.21	2972	0.23	0.00	0.00	56137	4.32
Large	554.94	3150250	6631	0.21	7020	0.22	0.00	0.00	117120	3.72
All	895.04	5042235	10774	0.21	11339	0.22	0.00	0.00	202054	4.01

In table 13 aggregate amount of wastage and used as seed are given. In the case of gram total wastage and quantity retained for seed works out 11.6% of total production and in the case of paddy it is about 4.25%.

Table 13: Crop-wise percentage of seed, feed and wastage in production of Gram (Bhiwani) and Paddy (Kurkshetra)

Crop	Area (ha.)	Prod. (kg.)	Seed used		Seed kept		Used as Feed		Wastage		Cons. As seed*, feed and wastage	
			Qty. (kg.)	%	Qty. (kg.)	%	Qty. (kg.)	%	Qty. (kg.)	%	Qty.(kg)	%
Gram	736.24	569365	27458	4.82	29378	5.16	2385	0.42	34302	6.02	66065	11.60
Paddy	895.04	5042235	10774	0.21	11339	0.22	0	0.00	202054	4.01	213393	4.23

* does not include Seed Used.

CHAPTER - V

Caste base and seed feed wastages ratios

5. Caste system in Indian society is an avoidable evil which is directly related to possession of social, economic and bureaucratic power in the country. Some dominant castes are distinctly in possession of all these powers and others are directly devoid. For example, education related activities have remained in the domain of one particular caste, possession of agricultural and fertile land in the hands of a few dominant castes such as Rajputs, Marathas, Reddys, Patils, Patels, Jats etc.. Trade, Business and Industry , in other words, the entire commercial sources have remained in the ownership of trading castes such as Chettiars, Banias, Punjabis, Sindhis and Bhapey Sardars. These castes are known as upper castes. Other professions, for example, artisans defined as Mundle castes are mainly craftsmen, devoid of productive sources and totally dependent upon their craftsmanship. Such people, like potters, carpenters, barbers, washer men, ironsmith, goldsmith, mason, shepherds, herdsmen, etc. are known as other backward castes. Finally the other menial workers doing mostly abhorred works by the so called civil society such as scavenging, sweeping, cobblers' work de-skinning the dead animals etc. were the castes put under a specific schedule of the constitution , are known as scheduled castes. Along with them are scheduled tribles, though put under another schedule. As known from the term itself, these are the people mostly living nomads' life, mostly dependent on forest produce etc.

During the freedom struggle, their cooperation for fighting the British occupants was inevitable, therefore, they were assured some benefits after independence, for example, certain proportion in govt. jobs, in educational institutions, some portion of agricultural land etc. The land reforms in the original sense were meant for this purpose also, along with economic logic that small size farms were more productive, and also social justice based slogan that land belongs to the tiller. For this purpose a movement "Bhudaan" was also started by Vinoba Bhave. But as the saying goes rights are never offered on the plate, they are obtained by hard struggle. Still these depressed classes are being denied their legal rights.

Table 14 : Land details (per house hold)

Caste Group	Households		Area Irrigated	Area Unirrigated	Crop	% Crop Area
	No.	%				
Bhiwani (GRAM)						
1	50	16.67	0	272.75	272.75	14.99
2	39	13.00	0	182.25	182.25	10.02
3	211	70.33	1.5	1362.75	1364.25	74.99
All	300	100	1.5	1817.75	1819.25	100.00
Kurkshetra (Paddy)						
1	98	32.67	799.25	0	799.25	36.14
2	2	0.67	9	0	9	0.41
3	200	66.67	1403.4	0	1403.4	63.45
All	300	100	2211.65	0	2211.65	100.00

Caste Group 1-BC, 2-SC/ST, 3-Others

5.1 Ownership of cultivable land: Census data of the selected villages show that barring scheduled tribes, strength in the village population of the other backward classes and scheduled castes is 70% to 85%. But the number of land owners of these classes is very limited and that is why un proportional number of respondents of these castes. For example, for studying gram we could select only 16.67% farmers from the backward castes and 13% of scheduled castes, who were land owners, whereas number of forward caste land owners is much more than total strength in selected villages and that is why they are more than 70% of the total sample. The situation in Kurukshetra, almost 100% irrigated aarea and much more fertile is worse than Bhiwani. Number of scheduled caste land owing farmers is less than 1% (table 14). Still worse is the situation of area under the crop in both the districts. In the case of Bhiwani, about 17% OBC householdsa own and cultivate less than 15% of the crop area, 13% scheduled caste households cultivate only 10% area under the crop. Naturally the share of forward caste will be more and that is nearly 75%. But in the case of area under paddy in Kurukshetra, the OBCs are better placed. With less than 33% strength, they cultivate more than 36% areas and that is at the cost of both scheduled castes and forward castes. 0.67% scheduled caste households cultivate only 0.41% of total area.

5.2 Production and disposal of gram: Average production for the sample households of Bhiwani district works out 3.13 quintals per acre. For the OBC families the average production is 3.73 quintals, for SC farmers, it works out 3.42 quintals whereas for the forward castes, average production is the lowest 2.97 quintals per acre. However, seed used in per acre of area in the three caste groups works out aas 15.30 kgs., 14.89 kgs., and 15.09 kgs. per acre for OBC, SC and FC castes respectively. The important point is that common understanding of the production practices for the respective caste groups is that SC families due to poor knowledge, poor resources and poor management practices are not known for good production results, whereas due all above reasons the FC should be the leaders in the production. But the fact is that with almost as much seed used as used by OBCs and much more than that used by SC families, production per acre in the FC households is much less than SC households. In alm,ost same proportion the respective households kept production for next crop as seed.

5.2.1 Disposal of Gram: on average, 5.16 % of production of gram has been retained by all the households for next year's crop as seed. Highest, 5.36% by the forward castes and lowest 4.6% by OBCs and 4.7% by SC households. For home consumption about 3% has been retained by all groups, lowest 2.76% by OBCs and the highest, 4.29%, surprisingly, by SC households. It shows how important pulse crops are for SC families, may be they do not have purchasing power to buy from the market or may be they do not produce as much as the forward castes, therefore, they retain a larger part of production for home consumption. About 15% is retained for later disposal varying between 12% to 17% in different caste groups. A larger portion of production about 75% is sold immediately by the producers varying between 74% in the case of forward castes to more than 79% in the case of OBCs and about 79% in the case of SC households. A small portion less than one half of 1% by all the groups is fed to the animals. Which varies between 0.45% in the case of forward castes to 0.28% in the case of OBCs.

Caste Group	No hh	Total production Qtls.	Production Per Acre	Seed used (Kg.)	Seed used per acre (Kg.)	Seed kept (Kgs)	Seed kept per acre (Kg.)	Seed kept per cent to Prodn.	Sold (Kgs)	Sold % to Prod.
Bhiwani (Gram)										
1	50	1020	3.74	4177	15.31	4725	17.32	4.63	80940	79.34
2	39	623	3.42	2714	14.89	2925	16.05	4.70	49185	79.01
3	211	4051	2.97	20567	15.08	21728	15.93	5.36	299377	73.90
All	300	5694	3.13	27458	15.09	29378	16.15	5.16	429502	75.44
Kurkshetra (Paddy)										
1	98	18772	23.49	3866	4.84	4702	5.88	0.25	1787633	95.23
2	2	221	24.56	33	3.67	35	3.89	0.16	21465	97.13
3	200	31430	22.40	6875	4.90	6602	4.70	0.21	2992528	95.21
All	300	50422	22.80	10774	4.87	11339	5.13	0.22	4801626	95.23

…..Continued Table-15.

Caste Group	Home consumption (Kgs)	Home consp. % to Prod.	Later disposal (Kgs)	Later disposal % to Prod	Paid to Labour (Kgs)	Paid in Kind % to Prod.	Animal feed (Kgs)	Animal feed % to Prod	Poultry Feed (Kgs)
Bhiwani (Gram)									
1	2815	2.76	13250	12.99	0	0.00	285	0.28	0
2	2675	4.30	7200	11.57	0	0.00	265	0.43	0
3	12415	3.06	69705	17.21	20	0.00	1835	0.45	0
All	17905	3.14	90155	15.83	20	0.00	2385	0.42	0
Kurkshetra (Paddy)									
1	43240	2.30	15050	0.80	26550	1.41	0	0.00	0
2	600	2.71	0	0.00	0	0.00	0	0.00	0
3	73975	2.35	14300	0.45	55555	1.77	0	0.00	0
All	117815	2.34	29350	0.58	82105	1.63	0	0.00	0

5.3. Production and Disposal of Paddy: As in the case of gram, paddy production per acre of land is recorded highest in the case of Sc families, which is more than 24.5 quintals as compared to 22.4 quintals in the case of forward castes. Similarly use of paddy in the form of seed is also lowest in the case of Sc households, 3.67 kgs as

compared to 4.90 kgs in upper castes. Similarly retention of paddy for seed purpose is lowest, 3.9 kgs., in Sc households as compared to about 5.9 kgs in the case of OBc farmers. Paddy retained for seed works out .22% of production for all the households varying between 0.25% in the case of OBCs to 0.16% in the case of SC households. About 95% of paddy is immediately sold by all the farmers. However in the case of SC households it is the highest 97.13% of production. Probably they do not have any other commodity top sell to meet their household expenditure. Otherwise paddy retained for home consumption is the highest, 2.7% of production, in these households. In other category households percentage retained for home consumption is 2.3% and 2.35%. as they have sold a substantial quantity of production so they have to cut from other sources. One such source is payment made in kind. As these households do not own large size land they have to work themselves, so they could save from labour payment in kind., whereas other category households have paid about 1.63% of production in kind. Largest quantity paid is by forward castes (Table 15).

5.4 Animals and ownership pattern (Bhiwani): Contrary to common feeling that milk animals (cows and buffaloes should be found in OBC and forward caste families, obviously because they have land and other facilities like irrigation to grow fodder. Scheduled caste families therefore, should have been having lesser number of animals and also not properly fed and cared for. But in district Bhiwani, forward caste households (70% of total respondents) own about 59% cows in milk, OBC house holds (less than 17% of total respondents) own about 23% cows in milk and 13% remaining respondents, SCs only own about 18% cows. So milk availability to SC households should not be aas bad as could have been expected. Of course, we are not sure whether the milk produced is consumed by family members or simply sold for cash income as generally happens. The other reasons, which seems most likely is the ownership pattern of buffaloes, main source of milk in Haryana and other Northern states of India. Almost 75% of buffaloes are owned by forward caste households, more than 15% by Obcs and the remaining about 10% by SC house holds. Hence, milk animals taken together, i.e., cows and buffaloes both seem to be fairly distributed. For example, 16.2% cows and buffaloes are owned by

OBCs who constitute 16.7% of sample, 10.9% by SCs who are 13% of sample, and reaming 72.9% by upper caste families who are 70% of sample.

5.4.1 Pattern of animal feed: for the last few decades, gram becoming costly is not regularly fed to animals. Otherwise we can write with our experience during 50s and 60s, before the advent of green revolution, boiled gram and rapeseed mustard oil meal (during rabi crops) were the main source of enrichment of animal feed and for kharif crops it was guar and millets which were added to dry fodder for nutrition. In most of the households in Northern Rajasthan, Punjab, Haryana and UP, gram can hardly be found being fed to animals now. But still in Bhiwani district where gram is largely grown is a source of animal feed.. though cows receive less gram per animal than she buffaloes and he buffaloes and bullocks probably are not considered worth that. Also, pattern of gram being fed to cows differ in different social; groups. For example, we do not find any OBC household giving gram to cows, upper caste households gave 2.6kg gram per cow and only scheduled caste families gave a little more quantity 4.5 kg gram per cow during the year. Thus total quantity per animal during the year would be nothing more than **"cumin in the mouth of camel".** Similarly, per animal quantity of gram given to buffaloes in milk works out only 4.8 kgs. With share of Sc households being the least, 2.9kg per buffalo. Obc households gave about 4.6 kgs and upper caste families a little more than 5 kgs. Dry cows and buffaloes in OBC and SC households did not get any gram. Only in upper caste families dry animals got about 1.4 kg gram per animal. Only in Sc families, caves were given a little quantity of gram , 0.8 kg of gram per calf.

5.5 Animals and ownership pattern (Kurukshetra): In Kurukshetra, where mostly wheat –paddy rotation of crops is followed, a little land is allotted for fodder crops also. That depends upon ownership of animals by the households. Scheduled caste families were not found owning any cow. Most of the cows were owned by upper caste families.

Table 16: Animals (in number) and their feed qty. (in kgs)

Caste Group	No of HHs	In Milk Cows				In Milk Buffaloes				Dry Cows & Buffaloes		Bullock		He Buffaloes		Calves & Others	
		No.	%	Qty given	Qty given per cow	No.	%	Qty given	Qty given per buff.	No.	Qty given	No.	Qty given	No.	Qty given	No.	Qty given
Bhiwani (Gram)																	
1	50	14	22.95	0	-	62	15.20	285	4.6	30	0	12	0	2	0	112	0
2	39	11	18.03	50	4.5	40	9.80	115	2.9	12	0	8	0	0	0	120	100
3	211	36	59.02	95	2.6	306	75.00	1575	5.1	122	165	13	0	1	0	497	0
All	300	61	100	145	2.4	408	100.00	1975	4.8	164	165	33	0	3	0	729	100
Kurkshetra (Paddy)																	
1	98	32	26.67	0	-	213	34.41	0	-	132	0	21	0	44	0	243	0
2	2	0	0.00	0	-	4	0.65	0	-	1	0	2	0	0	0	4	0
3	200	88	73.33	0	-	402	64.94	0	-	236	0	19	0	86	0	526	0
All	300	120	100	0	-	619	100.00	0	-	369	0	42	0	130	0	773	0

Table-17: Wastages (Quantity. in Kgs) and % to Production

Caste Group	No of HHs	At Harvest		At threshing		Shatered		Left in straw		In transport		In storage		Consumption/ Feed	
		Qty	%	Qty	%	Qty	%	Qty	%	Qty	%	Qty	%	Qty	%
Bhiwani (Gram)															
1	50	1156	1.13	4354	4.27	1313	1.29	20	0.02	25	0.02	57	0.06	162	0.16
2	39	632	1.02	2467	3.96	753	1.21	15	0.02	26	0.04	47	0.08	114	0.18
3	211	3959	0.98	12559	3.10	4055	1.00	467	0.12	310	0.08	321	0.08	715	0.18
All	300	5747	1.01	19380	3.40	6121	1.08	502	0.09	361	0.06	425	0.07	991	0.17
Kurkshetra (Paddy)															
1	98	12089	0.64	6417	0.34	9730	0.52	15895	0.85	4710	0.25	1266	0.07	2997	0.16
2	2	85	0.38	75	0.34	45	0.20	95	0.43	90	0.41	0	0.00	120	0.54
3	200	16998	0.54	18141	0.58	20574	0.65	36860	1.17	9855	0.31	2267	0.07	4887	0.16
All	300	29172	0.58	24633	0.49	30349	0.60	52850	1.05	14655	0.29	3533	0.07	8004	0.16

Though their number in total selected farmers were also larger, but possession of cows in milk was further skewed. For example, OBC households which were 32.7% of total sample owned 26.7% cows and upper castes with their 66.7% number in respondents were owning about 73% cows. However, the case of she buffaloes was different, with share almost proportional share of SC households and more than proportional ownership by OBC households, the share of upper caste families (about 65%) was less than representation in sample size. However, animals are not fed any paddy concentrate.

5.6 Wastages (case of gram in Bhiwani): In Table 17 data about wastage of gram during harvesting, threshing, shattered in the field, left in straw, wastage during transportation , storage and during consumption are given. Almost 1% of production is lost during harvesting, a little less by upper castes and a little more by OBCs, but almost 1% , equal to overall wastage by the SC households. About 3.5% of production is wasted during threshing, morethan 4% by OBC house holds, nearly 3% by upper castes and about 4% by SC families. About 1% in over all and by all the social groups is shattered in the fields. However, in the case of left in straw the proportion for upper caste families is significantly higher, more than 0.1% whereas in the case of other two groups, it is around 0.02%. reason is simple, their share for animal feed is more. About half a percent or 0.06% is wasted in transportation. It is slightly more in the case of upper caste families and almost negligible in the case of OBc house holds. Almost same peroprtion about 0.07% is lost in storage and that is fairly equal in all the social groups.

5.6.1. Wastages (case of paddy Kurukshetra): So far as loss of paddy during harvesting is concerned, it is about of gram losses in the same process, about 0.58% of total production. Interestingly in the case of SC house holds it is the lowest, may be due to they themselves doing the activity as explained earlier. Paddy losses in threshing are further down a little less than half a percent of total production. In the OBC and SC households, these losses are significantly less. Wastages due to shattering in the fields are also less than that for gram, it is about 0.6% as compared to about 1% in the case of gram. But absolutely less in SC house holds. Wastage due to left in straw are also lower in Sc households but theses are more than that of gram. In fact, in the case of gram these

wastages are almost nil as compared to about 1% in the case of paddy. Similarly losses in transportation of paddy are more than gram , though inter group variation is not theta large. Wastage in storage of paddy are as much as that of gram. But there are no wastages in SC house holds, may be due to less production they did not store much and for more time. Losses in consumption are as much as that of gram. But in the case of SC house holds they are significantly higher than any other group and overall average.

CHAPTER – VI

Summary and conclusions

After 1986 when an expert committee from organizations such as DES, NSSO, CSO, IASRI, Ministry of Civil Supplies and Ministry of Agriculture was set up to estimate ratios of seed, feed and wastage of food grains, no serious effort has been made to find out as to what proportion of food grains is lost in various production processes and distribution, what proportion is fed to animals, what proportion is retained for seed and what ultimately should be available for human consumption, though agriculture during the two decades has undergone many changes in cropping pattern, availability of (both shortages of some as well as abundances of many) various crops, input uses, soil conditions etc.

Along with the above argument, it is not known how much food grains are wasted in field while harvesting, transportation, marketing and storage. This will be clear when we look for such estimates for horticulture crops. Since, the market regulation days, we are told that from Rs. 3000/- crores to Rs. 50,000/- crores worth of horticultural produce is wasted every year due to lack of transport, improper marketing, storage etc., and we do not find even such crude figures for food grains. In sum such an exercise was long over due.

The study mainly focuses on two aspects of the problem. How much proportion of total production of cereals and pulses is wasted during production, storage, transportation and marketing processes, how much is used for feed and how much is retained by the farmers in the form of seed for the next crop. Secondly, how much proportion would be available for human consumption.

The study design as suggested by the coordinator was to be prepared keeping in mind the area under major food grain crops in each district of the state of Haryana. It was to be a multi-stage sampling with Tehsil/ Block as strata, villages growing main crops selected for the study as primary unit, cultivators growing the selected crop as secondary stage unit. Two districts – one for cereals,- Kurukshetra and one for pulses – Bhiwani, were selected on the basis of highest density of area under the respective crops. District Kurukshetra was selected for the purpose of Wheat and Paddy and District Bhiwani for Gram and Moong. Later on due to huge amount of field work involvement vis-à-vis

limited resources in each centre, only one crop from each district was asked by the coordinator to be retained.

Thus from two districts, 8 blocks/ tehsils and from each block/ tehsil 5 villages, total 40, and from each village at random 15 farmers, total 600, were selected. The 15 cultivators were equally divided into three categories – small size with 0-2 hectares of land, [S]; medium size with (2- 4 hectares)[M]; and large size with 4 hectares an above of land [L]. After selection of villages, with the help of the village level workers of the department of agriculture and village Pardhan of each village a list of all the cultivators was prepared and from the list 15 farmers (five from each size group) were selected. Data were collected with the help of two separate schedules- village level schedule and household schedule.

Main findings:

Size class wise distribution of farmers: In Bhiwani district, total number of farmers in 20 villages were 3006, out of which 47% were small farmers, 29.3% were medium and the remaining 23.7% were large farmers with average size of holdings 1.29 hectare in small size, 3.11 in medium and 7.47 hectares in large size farms. Overall average size of holding in the selected villages was 3.29 hectares. However, the sample farmers' size in the selected villages works out as 1.47 hectares, 3.2 and 8.48 hectares for small, medium and large size groups respectively. Average size of sample households in aggregate works out as 4.38 hectares. In Kurukshetra district total numbers of farmers from 20 villages in all the groups was 2021, out of which small size farmers were 60.4%, medium size 23.1% and large size 16.5%. The average size of holdings in three groups was 1.16 hectares in small size, 3.02 hectares in medium and 7.39 hectares in large size holdings. Whereas average size of holdings of selected farmers in three size classes was 1.37, 3.11 and 7.78 hectares respectively. As district Bhiwani is a semi- arid area, therefore, size of holdings is relatively larger in each size class as compared to those in district Kurukshetra which is a totally irrigated district.

Irrigated area in sample households: As data for the selected crops were mainly collected as per the schedule provided by the coordinator, we have data for irrigated area under gram in Bhiwani and under paddy in Kurukshetra. Gram as we know is mostly rain fed crop, or mostly grown where irrigation facilities are not fully provided. Therefore,

only a miniscule area 0.61 hectares or 0.8% is irrigated. On the other hand paddy requires a lot of irrigations and a certain level of standing water in the field during the entire life of the crop. As rainfall is not sufficient in the area to grow paddy, hence, entire paddy area is irrigated. In fact, district Kurukshetra is 100% irrigated area.

Cropping pattern: The irrigation pattern mentioned above can give indication of the cropping pattern which could take place. We have cropping pattern of two districts for two crop seasons- District Bhiwani Rabi crops and District Kurukshetra- Kahrif crops. Though the number of selected farmers in each group is same, i.e., 100 farmers, the percentage of crop area is significantly different in each group. For example, small farmers cultivated about 14% of gram, 6% of wheat and about 8% of mustard, whereas the respective figures for medium size farms were about 28%, 23% and 19% respectively as compared to huge percentage of area cultivated by large framers. Their share in the rabi crops was about 57% in gram, 72% in wheat and 74% in mustard. Similar type of cropping pattern is visible in the case of kharif crops in Kurukshetra, where small farmers cultivated about 12% area of paddy, 17% of chari (fodder crop) and 5% area of sugarcane, as compared to 26% of paddy, 31% of chari and 16% of sugarcane area by middle size farms. Whereas figures for the large size farms were 62%, 53% and 79% respectively for three main crops.

Productivity and value of production: If we look at data from Bhiwani, mostly semi-arid area, yield of gram is more (though marginally) in the case of small farms as compared to medium and large farms. But where irrigation facilities are available and size of holdings is relatively smaller (for example, the case of Kurukshetra) due to availability of more facilities, like tractors, improved seed varieties, fertilizers, pesticides etc., yield per hectare of paddy is more in larger farms as compared to smaller farms.

Yield of gram is more than over all average yield by 0.91% in small farms and in medium size farms by about 0.78% points, whereas it is less by 0.52% points in large size farms. Per hectare production of gram in small size households is 7.8 quintals as compared to 7.79 quintals in medium holdings. Whereas figures for large size households are 7.69 quintals per hectare while overall average is 7.74 quintals. The case of paddy production is totally different, where per hectare production increases with the increase in the size of holdings. For example, in small size holdings per hectare production is 55.22 quintals as

compared to 55.82 quintals in medium size households, whereas production in larger holdings is 56.77 quintals, and the overall average 56.33 quintals. But due to area under operation, the large size farms receive more than half of the gross value of the produce, whereas small size farms get only 14% and medium size farms about 28%. Contrarily, in the case of paddy in Kurukshetra, due to higher yield in large size farms and more due to area under their operation, their share in total value of produce is more than 62% and this at the cost of both the small and medium size farms, share of which is reduced to 26%in the case of medium size farms and about 12% in the case of small size farms.

In sum, it can be safely argued that land ownership in the state is highly skewed, with larger number of small farmers having a little agricultural area and less irrigation facilities in comparison to large farmers who are less in number but possess not only substantial part of land but also irrigation facilities and that determines the cropping pattern of different size classes. But productivity, i.e., yield per unit of area is in favour of small farmers in district Bhiwani as compared to fully irrigated paddy growing district Kurukshetra due to role of irrigation and other inputs such as fertilizers, pesticides, mechanization etc.

Utilization of gram: Farmers in Bhiwani produced 569365 kg of gram from 736.24 hectares and in district Kurukshetra 5042235 kg paddy from 895.04 hectares. To produce773.34 kg/ha gram and 5633.50 kg/ha paddy, 27458 kg of gram or 37.30 kg/ha seed was used, and for paddy production per hectare 12.04 kg of paddy or 10774 kg in total seed was used. However, for the next year's crop per hectare seed retained is a little higher for both the crops, 39.9 kg/ha of gram and 12.67 kg/ha paddy. In percentage terms, 4.82% of production of gram is used as seed. It slightly varies among size groups. For example, in small size holdings, the percentage of seed used is around 5 (4.91% to be exact), whereas in medium size households, it is 4.88% of production and in large size farms, it is 4.77%. Gram kept for seed (future crop) is slightly in higher quantity. And that is the case with all size groups. For example, 5.19% of production is retained by small farmers, 5.29% by medium farms and 5.1% by large size farms. Overall seed requirement increases to 5.16%. If we look at the figures of marketable and marketed surplus, it is about 91% of production of gram. Though it is slightly less in size group I, less than 90%, whereas in medium size farms and large size farms it crosses the 90%

mark, reaching to about 92% in large size farms. In other words, with the increase in size of holdings, percentage of gram available for sale increases. Interestingly, percentage for home consumption decreases as the size of holdings increases from about 5% in small size farms to slightly higher than 3% in medium size farms. But in the case of large size farms, it reduces to less than 3%. In other words, protein requirement of the poor farmers is met largely by home produced pulses, gram in this case, though they also sell to meet other financial requirements. Therefore, it becomes necessary to look into the total food consumption pattern of rural households for policy matters. Payment in kind by small and medium farms is nil. A small portion (negligible) is paid in kind by large size farms. So far as gram needed for animal feed is concerned, all the size groups have used, though requirement increases with the increases in the size of holdings from 0.13% in small farms to 0.25% in medium size farms to 0.58% in large size farms. It is but natural as the proportion of animal reared increases with the increase in size of holdings.

Utilisation of paddy: In Kurukshetra district, requirement of paddy production for seed purpose works out as 0.21% of production. Inter size group variation is almost nil. Paddy kept for (future crop) seed is slightly higher. And that is the case with all size groups. For example, 0.23% of production is retained by both small farmers and medium farms, and 0.22% of production was retained for seed purpose by large size farms.. If we look at the figures of marketable and marketed surplus, it is about 96% of production. Though it is slightly less in size group I, with less than 93%, whereas in medium size farms it is about 95%, reaching to about 97% in large size farms. In other words, with the increase in size of holdings percentage of paddy available for sale increases. As expected, percentage for home consumption decreases with the increase in the size of holdings from about 5% (exactly 4.62%) in small size farms to slightly less than 3% in medium size farms. But in the case of large size farms, it reduces to less than 2% (1.64% to be exact). In other words, food grain requirement of the poor farmers is met largely by home produced paddy, though they also sell to the market to meet other financial requirement. Payment in kind also decreases with the increase in the size of holdings from 2.43% in small households to less than 2% by medium farms and about 1.33% in large size farms. The obvious reason is the total quantity produced by different size groups. Paddy is not found to be used as animal feed and poultry feed.

Wastage during harvesting and distribution: In the case of gram it is noticed that during harvesting losses increase, though marginally with increase in the size of the holdings. The reason for that may be that in the smaller holdings to save on labour costs as well on harvesting losses many times farmers themselves do harvesting operations. We have personally observed that if farmers themselves harvest, they do it more cautiously whereas hired labour, whether on piece rate, or on daily wages or on total quantity of harvested produce basis, is least concerned about harvest losses. Total harvesting losses count as much as 1% of production, which are 0.75% in the case of small farmers and go up 1.06% in the case of large farms. But that variation among the groups is not noticed in the case of paddy harvesting. The losses remain more or less the same irrespective of the farm size. The reason lies in the fact, that in all cases paddy harvesting is done by hired labour. Farm owners irrespective of size do not do harvesting and threshing. Hence the losses remain almost same, i.e., 0.58% of production.

Gram losses during threshing are noticed about 4 and half % of total production with little variation among size classes starting from 4.55% in small size and going down to 4.34% in large size farms, whereas in the case of paddy threshing losses are found to be 1% of production, a little more than1% are noticed in small size holdings. Wastages in straw in the case of gram are negligible and in the case of paddy about 1% of production. Transportation losses are negligible in the case of gram but about 1% in the case of paddy. It is because gram is transported mostly in gunny bags whereas paddy in open trolleys. There is no significant variation across size classes.

Storage losses in both the crops are negligible. Home consumption in the case of both the crops is about $1/6^{th}$ of 1% of production. It goes on declining with the increase in the size of holdings from about $1/3^{rd}$ of production in both the crops in small size groups to about $1/7^{th}$ in the large farms. Obviously it is due to scale of production, because size of family may not be significantly different whereas size of holdings and total production are.

In sum, about 5% of gram production is retained for seed purpose for the next year, which varies between 5.1% to 5.29% among three size classes. About 1% of gram is lost in harvesting process, varying between 0.75% to 1.06%, and about 4.5% gram is lost in threshing, varying between 4.34% to 4.55%. Losses of gram in transportation and storage are negligible and about $1/6^{th}$ of 1% of production is used for home consumption. Use of

gram in the form of animal feed is not substantial. Thus about 91% of gram is available in the form of marketable surplus which in the case of small farmers is less than 90% and a little more than 90% in the case of small and medium farmers. So far as paddy is concerned, less than 0.25% of production is retained as seed for next year's crop, about 0.6% is lost in harvesting, less than 1% of paddy production is lost in transportation and marketing and about 2-3%% is retained for home consumption, more than 4% in the case of small farmers and about 2% in the case of large farmers. About 1% is paid in kind. Thus about 96% of paddy is available in the form of marketable surplus, about 93% in the case of small farmers and about 97% in the case of large farmers. Use of paddy as animal feed was not found.

Caste base and analysis: Productive assets in Indian Society are distinctly divided along the caste lines. For example, academic, educational and top quality government jobs have remained in the domain of almost one caste, fertile and irrigated land in the hands of a few dominant castes, trade, commerce and business in the hands of another caste. These castes are described as socially upper castes. Another group of castes is of manual workers/ artisans/ craftsmen such as potters, fishermen, carpenters, masons, washer men, boatmen, barbers etc. and the third group mainly doing menial work (such described by the so called civil society) such as cobbling, de-skinning dead animals, sweeping, scavenging etc. and finally also deprived sections are tribes mainly dependent upon forest produce. After independence, some efforts have been made to accommodate these deprived sections in the mainstream through positive action, such as reservation in government jobs, financial assistance, land allotment to land less workers etc.. Moreover, for the sake of policy, it is necessary to find out their status with regard to different issues.

Ownership of cultivable land: Census data of the selected villages show that barring scheduled tribes, strength in the village population of the other backward classes and scheduled castes is 70% to 85%. But the number of land owners of these classes is very limited and that is why their number in the sample is not proportional to their total population. For example, for studying gram we could select only 16.67% farmers from the backward castes and 13% from scheduled castes, who were land owners, whereas number of forward caste land owners is much more than total strength in selected villages

and that is why they are more than 70% of the total sample. The situation in Kurukshetra, almost 100% irrigated area and much more fertile is worse than Bhiwani. Number of scheduled caste land owing farmers is less than 1%. Still worse is the situation of area under the crop in both the districts. In the case of Bhiwani, about 17% OBC households own and cultivate less than 15% of the crop area, 13% scheduled caste households cultivate only 10% area under the crop. Naturally the share of forward caste will be more and that is nearly 75%. But in the case of area under paddy in Kurukshetra, the OBCs are a little better placed. With less than 33% strength, they cultivate more than 36% areas and that is at the cost of both scheduled castes and forward castes.

Production and disposal of gram: Average production for the sample households of Bhiwani district works out 3.13 quintals per acre. For the OBC families the average production is 3.73 quintals, for SC farmers 3.42 quintals and for the forward castes, average production is the lowest 2.97 quintals per acre. However, seed used per acre of area by the three caste groups works out as 15.30 kgs., 14.89 kgs., and 15.09 kgs. for OBC, SC and FC respectively. This is contrary to the general understanding that SC families due to poor knowledge, poor resources and poor management practices are not known for good production results, and due to all above reasons the FC should be the leaders in the production. But the fact is that with almost as much seed used as used by OBCs and much more than that used by SC families, production per acre in the FC households is much less than SC households.

Disposal of Gram: On average, 5.16 % of production of gram has been retained by all the households for next year's crop as seed, highest, 5.36% by the forward castes, lowest 4.6% by OBCs and 4.7% by SC households. For home consumption about 3% has been retained by all groups, lowest 2.76% by OBCs and the highest, 4.29%, surprisingly, by SC households. It shows how important pulse crops are for SC families, may be they do not have purchasing power to buy from the market or may be their total production is not as much as of the forward castes, therefore, they retain a larger part of production for home consumption. About 15% is retained for later disposal varying between12% to 17% in different caste groups. A larger portion of production about 75% is sold immediately by the producers varying between 74% in the case of forward castes to more than 79% in the case of OBCs and about 79% in the case of SC households.

A small portion less than one half of 1% by all the groups is fed to the animals, which varies between 0.45% in the case of forward castes to 0.28% in the case of OBCs.

Production and Disposal of Paddy: As in the case of gram, paddy production per acre of land is recorded highest in the case of Sc families, which is more than 24.5 quintals as compared to 22.4 quintals in the case of forward castes. Also, use of paddy in the form of seed is also lowest in the case of Sc households, 3.67 kgs as compared to 4.90 kgs in upper castes. Similarly, retention of paddy for seed purpose is lowest, 3.9 kgs., in Sc households as compared to about 5.9 kgs in the case of OBc farmers. Paddy retained for seed works out 0.22% of production for all the households varying between 0.25% in the case of OBCs to 0.16% in the case of SC households. About 95% of paddy is immediately sold by all the farmers. However, in the case of SC households it is the highest 97.13% of production. Probably they do not have any other commodity to sell to meet their household expenditure. Otherwise paddy retained for home consumption is the highest, 2.7% of production, in these households. In other two category households percentage retained for home consumption is 2.3% and 2.35%. As they have sold a substantial quantity of production so they have to cut from other sources. One such source is payment made in kind. As these households do not own large size land they have to work themselves, so they could save from labour payment in kind., whereas other category households have paid about 1.63% of production in kind. Largest quantity paid in kind is by forward castes.

Animals and ownership pattern (Bhiwani): The common feeling is that milk animals (cows and buffaloes) should be found in OBC and forward caste families. Obviously because they have land and other facilities like irrigation to grow fodder. Scheduled caste families therefore, should have been having lesser number of animals and also not properly fed and cared for. But in district Bhiwani contrary to the above, forward caste households (70% of total respondents) own about 59% cows in milk, OBC house holds (less than 17% of total respondents) own about 23% cows in milk and 13% remaining respondents, SCs only, own about 18% cows. So milk availability to SC households should not be as bad as could have been expected. Of course, we are not sure whether the milk produced is consumed by family members or simply sold for cash income as generally happens. The other reason, which seems most likely is the ownership pattern of

buffaloes, main source of milk in Haryana and other Northern states of India. Almost 75% of buffaloes are owned by forward caste households, more than 15% by Obcs and the remaining about 10% by SC house holds. Hence, milk animals taken together, i.e., cows and buffaloes both are distributed on expected lines For example, 16.2% cows and buffaloes are owned by OBCs who constitute 16.7% of sample, 10.9% by SCs who are 13% of sample, and reaming 72.9% by upper caste families who are 70% of sample.

Pattern of animal feed: For the last few decades, gram being costly is not regularly fed to animals as was during 50s and 60s, before the advent of green revolution. Boiled gram and rapeseed mustard oil meal were the main source of enrichment of animal feed which were added to dry fodder for nutrition. In most of the households in Northern Rajasthan, Punjab, Haryana and UP, gram can hardly be found being fed to animals now. But still in Bhiwani district where gram is largely grown is a source of animal feed, though cows receive less gram per animal than buffaloes and bullocks and he buffaloes are ignored. Also, pattern of gram being fed to cows differ in different social groups. For example, we do not find any OBC household giving gram to cows, upper caste households gave 2.6kg gram per cow and only scheduled caste families gave a little more quantity 4.5 kg gram per cow during the year. Thus total quantity per animal during the year would be nothing. Similarly, per animal quantity of gram given to buffaloes in milk works out only 4.8 kgs. With share of Sc households being the least, 2.9kg per buffalo. Obc households gave about 4.6 kgs and upper caste families a little more than 5 kgs. Dry cows and buffaloes in OBC and SC households did not get any gram. Only in upper caste families dry animals got about 1.4 kg gram per animal. And only in Sc families, caves were given a little quantity of gram, 0.8 kg of gram per calf. In sum another myth that FC families care more for cows and not the SC families does not find support. However, animals are not fed any paddy concentrate.

Wastages (case of gram in Bhiwani): Almost 1% of production is lost during harvesting, a little less than 1% by upper castes and a little more than that by OBCs, but almost 1%, equal to overall wastage by the SC households. About 3.5% of production is wasted during threshing, more than 4% by OBC house holds, nearly 3% by upper castes and about 4% by SC families. About 1% in over all and by all the social groups is shattered in the fields. However, in the case of left in straw the proportion for upper caste

families is significantly higher, more than 0.1% whereas in the case of other two groups, it is around 0.02%. About half a percent or 0.06% is wasted in transportation. It is slightly more in the case of upper caste families and almost negligible in the case of OBc house holds.

Wastages (case of paddy Kurukshetra): So far as loss of paddy during harvesting is concerned, it is about 0.58% of total production. Interestingly in the case of SC house holds it is the lowest, may be due to they themselves doing the activity. Paddy losses in threshing are further down a little less than half a percent of total production. In the OBC and SC households, these losses are significantly less. Wastages due to shattering in the fields are also less than that for gram, it is about 0.6% as compared to about 1% in the case of gram.. Wastage due to left in straw is also lower in Sc households. In fact, in the case of gram these wastages are almost nil as compared to about 1% in the case of paddy. Similarly losses in transportation of paddy are more as compared to gram. Wastage in storage of paddy is as much as that of gram. But there are no wastages in SC house holds, may be due to less production they did not store much and for more time.

Annexure Table – 1

Seed, Feed and Wastage

	Total Cereals	Rice	Density	Wheat	Density		Total Pulses	Area Gram	Density Gram	Area Moong	Density Moong	Area Massar	Density Massar	Other Pulses	
Ambala	155.8	71.9	46.1	79.0	50.7	96.8	2.6	-	-	-	-	1.8	69.2	0.4	15.3
Panchkula	30.3	6.2	20.4	61.5	54.4	74.8	2.5	1.1	44.0	-	-	0.4	16.0	0.5	20.0
Yamunanagar	120.4	55.5	46.1	61.8	51.3	97.4	2.7	0.2	7.4	-	-	2.0	74.0	0.4	14.8
Kurukshetra	221.1	111.8	50.5	108.9	49.2	99.7	0.9	0.1	11.1	-	-	0.7	44.4	0.1	11.1
Kaithal	323.5	164.2	50.7	153.4	47.4	98.1	0.5	0.3	60.0	-	-	0.2	40.0	-	-
Karnal	328.4	158.0	48.1	166.5	50.7	98.8	1.9	0.5	26.3	-	-	0.7	36.8	0.7	36.8
Panipat	160.8	77.4	48.1	82.6	51.3	99.3	0.9	0.1	11.1	-	-	-	-	0.6	66.6
Sonepat	237.3	77.3	32.5	139.5	58.7	91.2	2.2	0.2	9.0	-	-	-	-	2.0	90.9
Rohtak	160.4	23.9	14.9	91.7	57.1	72.0	6.2	2.4	38.7	-	-	-	-	3.8	61.2
Jhajjar	182.7	16.5	9.0	105.1	57.5	63.5	5.1	2.4	39.3	-	-	-	-	2.7	44.2
Faridabad	198.1	28.9	14.5	133.8	67.5	82.0	6.6	-	-	0.3	4.5	-	-	6.1	92.4
Gurgaon	232.5	7.9	3.3	136.5	58.7	61.7	2.3	0.9	39.1	0.1	4.3	0.4	17.3	0.9	39.1
Rewari	115.5	0.7	0.6	54.8	47.4	48.0	1.0	0.9	90.0	-	-	-	-	0.1	10.0
M. Garh	149.1	-	NIL	49.2	32.9	32.9	7.6	7.5	98.0	-	-	-	-	0.1	1.3
Bhiwani	358.9	8.1	2.2	144.0	40.1	42.1	94.4	93.0	98.5	0.8	0.8	-	-	0.6	0.6
Jind	361.4	11.6	3.2	206.5	57.1	60.3	1.0	0.8	80.0	-	-	0.1	10.0	0.1	10.0-
Hissar	304.3	32.3	1.0	207.8	68.2	69.2	7.3	5.1	69.8	2.0	27.3	0.1	1.3	-	-
Fetehabad	250.0	61.3	24.5	173.6	69.4	93.4	2.5	1.7	68.0	0.7	28.0	-	-	0.1	14.0
Sirsa	296.0	39.8	13.4	244.3	82.5	95.9	8.8	7.3	82.9	1.4	15.9	0.1	1.1	-	-

Annexure Table-2-A

Area, Production and Yield of Cereals, Pulses and Foodgrains (Haryana)

	Cereals			Pulses			Foodgrains		
	A	P	Y	A	P	Y	A	P	Y
1994-95	3537.5	10456.0	2956	474.4	516.3	1088	4011.9	10972.3	2735
1995-96	3570.7	9721	2722	449.8	450.7	1002	4020.5	10171.7	2536
1996-97	3607.7	11102	3077	418.1	346.0	828	4025.8	11448.0	2844
1997-98	3754.6	10956.0	2918	432.5	376.0	869	4187.1	11332.0	2706
1998-99	4073.0	11782.0	2892	409.0	323.0	790	4482.0	12105.0	2701
1999-2000	4153.0	12987	3127	134	114	851	4289.6	13065.2	3046
2000-01	4186.5	13195.0	3152	157.0	99.8	636	4343.5	13294.8	3061
2001-02	4064.3	13150.0	3235	188.6	148.3	786	4252.9	13298.3	3127
2002-03	3845.8	12446.0	3236	131.9	82.8	628	3977.7	12328.8	30.99
2003-04	4099.7	13050.0	3183	198.3	143.1	722	4298.0	13193.1	3070
cgr	1.02	1.03	1.01	0.86	0.82	0.95	1.01	1.03	0.84

Annexure Table-2-B

Area, Production and Yield of Cereals, Paddy (Kurukshetra)

	Cereals			Paddy		
	A	P	Y	A	P	Y
1994-95	215.3	716.0	3326	111.7	333.0	2971
1995-96	214.3	646.0	3057	110.04	268.0	2432
1996-97	204.8	744.0	3633	107.9	353.0	3272
1997-98	204.0	700.0	3431	106.5	327.0	3085
1998-99	221.0	722.0	3270	114.0	267.0	2341.0
1999-2000	218.1	840.0	3851	111.6	355.0	3172
2000-01	221.0	863.0	3905	111.8	357.0	3187
2001-02	222.2	858.0	3861	111.4	367.0	3310
2002-03	216.1	843.0	3901	106.9	371.0	3465
2003-04	224.3	799.0	3562	112.0	348.0	3107
cgr	1.01	1.03	1.02	1.00	1.02	1.02

Annexure Table-2-C

Area, Production and Yield of Cereals, Pulses and Foodgrains (Bhiwani)

	Gram			Total Pulses		
	A	**P**	**Y**	**A**	**P**	**Y**
1994-95	142.9	160	1120	146.9	162.0	1103
1995-96	149.4	157.0	1051	153.6	158.8	1034
1996-97	165.4	128.0	774	170.2	129.7	762
1997-98	168.7	149.0	884	177.7	153.0	861
1998-99	174.0	141	811	182.0	143.0	879
1999-2000	47.2	23.0	492	50.0	23.6	472
2000-01	93.0	52.0	554	94.4	52.3	554
2001-02	81.8	69.0	839	856	19.7	814
2002-03	25.9	16.0	606	40.2	25.0	622
2003-04	57.5	44.0	758	70.6	45.5	644
cgr	0.85	0.81	0.95	0.93	0.79	0.94

Annexure Table-3

	% of Gross Area Sown Under Grains to Total Cropped Area								
	1970-71	1975-76	1980-81	1985-86	1990-91	1995-96	2000-01	2002-03	2003-04
Haryana	78.03	77.026	77.65	72.19	68.92	67.30	71.03	65.91	67.28
Kurukshetra	-	80.97	83.51	84.02	82.94	79.66	84.73	82.98	83.41
Bhiwani	-	85.51	73.56	78.04	75.40	67.55	66.08	50.38	53.12
Gross Value from Agriculture Per Hectare (at Current Prices Rs.)									
Haryana	1491	2389	4696	7327	14574	25718	41323	-	46857
Kurukshetra	-	3966	7620	11054	20917	38482	56248	-	58421
Bhiwani	-	1394	2783	4421	9781	17244	24246	-	33850
% of Foodgrains in Gross Value of Agriculture Output (at Current Prices)									
Haryana	63.79	59.17	44.33	37.66	53.60	55.20	61.36	-	58.44
Kurukshetra	-	69.19	30.37	22.8	68.84	72.57	76.71	-	74.17
Bhiwani	-	67.91	47.88	43.99	52.47	46.93	48.34	-	36.20

Annexure Table-4

Population (2001)

	Area in Sq. km.	Rural Population	Urban	Total
Haryana	44212	1,50,29,260	61,15,304	2,11,44,564
Kurukshetra District	1530	6,09,943	2,15,511	8,25,454
Thanesar (Block)	891.40	3,42,150	1,44,658	4,86,814
Pehowa (Block)	517.16	1,54,109	33,564	1,87,673
Shahbad (Block)	277.13	1,13,678	37,289	1,50,967
Bhiwani (District)	4778	11,54,629	2,70,393	14,25,022
Bhiwani (Block)	998.56	3,05,342	1,69,531	4,74,873
Loharu (Block)	681.75	1,26,511	11,421	1,37,932
Tosham (Block)	744.68	1,51,212	11,272	1,62,484
Siwani (Block)	496.71	6,91,076	15,850	84,926

Appendix - I

Schedule - I

Agricultural Economics Research Centre
University of Delhi, Delhi-110007

Study for estimation of seed, feed and wastage for major foodgrains
Schedule -I: Stratum-wise list of selected villages for each crop covered under study
Crop: ----------State: ----------District: ----------

Stratum No.	Tehsil/Block	Name of the Selected Village
I		
II		
III		
IV		

Schedule – II

Agricultural Economics Research Centre
University of Delhi, Delhi-110007
Study for estimation of seed, feed and wastage ratios for major foodgrains.
Schedule -II: Complete enumeration respondents of the selected village
State: ---------- District: ----------
Stratum: ---------- Tehsil/Block: ----------
Village: ---------- Date of visit: ----------
Crops to be covered:
Kharif: Foodgrain ---------- Pulse ----------
Rabi: Foodgrain---------- Pulses ----------

Sl. No.	Name of the Cultivator	Father's /Husband's name	Area Owned (acres)	Cultivated Area (acres)	Holding size code

Holding Size: Small (0-2ha) [S]; Medium (2-4 ha) [M] and Large (more than 4 ha) [L]

Schedule – III

Agricultural Economics Research Centre
University of Delhi, Delhi-110007

Study for estimation of seed, feed and wastage ratios for major foodgrains

Schedule -III: Detailed enquiry from the selected farmer

(A) Identification particulars: Date of visit:----------

State: ---------- District: ----------

Stratum:---------- Tehsil/Block: ----------

Village: ---------- Season: ----------

Name of Farmer: ---------- Father's/Husband's name: ----------

Agricultural Year----------

(A) Number of members in the household:

Children = below 18 years ……Adults = (above 19 years)……..

(B) Caste: BC…….SC/ST……..Others…….

CROP-WISE DISTRIBUTION OF AGRICULTURAL LAND

Name of crop	Area (acres)		
	Irrigated	Un-irrigated	Total

(C) PRODUCTION AND DISPOSAL OF CROPS:

S. No.	Name of the crop	Total production (kg)	Quantity (kg) for							
			Seed used	Kept for seed	Sold	Home Consu-mption	Later disposal	Labour	Animal feed	Poultry feed

(D)Consumption of feed fed to Cow and Buffaloes:

Animals		No.	How many months to be given in a Year	Feed code	Quantity (in qtls.)	Remarks
Cows	Dry					
	In Milk					
	Calves					
Buffaloes	Dry					
	In Milk					
	Calves					
Bullocks						
He-Buffaloes						
Poultry						
Any others						

Feed Code = 1-Green fodder, 2-Dry Stover/Straw, 3-Hay, 4- Concentrate,
5-Tree lopping, 6-Any other (Specify)

(E) Wastage (kg) at different harvest and post harvest stages:

Crop	At harvest*		At threshing floor	Shattered on ground	Left in straw	In transport **		
	Sickle	Combine				F-T	T-S	S-M
Total								

* After collection of ear-heads called 'Sila' collected by labour

** F-T: Field to threshing floor, T-S: Threshing floor to storage, S-M: Storage to market

) **Wastage (kg) in storage at cultivator's level:**

Crop	Quantity stored	Wastage in storage due to		Wastage during home consumption		Wastage during animal/poultry feeding			
						Cattle		Poultry	
		Rats	Dampness / other causes	Cleanliness	Cooking and eating	Qty. given	Qty. unconsumed (waste)	Qty. given	Qty. unconsumed (waste)

Appendix -II

List of Selected Villages and Total Number of Farmers for Selected Crop

Stratum No.	Crop : GRAM District : BHIWANI		
	Name of Taluka / Block	Name of the Selected Village	Total No. of Farmers in the village
1	Shivani	1. Dhulkot	162
		2. Khera	105
		3. Gadwa	108
		4. Mohila	95
		5. Gandawas	143
2	Tosham	6. Alkapura	181
		7. Nigana	239
		8. Dharan	119
		9. Dhanibiran	106
		10. Baganwala	271
3	Behal / Loharu	11. Sorda Kadim	113
		12. Sudhiwas	144
		13. Obra	237
		14. Kasni Khurd	72
		15. Sarda Jadid	136
4	Kairu	16. Simliwas	216
		17. Khariawas	182
		18. Mansarwas	152
		19. Khaperwas	165
		20. Ladianwali	60

Stratum No.	Crop : PADDY District : KURKSHERTRA		
	Name of Taluka / Block	Name of the Selected Village	Total No. of Farmers in the village
1	Shahbad	1. Surajpur	76
		2. Dawoo Majra	152
		3. Landi	249
		4. Madanpur	83
		5. Tigri	81
2	Pehowa	6. Harigarh Barakh	129
		7. Dunia Majra	89
		8. Bherian	42
		9. Megha Majra	98
		10. Jurasi Kalan	118
3	Thaneswar	11. Raogarh	34
		12. Manjda Khera	45
		13. Udarsi	109
		14. Jhimar Hedi	120
		15. Singpura	64
4	Ladwa / Babain	16. Ban	131
		17. Banot	134
		18. Budha	137
		19. Jhandola	57
		20. Bhukhri	73

District Code : Bhiwani - (1), Kurkshetra - (2)