CHAPTER-1

INTRODUCTION
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1. Farmer and storage

INDIAN AGRICULTURE IS NO MORE subsistence vintage. Food is the basic requirement to sustain life. It fulfills the primary needs of man and play a key role in the destiny of mankind. If the stomach goes empty none can think of art, culture or philosophy.

World Attention was first focused on the potential contribution to available food supplies by the prevention of reduction of food losses during the World Food Conference held in Rome in 1974. It was again emphasized by the Seventh special session of United Nations General Assembly in 1975. In a resolution adopted by the Assembly, all countries and Institutional agencies agreed to take urgent actions designed to reduce food losses by 50 percent upto 1985. The range of post-harvest losses in cereals is quite wide but even that at modest average of 10 percent. It represents a loss of 75 million tonnes per year in developing countries as a whole. Thus, the target of 50 percent saving (37.5 million tonnes) would contribute significantly towards meeting the current food deficit.¹

The food problem in the world is expected to become more serious if the world population keeps growing at the present rate. For a developing country like India with a burgeoning population, the problem may still be worse. Although, the foodgrain production in the recent years has been satisfactory yet providing enough to meet all human demands in the coming years is a daunting task before us. Out of various strategies to enhance food production and its proper storage, the post-harvest handling of the grains is of paramount importance. Unless the problems of storage and that of marketed are satisfactorily solved, the problems of feeding hungry millions may continue even with substantial increase in production. Therefore, safe storage of foodgrains assumes greater significance in this context. There are a number of estimates of post-harvest losses. Most conservative estimates for the post – harvest losses in foodgrains in Indian put the figure at about 10 percent, a quantity is good enough is to feed at least 60 million people. This is in

¹Hnysmans, A.C. Agricultural Services, Division Food and Agricultural Organization of United Nations. The paper entitled, food loss presentation and small farm level storage presented in the seminar at department of Food (1979-80).
itself an alarming thing. It can also be noted that in India out of total producting about 70 percent is retained and stored by the farmer for consumption, seed, feed to animals, payment of wages etc. and about 30 percent marketable surplus is handled by the traders and government agencies. Moreover, higher quantity of grains stored by the farmers/traders is not based on sound and improved technology and the extent of losses is on the higher side. Storage occur due to quantitative and qualitative damages caused by insects, mites, fungi, rodents, birds, heat and moisture.2

The food problem in the coming years may become more serious world over if the population number is not kept with ‘carrying capacity’ of our food production system. However, a good harvest coupled with efficient post-harvest food conservation with certainly help to ensure food security to any country. The scientific storage of foodgrains to reduce the post-harvest losses is an important component of the system of food utilization. The grains in storage are attacked by a variety of pests like insects, rodents, birds etc. If the storage losses inflicted by these pests are minimized, we can enjoy greater benefits form the green revolution3.

It is believed that India had enough foodgrains till 1939. Though, there are rooms of doubt about the statement. The problem of food storage in the country began to attract public attention only after the ‘Bengal Famine’ of 19434.

Today, India is the world’s fourth largest producer of foodgrains and is next to U.S.A., U.S.S.R. and main land China and on the second place on the basis of area and production of wheat and is next to China.5 Though, the increasing trend of population is the root cause of food scarcity but the losses of foodgrains are also far behind it. Introduction of high yielding varieties of wheat has major significant in the green revolution in India. However, there is ample scope for increasing production to apply modern technology. Simultaneously, it stresses proper storage to fetch more money by saving storage losses.

Production and marketing environments differ greatly between and within countries and the existing marketing structure particularly in developing countries are in many cases ill adapted the prevailing production, consumption and capital supply pattern. They lack capital, standards and grades means of transport and storage facilities to take advantage of possible opportunities. Further, lack of storage facilities may be a source of heavy losses deterioration of quality, spoilage, waste and sharply fluctuating price. Supplies from seasonal production can be marked over a longer period reducing the impact of short term gluts and facilitative more even flow of produce to the market and ultimately to the final consumer.

The problems of losses of foodgrains varies from country to country. Lindgren (1955) reported 2.78 percent loss in weight by Trogoderma Granarium in Argentina and complete loss observe if the grain was left undisturbed. Brans (1956) recorded 15 percent loss to wheat, maize and beans in Mazico.

In India, different scientists have estimated various percentage of loss during storage. Rehman (1944) reported 73 percent loss in weight in Punjab by Trogoderma Granrium Everts. While Pruth and Singh (1950) observed annual loss of 2.5 million tonnes in wheat in India. Khare and Agrawal (1962) estimated 22 to 25 percent loss in weight of grain due to insects in Kanpur market. Srivatsava, et al (1973) indicated 9.7 percent loss in western U.P.

Storage facilities for farmer are essential to save him from exploitation at the time of harvesting. If proper storage facilities are made available he can be in a position to bargain rather than depend upon the mono-dictates of the traders. Agricultural products are seasonal in production more so in case of foodgrains but they are consumed even throughout the year. Besides, there is great deal of fluctuation in the production of foodgrains from year to year. This necessitates

7 Brans, S.H., and Grove, A.G. (1956), stored grain insect problems in Mexico. A report of control measures, proceedings of 10th international congress Ent. 4-3-105.
8 Rehman, R.A. (1944) India Engg. 5-2-72-275.
10 Khare, B.P. and Agrawal, N.S. (1962), seasonal Variation and peak period in the occurrence of S. oryzae Linn. And R.Dominica Indai, J.Ent. 24-137-139.
adoption of scientific methods of storage for agricultural products particularly of foodgrains. Storage continues to be a major problem in the marketing of foodgrains. Hence, inadequate storage and finance facilities become a major handicap to the producer which minimize his bargaining power while he is generally not in position to wait for better marketing situation.

2. Food Security: Supply and Demand Perspective

The foodgrain production increased from a low level of about 72 million tonnes in 1965-66 to a significant one of about 190 million tonnes in 1995-96 with a growth of slightly more than 2.5 percent per annum. The buffer stocks also increased from 2.2 million tonnes in 1965-66 to 31 million tonnes in 1995 but declined recently. If total factor productivity (TFP) growth is maintained at historical levels and proper storage facilities are also provided, our country may turn to be not importer. Achieving food security has so far been the over-riding goal of agricultural policy in India. The introduction and rapid spread of high yielding varieties in the late sixties and early seventies resulted in steady output growth for foodgrains. Public investment in infrastructure, research and extension along with crop production strategy has significantly helped to expand foodgrains production and storage.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Domestic supply (Million tonnes)</th>
<th>Supply growth (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>79.0 89.1 98.7 109.3 134.0 2.23</td>
<td>2.06</td>
</tr>
<tr>
<td>Wheat</td>
<td>60.0 72.5 83.4 98.0 127.3 3.86</td>
<td>2.85</td>
</tr>
<tr>
<td>Coarse grains</td>
<td>32.0 38.7 40.8 43.1 48.0 3.30</td>
<td>4.08</td>
</tr>
<tr>
<td>Total cereals</td>
<td>172.7 200.3 22.9 248.4 249.3 3.01</td>
<td>2.19</td>
</tr>
<tr>
<td>Pulses</td>
<td>15.0 17.3 19.9 22.9 30.3 2.83</td>
<td>2.82</td>
</tr>
<tr>
<td>Foodgrains</td>
<td>187.7 217.6 242.7 271.3 339.6 3.0</td>
<td>2.25</td>
</tr>
</tbody>
</table>

Scenario 1: Sustained growth in total factor productivity
Scenario 2: Declining growth in total factor productivity

The supply projections of rice, wheat, coarse grains and pluses given in Table 1.1 revealed that in the year 2000, production of wheat will be about 70-72 million tonnes and in the year 2020 it will reach to 108-127 tonnes. In the year 2000, foodgrains production is predicted about 213-218 million which will reach to 300-340 million tonnes in the year 2020. It seems that there is still gap between supply and demand in India (Projected) in different years.

Table 1.2. Projecting supply and demand for agricultural commodities in India in different years

(Quantity in million tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Supply</th>
<th>Demand</th>
<th>Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>187.7</td>
<td>18.0</td>
<td>2.7</td>
</tr>
<tr>
<td>2000</td>
<td>217.6</td>
<td>207.5</td>
<td>10.1</td>
</tr>
<tr>
<td>2005</td>
<td>242.8</td>
<td>237.7</td>
<td>10.1</td>
</tr>
<tr>
<td>2010</td>
<td>271.3</td>
<td>261.0</td>
<td>10.3</td>
</tr>
<tr>
<td>2020</td>
<td>339.6</td>
<td>324.1</td>
<td>15.5</td>
</tr>
</tbody>
</table>

Looking at the supply and demand balances for foodgrains (Table 1.2), it appears that the gap is increasing and in the year 2020 it will be 15-5 million tonnes. Therefore, storage may act as a bridge to fulfill that gap.

3. What does storage do?

Storage makes it possible to take advantage of the anticipated increase in prices. It is generally observed that in lean seasons of supply prices rise and it increases the value of stored foodgrains. An important function of storage is regulating the flow of supply of foodgrains which results in price stabilization and is advantageous to the producers and consumers alike. Processing units like flour mills/rice mills demand wheat and paddy throughout the year. For an efficient running of these mills and for economy as a whole adequate supply of raw materials is essential. This requirement can only be met by good storage system. Storage adds time utility to the foodgrains by making them available in period of scarcity. Stored goods are considered as a good security and it is easier to obtain bank advances or loans on the basis of stored goods.

The introduction of science and technology, improved seeds, scientific fertilizers, pesticides and improved irrigation facilities to our agriculture. Indian
agriculture has transformed itself from subsistence farming to commercial throwing up surpluses. Management of these surpluses in a way that will give incentive price to the farmers and their money's worth to the consumers is the task of scientific marketing. Demand for agricultural commodities remain rather steady throughout the year while their supply is seasonal depending upon harvest time. Farmers in villages use various kinds of storage structures such as mud bin (kuthila), bag, etc. These are neither adequate nor appropriate to meet the storage requirements of large surpluses for a considerable period of time.

Storage has always been an integral part of marketing as it is deeply related to agricultural production which exercises an important economic influence by creating place utility. The problems of storage shall, therefore, have to be tackled with the same zeal as production has been attempted to provide matching efforts. Increased production should not result in increased wastage. The present Indian population is estimated at 850 million and expected to touch one billion by turn of century. As against this, the level of foodgrain production is around 178 million tonnes (1989-90) and is required additional increase of at least 70 million tonnes to meet foodgrain requirement of the country by 2000 A.D. Therefore, the problems of storage, movement and utilization of the foodgrains will be of equal magnitude. The producer's stock which constitute nearly 70 percent of the total foodgrain production have no yet received adequate attention for proper storage. What is worse in a developing nation like India not only produces less. It losses much of its valuable production due to poor and unscientific storage conditions.

Storage also create immense job opportunities in different walks of life starting from labourers to transporters, traders, financiers and a variety of Government Officials required closely to watch and monitor the various functions of a gigantic marketing process. It is, thus, an instrument of development of a vibrant economy in which a sizeable part of population, trading, financing and various other functions in which storage has pivotal role to play in the growth and developing of a country. "The basic function of storage is to bridge the gap between economic methods of production and the need of consumer."13 The task is

provide what is required, when it is required and do all these economically. Thus, storage is a growth oriented industry which is useful at unitary level such as producer, the village level hoarder, the small urban trader as well as at big level such as the stockist and wholesalers and Government agencies employed in marketing of foodgrains and responsible for maintaining the price line by stream lining the distribution network throughout the State/Nation.

4. Food as the basic necessity

The wheat is the staple food in the Northern Zone of country and requires constant care and upkeep to protect from insects, pests, moisture etc. It is a natural consequence that increase in demand for food of increasing population. This demand can be fulfilled by increasing food production as well as by minimizing storage losses. As a measure to solve food problem, efficient storage is equally important.

Much of the output of agriculture is harvested during relatively short periods. Grain, cotton, tobacco, fruits and vegetables are highly seasonal in nature and the production of live stock, egg and dairy products though continuous throughout the year has wide variations between high and low periods of production. The desire for these products by consumer however is quite constant in whole year. The extent to which there is any time lag between the production of raw materials on the farm and the consumption of finished products, storage is necessary part of the marketing. The extent to which goods are stored largely depends upon the feasibility and cost of storage. For some products, storage for an extended length of time is not technologically feasible at any cost. For others, storage for very long period of time would be technologically feasible but the return would not cover such costs. The holding action may also take place at various levels of marketing system, farmers, processors, wholesalers, retailers and even consumers.14

There are two general type of storage operations. One is to equalize seasonal production to the pattern of demand and the other is that storage at all times within the trade channels is necessary to keep the marketing system operating without

facing scarcity. The first type of storage operation is undertaken by elevators, warehouses and other places of mass accumulation. The later is mainly represented by the operating inventories of the various manufactures, wholesalers, retailers and to a small extent by consumers. To that extent the products are not perishable. They can be placed in storage after harvest and than released little by little as the time passes. In this way storage makes the commodities available for consumption throughout the year.

With the enhancement of agricultural production within the country the more urgent is the extension of adequate and scientific storage facilities in rural areas to reduce losses of foodgrains in storage. Thus, it is imperative to check losses and evolve a scientific method for efficient storage. According to report of National Commission on Agriculture in 1976, nearly 6 to 8 percent foodgrains are lost annually.

Foremost considerations before a farmer for storing wheat is for home consumption. By and large a farmer disposes off his surplus production to the market within nine months of harvest. During this period mostly the prices quite high. Therefore, requirement for home consumption throughout the year compels him to store foodgrains to meet the need of the year. Another consideration for storage is his seed requirement for next crop season. Though, volume of seed required is not so high still storage for seed purpose is inevitable particularly for small farmers. Large farmer and those who can mange to fulfill their necessary pecuniary requirements from some other sources or from past savings are in better position and not in hurry to dispose off their grain at harvesting time. They obviously would wait till they get higher prices for their produce. For this purpose they need to store their output. Some other considerations like possible feast of feed to animals also influence storage requirement.

5. Foodgrains Procurement and stocks

Foodgrains procurement by the Government serves the dual purpose of providing support price to the farmers and of buildingup public stocks of foodgrains procurement operations are carried out by the FCI and the state agencies

designed by State Government procurement prices are based on support prices recommended by CAPC (Commission for Agricultural Costs and Prices).

Foodgrains are maintained by the Central Government for three main purposes.

(i) Meeting the prescribed minimum buffer stock norms for food security.
(ii) For monthly release of foodgrains for supply through PDS (Public distribution system).
(iii) For marketing invention to augment supply so as to help moderate the open market prices.

Table 1.3 Buffer stock norms at natural level.

<table>
<thead>
<tr>
<th>Foodgrain</th>
<th>January</th>
<th>April</th>
<th>July</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>8.4</td>
<td>4.0</td>
<td>14.3</td>
<td>11.6</td>
</tr>
<tr>
<td>Rice</td>
<td>8.4</td>
<td>11.8</td>
<td>10.0</td>
<td>6.5</td>
</tr>
<tr>
<td>Total</td>
<td>16.8</td>
<td>15.8</td>
<td>24.3</td>
<td>18.1</td>
</tr>
</tbody>
</table>

As compound to buffer stock norms of 16.8 million tonnes for January 1, the stock position as an January 1, 2002 at 58 million tonnes was way also to norms. Hence, there is urgent need to expand the facilities of storage.

6. Storage problem

In addition to storage problem common to all harvested grains, wheat may rendered unfit for malting of bread-making because of spoilage during storage particularly due to mould. Indian Government reports on storage losses of wheat (Krishanmurty 1972) give figure 2.5 percent loss approximately due to rodents and a slightly higher percentage due to insects. Small farm storage losses very and are typically around 10 percent. 16

Problem of producer level of storage is acute in our country. Non-availability of scientific storage at farm level not only forces to producer to consume sub-standard food but also compel him for not getting remunerative price for their production. Therefore, it is worth important to study the various methods of storage in the prevailing area. Since the production of agricultural commodities

is seasonal, they must usually be stored until consumed or processed. The storage of grain calls for protection against damage by insects and pests, rodents, microorganisms and heating brought in by germination or due to action of bacteria. Moisture is the most important factor in process of storage of grains. The occurrence of insects is caused at low moisture content. The proper storage of grain requires complete protection from rains, snow, ground moisture, insects and bacteria.

Safe storage is one of the serious problem faced by Indian farmers. The grain has to be stored safely for consumption as well as for seed purpose. Generally storage period varies from three months to about nine months. As the period of storage increase the quantity and quality deteriorate. To have a buffer stock out of the produce of bumper crop harvest year is a must to achieve self-sufficiency which in turn require improved methods of storage as to keep their nutrients intact. Lack of storage facilities along with a number of other reasons are mainly responsible for immediate sale of farm produce after crop harvest even in a glutted market at low in Indian condition. Thus, in order to enable farmers to take advantage of the off season prices extension arrangement of efficient storage facilities are badly needed. There is every possibility to have a real economy avoiding undesirable losses during storage through adoption of improved and more efficient technique of storage. Therefore, the adoption of modern methods of storage are must.

In India, the income of an average farmer is mainly based on his agricultural production. He has to meet all of his needs out of his farm income. From this point of view, efficient storage facilities are the most needed at farm level so as to enable farmer to store his produce for off season sale on remunerative prices. But unfortunately farmers for following reasons sell their produce in the villages just after harvest.

- In India, about 70 percent of the population lives in villages which depends mainly on agriculture. Large number of the village farmers come in

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17Cotton, R.T. and Ashby W. Insects pests of stored grains and seed U.S. Department of Agriculture, Year Book 1951, pp. 629-639.
semi-medium and small categories of holdings. On account of poor means of communications and lack of good road and transport facilities farmer is compelled to sell his produce in the local market.

- They can not afford to have facilities of modern or scientific methods of storage and depend for storing their produce in mud-made kuthila old gunny bags or in heaps in the corner of their houses. The losses are much in such a way through ground moisture, rats, pests etc.

- As it has already been discussed the economy of Indian farmers depends on agriculture. He has usually no side incomes from any other sources. The average farmer is always in need of money to meetout his family requirements like clothing, education, medical care, old debts, social ceremonies etc. It compels him to sell his produce in the local market just after harvest.

- On account of small size of marketable surplus in the absence of transport facilities at cheaper rates, producer does not under take trouble and risk of carrying his produce to mandi.

- A majority of the farmers have no time to look to market side as they are too busy with work on their own farm.

Inspite of the above mentioned factors causing sale of wheat at harvest time and in the village itself, the farmers of all strata store quantity of wheat throughout the year for their own consumption, seed and sale. It has been estimated that farmers retain about 70 percent of their own production and sell the remaining 30 percent at harvest time and rest of the surpluses dispose off throughout the year. Large farmers store a little larger quantities for sale whole year. Hence, proper storage facilities are needed by all categories of farmers. Also in the event of bank loans, cooperative loans being available and growing surpluses as a result of improved technology, the need for proper storage facilities will grow day by day particularly at village level.

7. The Present Study

Study broadly aims at finding out the extent of losses and costs in storage of wheat grain. The specific objectives of study are:
(i) To examine the economics of storage methods, costs and losses.

(ii) To study the association between storage cost and price variations.

(iii) To estimate the response of influencing factors of farm level marketable/marketed surpluses.

(iv) Policy formulations and corrective measures taken for minimising storage costs and their losses.

8. Data Source and Sampling Design

The proposed study covers the extent of storage losses, costs, seasonal price variation, economics etc. from the selected cultivators. Multistage stratified random sampling method was adopted for selection for sample farmers for the study.

(i) Selection of district

At the first stage the North Bihar was on the criterion of having potentiality to enhance wheat production because of the high fertile land. North Bihar comprise 21 district. Out of 21 district, one district Siwan was selected on the basis of the highest percent area under wheat crop.

(ii) Selection of block

A list of development block lying in the one selected district was taken keeping the same criteria. Then after two blocks from selected district i.e. Andar and Husainganj were chosen purposively for the sample on the basis of the highest percent area under wheat crop.

(iii) Selection of Village

A list of villages together with the cropped area was obtained from the selected blocks. Than percentage of wheat to total cropped area was worked out for each village. The village having less than forty percent area of its total cropped area under wheat crop was omitted. Thus, the village having more than forty percent area under wheat crop was form universe from the present study. These villages were arranged in alphabetical order and two of them were selected randomly from each selected block. 18

18The villages, thus selected were Chhajawa Ballia, Belhi, from Andar block & Navalpur, Hasanpurwa from Hasainganj block in Siwan district.
(iv) Selection of Farmer

After selection of villages, selection of farmer was done from each of the two selected villages. A list of farmers of each village along with the area under wheat crop and their total cropped area were obtained from the respective karamchari of each village. Proportion of wheat to total cropped area on individual farm was worked out, farmers having less than sixty percent area under wheat were omitted and remaining were arranged in descending order with respect to area under wheat. Further, lists were divided into three strata viz. medium, semi-medium and small. Finally thirty farmers from each village were selected randomly in proportion to the number of cultivators in identified strata. Thus, out of total number of 399 cultivators in three farm size groups, 120 cultivators were selected for the present study. Distribution of farmers along with the selected ones in each of the three farm size groups was as follows:

Table 1.4 total as well as selected farmers in different farm size groups.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Farm size group</th>
<th>No. of farmers</th>
<th>No. of selected farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Medium</td>
<td>61</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>(Above 4 to 10 ha.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Semi-medium</td>
<td>146</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>(2 to 4 ha.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Small</td>
<td>192</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>(1 to 2 ha.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>399</td>
<td>120</td>
</tr>
</tbody>
</table>

(v) Collection of data

The study was based on primary data. The primary data were collected through pre-prepared schedules and questionnaires by personal interview method. The entire data were collected within 4 to 5 meetings with the farmers. Thus, the survey method was used for collection of data. The data were related to the agricultural year 1998-99.

9. Analytical Tools

The tools of analysis are deployed in accordance with the objectives to achieve their appropriate inferences of the study. They are presented in following manner.
(I) To study the economics of storage methods, costs, losses besides their tabular analysis following models are applied.

(i) Correlation coefficient ($r$)

$$r = \frac{\sum (x-\bar{x}) \cdot (y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \cdot \sum (y-\bar{y})^2}}$$

Where,

$$\sum (x-\bar{x})^2 = \sum x^2 - \left(\frac{\sum x}{n}\right)^2$$

$$\sum (y-\bar{y})^2 = \sum y^2 - \left(\frac{\sum y}{n}\right)^2$$

$$\sum (x-\bar{x}) \cdot \sum (y-\bar{y}) = \sum xy^2 - \frac{\sum x \cdot \sum y}{n}$$

(ii) Economics of storage

$$NR = CR - C$$

Where,

$NR$ = Net return to storage.

$CR = P_1 - P_0$

$P_0$ = Price at the time of storage.

$P_1$ = Price at the time of destorage.

$C$ = Cost involved in storage.

The percent margin from storage is worked out with the help of this equation.

$$MS = \frac{P_1 - P_0 - C}{P_0 + C} \times 100$$

(iii) Losses during storage

$$y = a + \sum_{i=1}^{n} X_i B_i \cdot e$$

Where

$y$ = Quantum lost (kg./farm).

$X_1$ = Moisture percentage in stored grain.

$X_2$ = Percent infection due to insect.

$B_i$ = Coefficients
a = Intercept
\( e = \text{Error term.} \)

IV. The extent of farm marketable and marketed surpluses are estimated with the help of following formula.

\[
y = \alpha + \sum_{i=1}^{n} x_i e
\]

\[
= \alpha + e \sum_{i=1}^{n} x_i
\]

Where,

\( y = \text{Marketable/ marketed surplus (QtL.)} \)

\( X_i = \text{Production of wheat (QtL.)} \)

\( X_2 = \text{Size of family (Nos.)} \)

\( \alpha = \text{Intercept} \)

\( e = \text{Error term.} \)