Patterns and Trends in Food Consumption in Poor Urban and Rural Households in Bangladesh

Major Food Sector Studies

Shantana Halder[1]
Ian Urey[2]

Research and Evaluation Division, BRAC
BRAC Centre, Dhaka
Imperial College London, Wye Campus

September 5th 2003

[1] Senior Research Fellow, RED/ BRAC Dhaka, Email: shantana.rh@brac.net
[2] Research Associate at Imperial College at Wye, Ashford, Kent TN25 5AH.
Email i.urey@ic.ac.uk

Abstract

This paper examines six major food sectors in Bangladesh namely rice, wheat, fishery, poultry, dairy, and fruits and vegetables, concentrating on production and consumption changes with evidence from the BRAC/Imperial household survey, together with insights from focus group discussions. The nature of the marketing and processing chains are also discussed together with key issues affecting the sectors.

The food sector study results indicate a growing divide between the consumption patterns of the deficit group and the surplus group. The contrast is most marked between the rich and poor living in urban areas and upazila centres. Those living in these areas are more market dependent and vulnerable to price fluctuations.

The diet of the poor seems to be contracting in diversity, with rice increasingly dominating consumption, though in urban areas there is some substitution with wheat based products for convenience and possibly as a cheaper food source, as no fuel expense is entailed. All the high protein items, especially animal products are beyond the means of the poor for consumption on a regular basis, as demand from the growing urban population draws produce into the market where the price is too high for the poor. For many, vegetables appear to be the only remaining high protein food item. The urban poor appear to be the most vulnerable without any access to home production.

For the surplus groups living close to centres and with good market access, dietary diversity and the quality of produce consumed appear to be improving. Consumption of high protein items is increasing as markets are facilitating greater availability in urban areas. Also consumption of processed, packaged and branded items is becoming a regular feature of this group, and there is evidence of a dispersion of this trend into more remote and less rich/surplus areas.

Executive Summary

This paper examines some of the major food sectors in Bangladesh, concentrating on production and consumption changes with evidence from the BRAC/Imperial household survey, together with insights from focus group discussions. The nature of

the marketing and processing chains are also discussed together with key issues affecting the sectors.

Rice production has increased, reaching self-sufficiency levels in 1999, the net availability of rice has increased and it is greater than the nutritional requirement. The increase in rice production has helped to reduce poverty but has also made the diet even more imbalanced.

Rice is the major dietary component throughout Bangladesh, and the reliance upon rice appears to be increasing for the poor, especially the rural poor. The urban poor actually record decreasing consumption levels of rice and this may indicate that their diets may be declining in quantity as well as quality. Middle/rich income groups still consume three meals of rice per day and are increasingly able to supplement this with alternative energy and protein sources, and consequently rice is relatively less important in their diet. The survey indicated that rice consumption could be declining for the educated middle-income group as their consumption pattern diversifies. Consumption patterns show increasing inequality across the income profile, with the poor retreating to increasing rice consumption.

The poor are more market dependent than other groups and rely on a well functioning market for cheap sources of rice. Rice markets are in a period of transition and the chains are shortening, this may be beneficial for the poor in delivering cheaper rice, but the poor are heavily involved in this rice market as an employment source and the net effect could be detrimental if employment is being lost. Identifying trends in the employment of the poor given the changing nature of the marketing and processing chains is needed.

Liberalisation in the rice market appears to have had positive effects, especially in regard to price stabilisation, this is important for the poor both as consumers and producers. Increased production and liberalised markets would now allow Bangladesh to export rice in good production years, however, policy makers must consider whether greater agricultural diversification would be a better option in terms of nutrition, income and employment generation, than further growth in the rice sector.

Wheat production and consumption is very secondary to rice. Wheat production has increased, though initial consumption figures suggest that consumption has fallen recently. Consumption of wheat flour does appear to be decreasing, though it is still a relatively larger part of the poor's diet, mainly through the influence of the public distribution network. Decreasing consumption of wheat flour is counter-balanced by increasing consumption of wheat-based products, especially amongst the less poor and the urban dwellers. The survey showed that bread and biscuits are the food items that the highest percentage of households perceive to have increased over the last 5 years. A significant proportion of this increased consumption is in the packaged and branded sector. Although this market is still small it does appear to growing especially amongst the less poor and the urban dwellers.

Unlike rice, wheat and wheat-based product consumption is higher for specific household members, notably children and male earners.

The wheat sector market is witnessing increasing private sector involvement, as the public distribution network is diminishing in importance. The growth of the import sector has also encouraged this private sector involvement. The changing nature of the market, with processed products, replacing wheat flour purchases is affecting the small-scale millers and they are loosing out to the larger scale automated millers. This may have negative impacts for poor people involved in this sector, but the whole growth of a processing and packaging sector may offset these losses.
Production of fish is very high in Bangladesh and has increased overall in the last 10 years, this production growth has mainly come from the aquaculture sector whilst open-access capture fisheries have declined. The latter is the normal source of fish for the rural poor. Figures tend to suggest that fish consumption is undergoing a slight increase or remaining static. However, there are worrying signs of declining consumption amongst the poor, especially the urban poor, who depend on the market.

Fish is mainly sourced from low level markets and the marketing and processing networks are very under-developed. This is a factor in pricing fish out of the shopping basket of the poor, together with the increasing demand from the growing urban surplus group.

The ownership of fishing resources is a key issue in the sector; the increasing value of fish has meant that traditional open access resources are being captured by landlords. When this is combined with the drainage of land for rice cultivation this has led to a decline in the availability of fish for poor consumers, especially the small fish consumed by the poor.

The shrimp and prawn sector is an important export sector but does not contribute greatly to the diet of the local poor. There are problems in the sector relating to ownership and hygiene /quality standards in processing plants, but the sector does provide evidence that diversification can result in increased incomes for poor people, with many gaining employment in the transport and processing stages.

The production of poultry meat and eggs has increased significantly and net availability has increased. Nevertheless, the level is still well below the requirement for a good nutritional balance. There is a shortage in supply and consumption patterns are polarising between the poor and less poor.

The poor are recording decreasing consumption of poultry products, and this is especially marked if the poor are market dependent for their source of eggs. The shortages have pushed prices beyond the range of poor consumers and producers have to market virtually all their produce to profit from their poultry rearing. The rich group in the survey tended to have access to eggs from their own production.

To compound this growing inequality in consumption, poor producers do not benefit from the supply shortages as the market is inefficient and intermediaries are capturing high margins. There are numerous marketing constraints, including transport, refrigeration, storage facilities and shortage of feedstuffs, which are preventing the development of the sector.

NGOs are heavily involved in small livestock programmes, developing integrated schemes to encourage production usually by poor women. However, there are now concerns regarding the profitability of these semi intensive systems and the entry of

too many NGOs into the sector. The shortage and high prices of feed grains is the crucial element, these prices often mean that the traditional scavenging system is more profitable and less risky for poor producers.

Poultry products appear to be another example where higher value, higher protein products are declining in the diet of the poor, as the demand from the growing middle class in urban markets prices the poor out. The declines are occurring from a very low level of consumption, already well below those required for a balanced diet.

The milk sector holds many similarities with the poultry and other high value, high protein produce. Production has been increasing but not sufficiently to meet the large demand. Although consumption has increased, levels across the country are still very low. Worryingly milk is another product where consumption appears to be declining for the poor as middle/upper income urban markets capture the available milk supply. The increase in collection networks both NGO and private have encouraged increased production but this has not increased consumption at the local level. In this case remoteness from markets can be an advantage nutritionally for poor producers, as they are likely to produce for home and neighbourhood consumption. Yet producers with good market access fail to fully benefit from the high urban demand, as the intermediaries capture the high margins. The most vulnerable to declining milk consumption are market dependent poor groups, the landless rural poor and slum dwellers.

The urban market for processed and packaged milk products, though still very small, is expanding rapidly. Collection and distribution networks, together with chilling centres and refrigerated transport infrastructure are developing under private sector and NGO control. These provide hygienic, high quality products, whilst also providing a range of employment opportunities throughout the sector. If development could proceed so that further employment was generated whilst expanding availability to a wider range of consumers this could be a positive development.

The percentage of cultivatable land under vegetable and fruit production is very low, yet Bangladesh has the potential to produce a wide range of high value horticultural

produce. Despite attempts to diversify, production has not expanded greatly. The growth in HYV rice production has reduced cultivation of other crops, especially pulses. These are a cheaper traditional source of protein for the poor, and declines in production have negative impacts on dietary balance.

Marketing difficulties appear to be the major constraint preventing producers moving into commercial production of horticultural crops. Homestead gardens are the most important production unit, mainly for domestic and local consumption. Inadequacies in marketing chains mean that the market dependent urban poor are those who are the most vulnerable.

The rich, and in the case of vegetables middle/breakeven, consumers have perceived consumption increases, for the poor the picture is more static. The likely explanation is that although supply shortages and market inefficiencies are increasing the price for the poor, they are substituting increased vegetable consumption for increasingly inaccessible fish and livestock products.

Fruit consumption is especially low across the entire poverty profile, this is as a consequence of low production but also the seasonality and the inability to store produce resulting in significant wastage. Fruit exhibits the same pattern as other higher value products with growing inequality in consumption patterns, only the rich are able to access the market sourced fruit, especially the imported fruits.

If the sector is to develop and make a contribution to improved nutrition, improved incomes, and increased employment opportunities it is crucial to develop the associated processing and packaging industries and the linkages to producers.

The over riding impression from the food group studies is one of a growing divide between the consumption patterns of the deficit group and the surplus group. The contrast is most marked between the rich and poor living in urban areas and upazila centres. Those living in these areas are more market dependent and vulnerable to price fluctuations.

The diet of the poor seems to be contracting in diversity, with rice increasingly dominating consumption, though in urban areas there is some substitution with wheat based products for convenience and possibly as a cheaper food source, as no fuel expense is entailed. All the high protein items, especially animal products are beyond the means of the poor for consumption on a regular basis, as demand from the growing urban population draws produce into the market where the price is too high for the poor. For many, vegetables appear to be the only remaining high protein food item. The urban poor appear to be the most vulnerable without any access to home production.

For the surplus groups living close to centres and with good market access, dietary diversity and the quality of produce consumed appear to be improving. Consumption of high protein items is increasing as markets are facilitating greater availability in urban areas. Also consumption of processed, packaged and branded items is becoming a regular feature of this group, and there is evidence of a dispersion of this trend into more remote and less rich/surplus areas.

Table of Contents

Executive Summary 2

Glossary of Bangla Terms 11

Abbreviations 15

Preface 17

Introduction 19

1.The Rice Sector 21

1.1 Introduction 21
1.2 Production 21
1.3 Consumption 22
1.4 Consumption Pattern for Rice: Survey Results 23
1.5 Marketing Structure 26
1.6 Processing Structure 31
1.7 Constraints 33
1.8 Issues in the Sector 33
1.8.1 Import Liberalisation of Rice Marketing 33
1.8.2 Opportunities for Rice Export 34
1.9 Summary 35
2.Wheat Sector 37

2.1 Introduction 37
2.2 Production 37
2.3 Consumption 37
2.4 Consumption Pattern for Wheat: Survey Results 38
2.5 Marketing 46
2.6 Processing 48
2.7 Summary 49
3.The Fishery Sector 50

3.1 Introduction 50
3.2 Production 50
3.3 Consumption 51
3.4 Consumption of Fish: Survey Results 52
3.5 Marketing Structure 54
3.6 Processing Structure 56
3.7 Issues in the Sector 56
3.7.1 Ownership 56
3.7.2 Status of Fishers 57
3.7.3 Agricultural sector changes 57
3.7.4 Fishing Livelihoods 57
3.8 Shrimp and Prawn Sub-Sector 58
3.8.1Production 58
3.8.2Marketing 58
3.8.3 Constraints 59
3.8.4 Issues in the sub-sector 59
3.9 Summary 60
4.The Poultry sector 61

4.1 Introduction....61
4.2 Production....62
4.3 Consumption....64
4.3 Consumption of Poultry products: Survey results....66
4.4 Marketing Structure....70
4.5 Processing Structure....75
4.6 Constraints....76
4.7 Issues in the Sector....78
4.7.1 Profitability of Poultry Farming....78
4.7.2 Linkages in the poultry production system....79
4.7.3 NGO Involvement in Small Livestock Development....80
4.7.4 Poverty Reduction via small livestock development....81
4.8 Summary....82
5. The Dairy Sector....84
5.1 Introduction....84
5.2 Production....84
5.3 Consumption....87
5.4 Consumption of milk and milk products: Survey Results....87
5.5 Marketing....92
5.5.1 Unprocessed fresh milk....92
5.5.2 Processed fresh milk....93
5.6 Constraints....96
5.7 Issues in Dairying....96
5.7.2 Herd size and labour requirements....98
5.7.5 NGO Involvement in Dairying....100
5.8 Summary....104
6. Fruit and Vegetable Sector....107
6.1 Introduction....107
6.2 Production....107
6.3 Consumption....110
6.4 Consumption of Fruit and Vegetables: the survey results....111
6.5 Marketing....117
6.6 Processing....117
6.7 Constraints....119
6.8 Issues in the Sector....119
6.8.1 NGO Initiatives....119
6.8.2 Homestead Cultivation....120
6.8.3 Livelihood opportunities....120
6.9 Pulse Sub-Sector....121
6.10 Potato Sub-Sector....122
6.11 Summary....123

List of Tables

Table 1.1 Production of Rice and Net availability of Food grains 21
Table 1.2 Average Per Capita Daily Intake 23
Table 1.3 Trends in per capita per day food intake by rural and urban poor (bottom 2 quintiles) in the nineties 23
Table 1. 4 Consumption pattern of Rice by Area and Poverty Group 24
Table 1.5 Frequency of Rice Consumption (%) 24
Table 1.6 Sources of Rice Consumed (%) 25
Table 1.7 The extent of rice processing (%) 25
Table 1.8 Perception of changes in rice consumption over the last 5 year period (%) 26
Table 1.9 Rice Market Participation Status, Rural Areas as Percentage of Population 30
Table 2.1 Average Per Capita Daily Intake 37
Table 2.2 Consumption pattern of wheat flour by area and poverty groups.....38
Table 2.3 Sources of wheat flour consumed (%) 39
Table 2.4: The extent of wheat flour processing (%).....39
Table 2.5: Perception of changes in wheat flour consumption over the last 5 year period (%) 40
Table 2.6 Perception of changes in bread consumption over the last 5 year period (%) 41
Table 2.7 Consumption pattern of bread by area and poverty groups 42
Table 2.8 Intra-household consumption patterns (%).....42
Table 2.9 Consumption pattern of biscuit (local) by area and poverty groups.....43
Table 2.10 Consumption pattern of biscuit (brand) by area and poverty groups 44
Table 2.11 Intra-household consumption of biscuits (local) by sampled groups (%) .45
Table 2.12 Perception of changes in biscuit (local) consumption over the last 5 year period (%) 46
Table 2.13 Perception of changes in biscuits (brand) consumption over the last 5 year period (%) 46
Table 3.1 Average Per Capita Daily Intake 51
Table 3.2 Consumption pattern of fish by sample and poverty groups 52
Table 3.3 Intra household consumption of fish by sampled groups (%) 53
Table 3.4: Sources of fish consumed (%) 53
Table 3.5 Perception of changes in fish consumption over the last 5-year period (%)54
Table 3.6 Outline of Actors, Produce and Locations in the Fish production and Trading Networks 55
Table 4.1 Poultry Production and Trade 62
Table 4. 2 Poultry and Duck Populations and Growth rates.....62
Table 4.3 Required annual growth rate of meat and eggs to meet the minimum intake of calories over the next ten years.....63
Table 4.4 Consumption of Meat and eggs in Bangladesh (per head per year) 64
Table 4.5 Household expenditure survey (HES and Nutrition Survey (IFSNS) Consumption estimates (Kg/ per capita / per annum).....65
Table 4.6 Average per capita daily intake of poultry products.....65
Table 4.7 Percentage of protein intake by food items (chicken and duck).....66
Table 4.8 Consumption pattern of eggs by area and poverty groups.....66
Table 4.9 Frequency of eggs consumption (%) 67
Table 4. 10 Intra- household consumption patterns (%).....68
Table 4.11 Sources of eggs consumed (%) 69

Table 4.12 Perception of changes in eggs consumption over the last 5 year period (%) 69
Table 4.13 Problems faced by the layer farms in marketing eggs 73
Table 4.14 Marketing Problems faced by egg traders (% of respondents) 73
Table 4.15 Marketing Costs of Egg Intermediaries 74
Table 4.16 Marketing Margins of Egg Traders 75
Table 4.17 Increase of nominal and real prices of poultry products. 77
Table 4.18 Comparison of the Productivity and Profitability of Poultry Production systems. 78
Table 4.19 Returns from Poultry Farming Systems 79
Table 5.1 Number of livestock in Bangladesh by species (millions) 84
Table 5.2 Trends in milk production and availability in Bangladesh 85
Table 5.3 Average Per Capita Daily Intake 87
Table 5.4 Consumption pattern of milk by sample groups 88
Table 5.5 Frequency of milk consumption (%) 89
Table 5.6 Intra –household consumption patterns (%) 90
Table 5.7 Sources of milk consumed (%) 90
Table 5.8 The extent of milk processing (%) 91
Table 5.9 Perception of changes in milk consumption over the last 5 year period (%) 92
Table 5.10 Milk collection and price paid to the rural producers by Milk Vita Dairy 95
Table 5.11 Estimated Probable Employment generation, 2002 97
Table 5.12 Average herd/flock size by different types of livestock farm households. 98
Table 5.13 Pattern of Utilization of labour on dairy farms. 98
Table 5.14 Estimated gross costs and benefits earned from dairy farming 100
Table 5.15 Daily sales of processed liquid milk by manufacturers. 104
Table 6.1 Production of Fruit 1994-95 to 1997-98 108
Table 6.2 Production of vegetables in Summer 1994-95 to 1997-98 108
Table 6.3 Total area under horticultural crops (1997-98) 109
Table 6.4 Average Per Capita Daily Intake 110
Table 6.5 Consumption pattern of vegetables by area and poverty groups 111
Table 6.6 Intra–household Consumption patterns by sampled groups (%) 112
Table 6.7 Sources of vegetables consumed (%) 112
Table 6.8 Perception of changes in vegetables consumption over the last 5 year period (%) 113
Table 6.9 Consumption pattern of fruits by area and poverty groups 114
Table 6.10 Intra-household Consumption patterns (%) 114
Table 6.11 Sources of vegetables consumed (%) 115
Table 6.12 The extent of Fruit processing (%) 116
Table 6.13 Perception of changes in Fruits consumption over the last 5 year period (%) 116

List of Figures

Figure 1.1 The Advanced Area Trade Circuit in 1989 29
Figure 1.2 The Advanced Area Trade Circuit in 2000 29
Figure 1.3 Backward Area trade Circuit in 1989 29
Figure 1.4 Backward Area Trade Circuit 2000 30
Figure 1.5 Flow Diagram of Rice Processing 32
Figure 4.1 Layer Farm Marketing Channels 71

Figure 4.2 Broiler Meat Marketing Channels 71
Figure 5.1. Milk Production and Marketing of unprocessed milk 94
Figure 5.2. The BRAC model for Livestock Rearing 102

Glossary of Bangla Terms

Aman	Seasonal paddy group, growing in the monsoon season and harvested November / December.
Aratdar	Wholesaler usually with premises and larger scale than bepari and faria
Atta	Whole wheat flour
Atta Chakka	Wheat crushing machine
Aus	Seasonal paddy group sown in the pre-monsoon season and harvested in the monsoon season July/August
Beel	Inland water body (lake)
Bepari	Produce collector without premises, smaller scale than an aratdar
Boro	Seasonal paddy group grown in the dry/ cold season, harvested March/April. Boro paddy is transplanted and mainly irrigated.
Chalani	Type of wholesaler in the fish sector
Chandabaz	A tout
Dadon	Traditional form of trade tying loan
Dheki	Traditional manually powered method of paddy milling
Dhaner upore	Traditional form of credit provision
Faria	Small scale collector/wholesaler similar to bepari
Haat	Local market usually without built structures
Ghat	River crossing point
Gher	Ponds used for the cultivation of prawns and shrimp
Jalmahal	Form of leasehold tenure
Kalajira	Variety of fine aromatic rice
Khuchra bepari	Small–scale trader in fingerlings

Mastaani	Terms for local hard-men / thugs involved in protection rackets and corruption
Masur	Variety of pulse / lentil
Misti doi	Sweet yoghurt based dessert
Paddy	Rice in its un-milled state
Paiker	A retailer
Rabi	Season corresponding to the dry / winter season, harvesting in March or April.
Thana	Local administration area based on the police station area control

Abbreviations

ACC/SCN	Administrative Committee on Coordination/Sub-committee on Nutrition
ADB	Asian Development Bank
BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
BMI	Body Mass Index
BRAC	Bangladesh Rural Advancement Committee
CBN	Cost of basic needs
CED	Chronic energy deficiency
CNS	Child Nutrition Survey
DHEW	Department of Health, Education and Welfare (U.S)
EPI	Extended Programme for Immunization
FAO	Food and Agriculture Organization of the United Nations
g	gram
GDP	Gross Domestic Product
GOB	Government of Bangladesh
HES	Household Expenditure Survey
HIES	Household Income and Expenditure Survey
HKI	Helen Keller International Worldwide
ICDDR,B	International Center for Diarrhoeal Diseases Research, Bangladesh
ICLARM	International Center for Living Aquatic Resources Management
INFS	Institute of Nutrition and Food Science
IPHN	Institute of Public Health Nutrition
Kcal	Kilo calorie
MOE	Ministry of Environment
MOF	Ministry of Finance
MOHFW	Ministry of Health and Family Welfare
MUAC	Mid-upper arm circumference

NCHS	National Center for Health Statistics
NGO	Non-governmental Organization
NNC	National Nutrition Council
NPAN	National Plan of Action for Nutrition
PRSP	Poverty Reduction Strategy Paper
SP	Nutritional Surveillance Project
RDA	Recommended Dietary Allowance
SNB	State of Nutrition in Bangladesh
UNFPA	United Nations Population Fund
UNICEF	United Nations Children Fund
UNDP	United Nations Development Programme
WB	World Bank
WHO	World Health Organization
WSC	World Summit for Children

Preface

This research study supports DFID's and other agencies commitment to attaining the International Development Targets, the first of which is "reducing by one half the proportion of people living in extreme poverty by 2015". In Bangladesh, in spite of food system improvements and economic growth insufficient progress has been made on reaching the targets. The core problem to be addressed by the research is that in Bangladesh widespread and severe malnutrition damages human health and the capacity for physical and intellectual work.

The research will concentrate on analysing the food system as a complex of enterprises with livelihood opportunities for the poor. The on–going transition of the food system will be destroying some opportunities whilst creating others. Analysis of interventions by Government, NGO's and donors should aim to focus policy on increasing enterprise opportunities for the poor in the transitory system. Allied to this specific nutritional implications and interventions will have to be considered. Critical in the delivery of these interventions will be the role of the NGO sector.

The research is designed as a scoping study providing an overview and small-scale case studies that will stimulate and guide further detailed research in this area.
The research is a partnership between Imperial College London (Wye Campus) and BRAC. The principal researchers at Imperial are Jonathan Kydd, Edward Clay (ODI) and Ian Urey, the Principal BRAC researchers are Muazzam Husain, Shantana Halder, H.K.M. Yusef and Proloy Barua. The research also draws upon the advice of W.M.H. Jaim (BAU), David Lewis (LSE), and Abdus Sattar Mandal (BAU).

This component of the project comprises case studies of major food sectors. Information has been gained from desk studies, interviews, and data taken from the household survey conducted as part of the project. The authors would like to thank the team members together with following people for providing important literature; Bob Baulch (IDS), Brigitta Bode (CARE), Paul Dorsoh (IFPRI), Martin Greeley (IDS), A. Halls (Imperial), Gerard Hendrikson (REFPI/BAU), Martin Leach (DFID), Mustafa Mujeri (BIDS), K.A.S. Murshid (BIDS), Dora Panagides (HKI), Tim Roberts (DFID),

R.I. Sarkar (REFPI/BAU), Quazi Shahabuddin (BIDS), Leigh Stubblefield (DFID), Paul Thompson (ICLARM) and Harriet Torlese (HKI)

The funding for the research is provided by the Crop Post Harvest Programme of the Department for International Development. The study team wish to thank them for their generous support to this initiative.

Introduction

These case studies are designed to provide a brief overview of certain major food groups within Bangladesh. The studies follow the same format and cover production, consumption, marketing, processing, constraints and issues pertinent to the particular food sector. As part of the BRAC/Imperial College project looking into 'Patterns and Trends in Food Consumption in Poor Urban and Rural Households the main objectives of this study were to review the existing production, consumption and marketing situation in Bangladesh and then to develop policies relating to these sectors that might impact on poverty alleviation.

The specific objectives were to review and document existing production and marketing systems (informal and formal); to illustrate current consumption patterns amongst different groups, including sources of consumed produce and their extent of processing; to examine the forward and backward linkages in collection, processing, packaging and marketing of food items and determine the employment potential; to find out marketing constraints and formulate ideas to improve marketing system; and to identify consumption patterns and determine if transitions are taking place within the food system in general.

The case studies use available published and unpublished materials received from different sources. In addition several focus group discussions were conducted with producers, processors and consumers. Interviews were also conducted, especially with BRAC's field level management. Secondary and primary data has been used in the overview of current consumption patterns. The primary data has been extracted from the main survey conducted under the BRAC-Imperial college joint project. In April-May 2003 a household survey was conducted on 333 households from rural areas, urban slums, char areas and BRAC local level staff. Along with other information, data on households' consumption, expenditure, sources of food consumed, and the extent of processing of food consumed was collected. See Annex 1 for survey methodology.

Although the case studies follow the same basic structure they do vary in detail, this reflects the importance of the sector, the breadth of literature available for certain food sectors, and time-scales available for team members.

The project is a scoping study and seeks merely to highlight issues for further study rather than to provide a comprehensive study of the food system with policy recommendations. Policy recommendations can be suggested at this stage but will clearly require more detailed and geographically disbursed investigation.

1.The Rice Sector

1.1 Introduction

Rice is the dominant crop in agricultural production and food consumption in Bangladesh and it is the single largest source of rural livelihoods. Consequently the rice sector is of critical importance and the implications of change in the rice sector for the poor as consumers, producers, and workers are crucial. Rice production is increasing and its importance in the diet, especially of the poor, is growing despite the dietary pattern in Bangladesh already being imbalanced in favour of rice.

1.2 Production

Rice production has expanded since the mid 1970s, outstripping population growth (Table 1.1). Yield increases rather than area expansion have provided the majority of this growth, yet potential for even higher yields still exists, as yields are low in comparison to other Asian economies (Rahman 2000).

Increased production has had numerous impacts, as rice is a subsistence crop and a cash crop. Firstly, food availability improved and stabilised. Secondly, land has been released for diversified production, such as vegetables, resulting in higher incomes. Thirdly, rice markets expanded; in the late 1990s almost 50% of rice production went through marketing channels, creating further employment (Rahman 2000).

Table 1.1 Production of Rice and Net availability of Food grains

YEAR	ESTIMATED POPULATION MILLION	TOTAL RICE PRODUCTION "000" M. TONS	IMPORTS	INTERNAL PROCUREMENT	OFF TAKE
1986-87	104.1	15407	274	137	495
1990-91	109.6	17862	202	727	971
1994-95	119.9	16838	204	123	322
1996-97	124.3	18883	89	581	797
1998-99	128.2	19905	359	563	2386
1999-00		23134	-	-	-

(BBS 2000)

Rice is the dominant crop nationwide, but with certain clear surplus regions. Over 70% of the cultivable land is used for rice, 10% of which is for fine or aromatic rice. Rice production decreased from 17.8 million tons in 1991 to 16.8 million tons in 1995. Production then began to increase and reached 23.1 million tons in 2000. The population increased from 111.4 million to over 125 million during this time, with a growth rate of 1.47% per year. The gross per capita availability of rice showed a continuous decreasing trend during the first half of the decade (439 g/day to 422 g/day) but then showed a persistent increase during the second half of the decade (422 g/day to 499 g/day). This high per capita availability played an important role in reducing poverty and hunger in the country. However this availability is much higher than the ideal requirement of 312 g/day for balanced nutrition, and consequently the diet is imbalanced.

Self–sufficiency in rice production was achieved in the period, resulting in policy debates concerning increasing rice production or diversifying agricultural production into more high value commodities

1.3 Consumption

The net availability of rice is high and it forms the major element of the Bangladeshi diet. It represents a high proportion of total food expenditure, especially amongst the poor. Table 1.2 indicates this importance with rice accounting for around 50% of the weight of food consumed. Although overall rates of food consumption and rice consumption have not changed dramatically trends can be seen with rice consumption showing a decline amongst urban dwellers, this could be as a consequence of the increasing poverty of the majority of urban dwellers or a transition in food consumption patterns away from rice. These consumption figures are supported by Table 1.3, which shows that for the urban poor rice intake has shown a slight decrease, but its contribution to total energy intake has increased indicating a worsening diet for the urban poor. The rural poor are also becoming more dependent on rice as their source of energy. Their diet has become even less well balanced, by 2000 rice accounted for nearly 85% of total energy intake in the poor rural group.

Table 1.2 Average Per Capita Daily Intake

ITEM	1991-92			1995-6			2000		
	Nation	Rural	Urban	Nation	Rural	Urban	Nation	Rural	Urban
Food Total (gms)	887	878	938	914	911	931	893	899	871
Rice (gms)	473	481	416	464	479	390	459	479	372
Calories K. Cal	2266	2267	2258	2244	2251	2209	2240	2263	2150
Protein (gms)	62.7	62.3	65.5	64.9	64.5	67.5	62.5	61.9	64.9

Source: (BBS 2001a)

Table 1.3 Trends in per capita per day food intake by rural and urban poor (bottom 2 quintiles) in the nineties

FOOD	RURAL POOR						URBAN POOR					
	1990-91		1995-96		2000		1990-91		1995-96		2000	
	Intake	% Energy	Intake	% Energy	Intake	% Energy	Intake	% Energy	Intake	% Energy	Intake	% Energy
Cereals	440	88.2	446	86.9	448	86.2	442	82.6	439	81.9	415	81.1
Rice	400	80.4	413	80.7	440	84.9	406	76.0	406	76.1	396	77.6
Wheat	240	7.9	33	6.3	8	1.3	36	6.6	33	5.9	19	3.5

[1]*Household Expenditure Survey: World Bank 2002.*

1.4 Consumption Pattern for Rice: Survey Results

The BRAC/Imperial survey provided consumption information on individual food items and this is presented here for rice disaggregated by the poverty groupings and the sample populations (see Annex 1).

Table 1. 4 Consumption pattern of Rice by Area and Poverty Group

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Rice consumption frequency of last three day (%)	100	100	100	100	100	100	100	100	100
Per capita rice expenditure per day (Tk.)	9.04	7.86	6.31	8.68	7.56	7.7	8.24	9.48	8.21
% Of rice to total food expenditure	40.5	36.4	32.4	47.3	25	44.9	33.2	29.3	38.4
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

All households across the poverty and area profiles consumed rice within the 3-day recall period (Table 1.4). The proportion of total food expenditure on rice is highest for the poor, especially the rural poor. Rice accounts for 45% of the poor's expenditure on food and for char areas the figure is 47%. The BRAC staff group spend the lowest proportion of their income on rice, indicating that this group have more diversified sources of energy and protein. Slum dwellers also spend a smaller proportion of their total food expenditure on rice than the rural populations, this may be accounted for by the nature of the urban poor diet, which may have less home preparation of food.

Table 1.5 Frequency of Rice Consumption (%)

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Once daily	3.3	1.7		3.3		2.9	-	3	2.1
Twice daily	23	13	20	10	4.3	23.3	11.7	6	17
Thrice daily	73	84	80	87	96	72.7	88.3	91	81
Once fortnightly		0.8			0.6				0.3
Never	0.8				0.6				0.3

Source: Field survey 2003

Table 1.5 gives evidence of the frequency of consumption for the sample groups. Even with the higher proportionate expenditure by poor rural groupings, the frequency of consumption is still lower in these areas. The thrice-daily consumption figures show that around 73% of the poor and low vibrant village groups eat rice at this frequency compared to over 90% for the rich and BRAC Staff group. Thrice-daily consumption of rice shows an increase throughout the poverty profile. These high frequencies in the rich group do not really support the proposition that dietary patterns for this group are shifting away from being rice dominated.

Table 1.6 Sources of Rice Consumed (%)

SOURCES	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home produced	57	49	46	8.7	27	9.88	2.5	20	30.4
Low level market*	18	27	32	78	37	48.26	7.5	0	36.5
Fixed market**	25	24	20	13	37	40.12	90	80	33.1

*Bought from neighbour/local trader, bought from *Haat,* bought from street trader
** Bought from fixed *Bazaar*, bought from shopkeeper
Source: Field survey 2003

The rich group appear to have the greatest access to rice from home production; this is consistent with ownership of land being a key indicator of poverty. The poor are more market dependent, though the middle-income recording seems rather anomalous.

Table 1.7 The extent of rice processing (%)

EXTENT OF PROCESSING	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home processed	9.2	7.6	10	-	4.3	5.8	6.4	12	7.2
Processed outside	90.8	92.6	90	100	95.7	94	94	88	92.8
Processed and packaged	-	-	-	-	-	-	-	-	-

Source: Field survey 2003

Rice is clearly processed predominantly outside the home and for urban slum dwellers exclusively so. The rich demonstrate the highest level of home processing, this is unlikely to be the results of high levels of home manual processing, but due to access for larger landowners to home produced and processed rice.

Table 1.8 Perception of changes in rice consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	43	44	28	57	35	44	43	36	42
Decrease	6.1	13	20	-	13	16	4.3	4.5	11
No Change	50	43	53	43	52	39	53	60	47

Source: Field survey 2003

Table 1.8 demonstrates some interesting features that are consistent with the secondary consumption data. Rice consumption has not changed markedly with the majority recording no change. However, perceptions of increased consumption are strongest in the poor rural groupings, especially the char area, this illustrates the increasing dependence on rice amongst the rural poor. The only groups where significant proportions have highlighted decreases in consumption are in the slum area and the poor group, this could be part of dietary transition or increasing poverty amongst these groups. One might have expected a decrease in consumption in the rich group, as they diversify their diet, but this doesn't appear to be supported by the data and both the BRAC staff and the rich groups perceive increasing consumption overall.

1.5 Marketing Structure

Currently, rice marketing structures are in transition, as a result of processes such as; liberalisation, urbanisation, industrialisation, and infrastructure development. Studies

e.g. (Baulch, Das et al. 1998), and (Murshid 2001) have reached similar conclusions as to the nature of these changes.

Marketing chains are seen to be shortening and direct marketing of rice has increased. Spatial and vertical integration is growing with farmers delivering directly to millers. Paddy *aratdar*s have increased in number and importance, and are entering into all procurement areas. These factors are limiting the role of the traditional *farias* and paddy *beparis*. Rice *beparis* are declining as millers are selling more directly to wholesalers in the terminal market.

Mills in the terminal markets are part of this shortening of the rice chains, they buy directly from procurement regions and sell on to large retailers. This has created a shift in market power away from the traditional wholesale markets, especially in the Dhaka region.

The market has seen new entrants at most tiers, indicative of the low barriers to entry, so there is little evidence of horizontal expansion, *paddy aratdars* have tended to expand diagonally into other agricultural trading activities. Vertical expansion by *Aratdars* is limited as they are unable to access institutional credit and there is an excess milling capacity.

Studies (Baulch et al, DFID, Mursid) into the relative importance of intermediaries within the paddy-rice marketing found that *aratdars* collected 74% of their paddy from farmers, 20% from *bepari*, and 6% from smaller *aratdars.* Millers received 49% of paddy from *aratdars*, 42% from farmers, and 9% from *beparis. Aratdars* sell 99% of their *paddy* to the millers (59% local and 41% long distance trades) with only the remaining 1% into procurement channels. The rice millers sell 61% of the milled rice to local market wholesalers, 27% to long distance wholesalers, 5% to rice beparis, and 7% to government procurement. The figures illustrate the importance of the main players (*paddy* and rice *aratdars*) with smaller roles for *beparis* and government procurement channels.

A DFID (2002) study on the fine and aromatic rice market structure noted the dominance of large traders in this sub-sector. Fine paddy tended to go to the automatic mills.

Murshid (2001) described the rice marketing chain in 3 contrasting areas of Bangladesh, an advanced agricultural area, a backward agricultural area, and the major markets supplying Dhaka. The study re-examined areas from an earlier study in the late 1980s and is thus able to analyse changes in the rice marketing structures in the 1990s (Figures 1.1, 1.2, 1.3,1.4 present of these marketing structures)

Murshid (2001) notes that in the "backward area" near Noakhali (Figures 1.3 & 1.4) "subordinate traders" have virtually disappeared, and the total number of traders had declined by around 60%. The market chain is thus shorter in this area with the removal of intermediaries transacting and providing finance in the system.

In contrast in the "advanced area" near Bogra (Figures 1.1 &1.2) the market chain has lengthened with cycle *bepari* and the paddy *aratdars* emerging as important players. The credit structure has changed with short-term sales on credit provided by *aratdars*, millers and wholesalers to customers.

In the large Dhaka area markets the old system of trade tying loans or "*dadon*" has virtually disappeared. The long distance rice trade has altered significantly, now direct cash transfers from rice *aratdars* to distant wholesalers are by telegraphic bank-to-bank transfer. The bank transactions are much improved but there is still a problem of default from buyers making credit purchases.

In Dhaka the large market of Badamtoli has declined in importance and has been replaced by a number of smaller but still substantial markets. This competition amongst markets reduced the turnover in Badamtoli by about 50%.

Changes observed in rice marketing appear to show that trade is freer and that the paddy-rice marketing chain is a dynamic well functioning market system. Policy implications are that government and agencies should reinforce the advantages of the private sector (improving transport, credit accessibility and maintaining a stable

trading environment) rather than competing against it. These studies also concluded that market structure developments could have adverse implications for poor participants within the chain.

Figure 1.1 The Advanced Area Trade Circuit in 1989

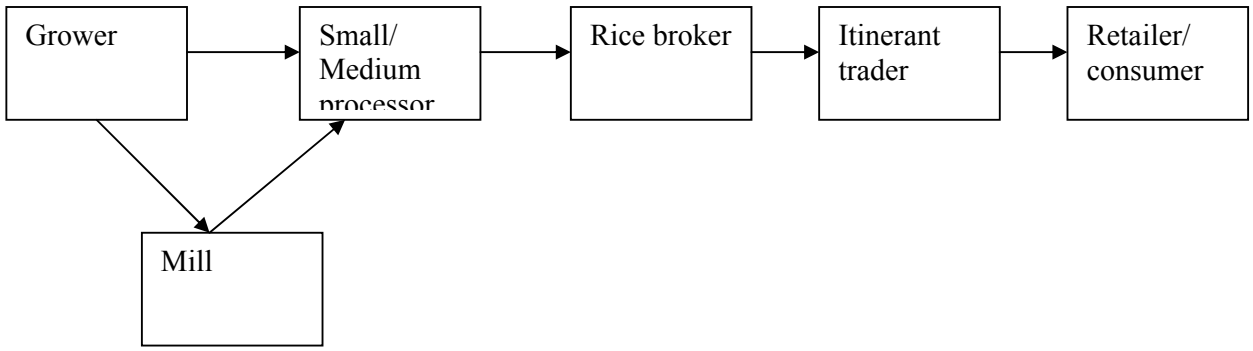


Figure 1.2 The Advanced Area Trade Circuit in 2000

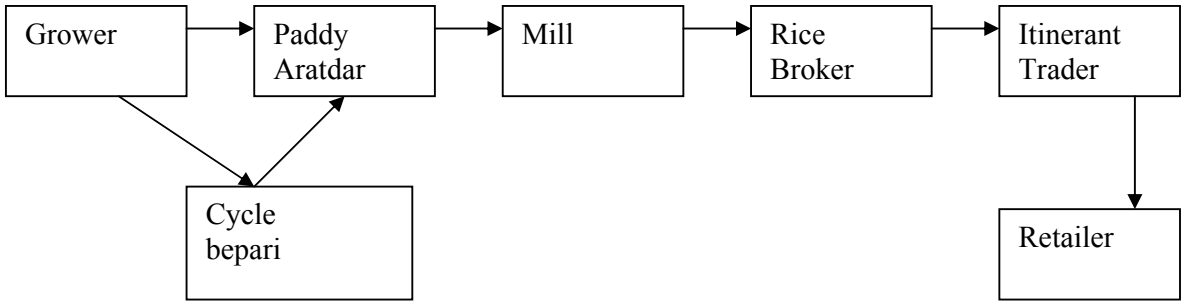


Figure 1.3 Backward Area trade Circuit in 1989

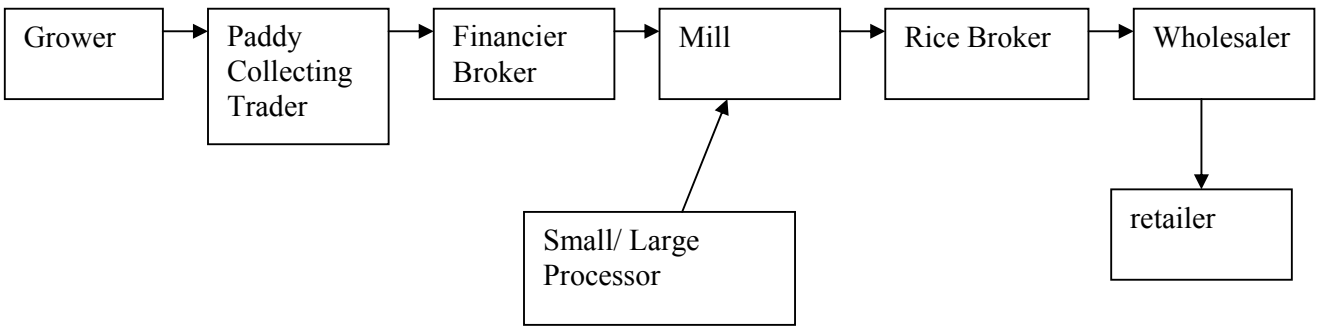
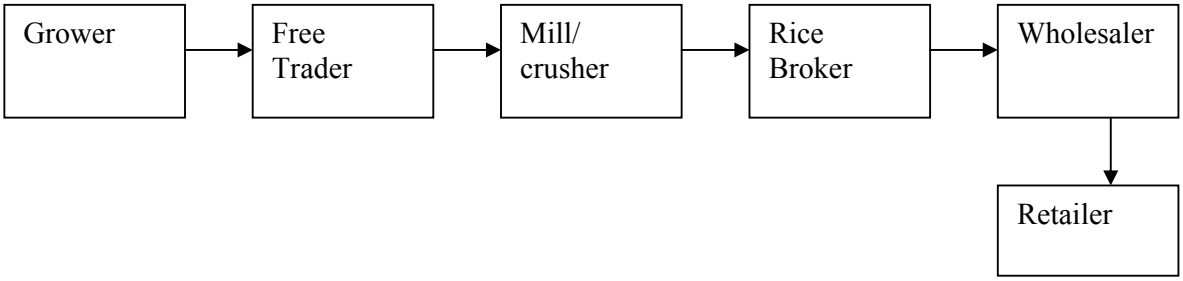


Figure 1.4 Backward Area Trade Circuit 2000



Source; (Murshid 2001)

A well functioning rice market is very important for the poor, both as consumers and producers. Table 1.9 demonstrates the interesting relationships between market participation and poverty level. The percentage of net sellers rises through the income quintiles whilst the percentage that are only buyers declines with increasing income. The poor are clearly more market dependent than the higher income quintiles. The net buyers category though exhibits a non-linear relationship. It could be possible that the poorest group are constrained in purchasing by their poverty.

Table 1.9 Rice Market Participation Status, Rural Areas as Percentage of Population

QUINTILE	NET SELLERS	NET BUYERS	ONLY BUYERS
Poorest	18	24	58
2	23	29	48
3	30	28	41
4	38	26	37
Richest	42	22	37
Total	30	26	44

Source (WB 2002), (2000 HIES)

1.6 Processing Structure

Rice processing is the biggest food industry in Bangladesh, with over 100,000 large and small-scale rice mills. Employment in the rice processing chain is critical to the livelihoods of many in the rural non-farm economy (Nural Afsar, Baqui et al. 2001).

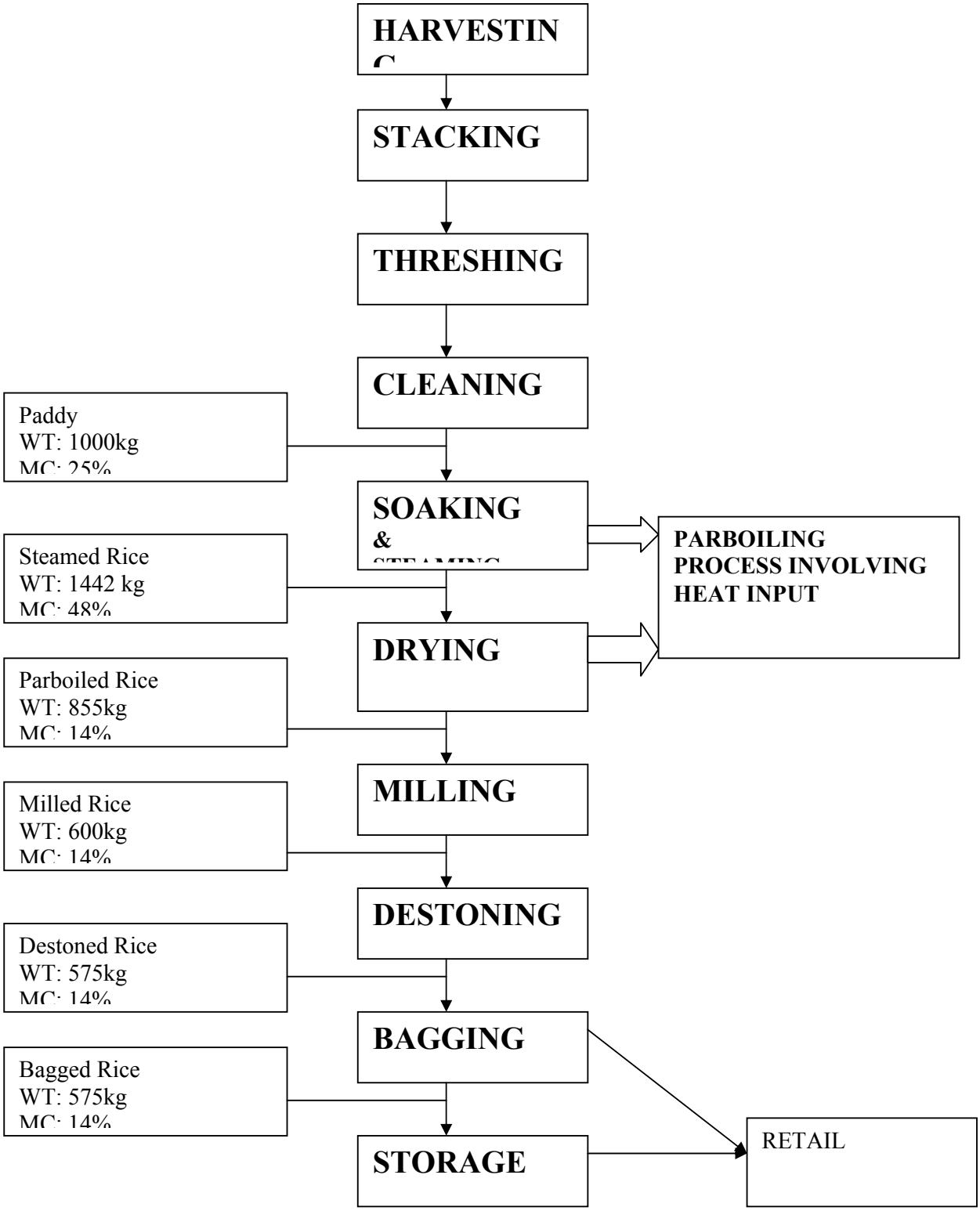
Rice processing occurs on three levels; the small huller type mills in rural areas; the larger huller and rubber roll mills; and fully automated rice mills with modern parboiling. Milling capacity is more than adequate and currently there is under utilisation of the more efficient large mills.

The traditional manual hulling by "*deki*" was displaced in the 1970s and 1980s. Small hullers are not traditional but part of the modernisation associated with the spread of diesel and electric power to rural areas. This technical change had major implications for poorer women's work.

The basic processing chain is shown as a flow diagram (Figure 1.5). This illustrates the processing stages together with the resultant weight losses and moisture content. All processes, except milling, are done manually with over 90% of the rice being parboiled before milling. Millers begin to purchase in December and only operate for 6 to 9 months depending on the availability of paddy, which clearly is an inefficient way to operate the mills.

Figure 1.5 Flow Diagram of Rice Processing
Source (Nural Afsar, Baqui et al. 2001)

(WT= weight, MC = moisture content)



1.7 Constraints

Rice quality and high levels of post harvest loss are key issues in the current system, especially for the smaller mills. Factors behind these problems include; old milling technology (Engelberg huller mills); poor infrastructure (drying facilities, organised market sheds, storage facilities, and transport links); frequent power interruptions; under-utilisation of large mills; and the stagnation of new research (Rahman Khan 2002) (DFID 2002). The poor quality of the milled rice impacts upon the grading and this is detrimental to any export potential (Nural Afsar, Baqui et al. 2001).

However improved processing and grading requirements for export rice could lead to employment losses especially for poor people as milling is likely to shift towards the larger more efficient mills.

Specific constraints for actors in marketing chain highlighted the following concerns: for traders, lack of access to working capital and transport difficulties; for millers, electrical supply; for *aratdars,* lack of storage facilities; and for rice retailers, increasing competition forcing diversification and a growth in sales on credit. (DFID 2002) (Baulch, Das et al. 1998)

1.8 Issues in the Sector

1.8.1 Import Liberalisation of Rice Marketing

Liberalisation policies in the early 1990s removed restrictions on private imports, this had important consequences for food security in terms of supply, prices, and benefits for consumers and producers. Liberalisation of external trade caused major changes in the determination of food grain prices. Bangladesh effectively operated under a ceiling of import parity price with India (which became a surplus producer and source of imports in the 1990s) (Murshid 1999) (Dorosh 1999).

Liberalisation reduced the government's influence on the rice market through its import controls, allowing the private sector to have more of a role in price

stabilisation. This was not adversely affected, with real rice prices only slightly more unstable in the 1990s (Dorosh and Shahabuddin 1999).

The 1994 reforms allowed private traders into the rice import sector, developing another marketing chain. Entry into this market has mainly come from established firms with around sixty percent starting in 1995 soon after the reforms. A further forty percent joined following the 1998 production shortfall associated with the large flood (Murshid 1999).

Cross border trade with India, both formal and informal, is now extensive and has become an important element of the rice market. The informal trade involves large numbers of traders at small border *haats,* these traders are subject to unofficial tolls levied by border forces and staff of law enforcement agencies, this constitutes a considerable hindrance to trade and increases the price to consumers (Shahabuddin and Dorosh 1998).

Most cross border rice imports arrive via small trucks in small lots, allowing smaller transaction sizes and speedier delivery. Although this is not pro-poor employment, it indicates large traders do not dominate. The exact quantity of rice being imported is uncertain. Many believe that larger quantities of rice are coming in unofficially at smaller crossings. However, other estimates have also placed levels at 25% less than official figures due to non-rice commodities being imported as rice (Murshid 1999).

1.8.2 Opportunities for Rice Export

Potential now exists for the export of rice, recent studies of comparative advantage in agriculture (Shahabuddin and Dorosh 2001) indicate that rice production for import substitution has comparative advantage, however, moving to an export regime implies a substantial decline in economic profitability with more profitable options than rice production for export. Bangladesh faces a difficult situation with rice production oscillating around self-sufficiency. In bumper years the price will be depressed, if no mechanisms for rice export exist. Some argue that production should increase to allow for small but persistent exports. In 1996/7 Bangladeshi prices would have allowed competitive rice exports into the world market. However, a lack of appropriate market

structure and grading standards prevented this, and these will be seriously limiting factors until an export marketing chain is developed. Development of the export rice trade could lead to new employment opportunities in marketing and transport.

Rahman (2000) suggests that the export of rice could enhance food security for the poor through increased imports of cheaper but more nutritious wheat. He demonstrates that the export of aromatic rice would allow the import of double the volume of wheat. There does appear to be a potential market for fine, aromatic, and organic rice in the EU and USA (DFID 2002) (Rahman 2000), but adherence to quality standards must improve.

The majority of rice grown in Bangladesh is coarse rice (mainly HYV varieties); this has a smooth and predictable demand from home consumption and a ready market. However, fine rice would have better earnings if the market functioned well, as fine rice has lower yields, but higher prices and lower input cost (low fertiliser and pesticide use and low irrigation demands). The fine rice market tends to be controlled by a few large traders and this is a disincentive for producers to switch and for the involvement of small traders (DFID 2002).

1.9 Summary

Rice production has increased and self-sufficiency in rice occurred in the late 1990s, the net availability of rice increased and is greater than the nutritional requirement. Production increases helped to reduce poverty, but to also led the diet becoming even more imbalanced.

Rice is the major component of the diet throughout Bangladesh. The reliance upon rice appears to be increasing for the poor, especially the rural poor. The urban poor actually record decreasing consumption of rice and this could indicate that their diet is declining in quantity as well as quality. Middle/rich income groups still consume three meals of rice per day but are increasingly able to supplement this with alternative food sources, consequently rice is relatively less important in their diet. The survey indicated that rice consumption could be declining for the educated middle-income group as their consumption patterns diversify. Consumption patterns

show increasing inequality across the income profile, with the poor retreating to increasing rice consumption.

The poor are more market dependent than other groups and therefore rely on a well functioning market. Rice markets are in a period of transition and the chains are shortening, this may be beneficial for the poor in delivering cheaper rice, but the poor are heavily involved in rice market employment and the net effect could be detrimental. Identifying trends in the employment of the poor given the changing nature of the marketing and processing chains is required.

Liberalisation in the rice market appears to have been positive, helping price stabilisation, which is important for the poor both as consumers and producers. Bangladesh could now export rice in good harvest years but must consider whether greater agricultural diversification would be a better option in terms of nutrition, income and employment generation.

2.Wheat Sector

2.1 Introduction

Wheat is the second most important cereal after rice and vastly more important than maize or Soya. It is now a regular part of the diet in urban and some rural areas. In many rural areas it is still considered inferior to rice but in urban areas wheat consumption appears to be increasing. This has been attributed to the growing exposure to western tastes and diets and rapid urbanisation (Baulch, Das et al. 1998). Another factor was food aid from the 1960s to 1990s, which arrived mainly as wheat.

2.2 Production

Wheat production nearly doubled in the 1990s, with production largely concentrated in the poorer regions of the northwest and Khulna district. Of domestic production 44% is consumed on the farms, government procures 8%, and 48% is sold to private traders.

2.3 Consumption

Wheat consumption has declined in the decade from 36.3 grams per capita in 1991 to 17.2 in 2000 (Table 2.1). This is a large-scale decline and is most dramatic in rural areas, in urban areas consumption is higher and the decline is not so marked. These declines have occurred is in spite of wheat production increasing in the country. Results from the project survey suggest these figures may be explained by declines in wheat flour consumption by households but an increased in the consumption of processed wheat products, i.e. bread and biscuits.

Table 2.1 Average Per Capita Daily Intake

ITEM	1991-92			1995-6			2000		
	Nation	Rural	Urban	Nation	Rural	Urban	Nation	Rural	Urban
Food Total (Grams)	887	878	938	914	911	931	893	899	871
Wheat (grams)	36.3	34.6	47.1	33.7	32.4	40.1	17.2	14.0	30.1

Source: (BBS 2001a)

2.4 Consumption Pattern for Wheat: Survey Results

Interestingly wheat flour consumption (Table 2.2), which is traditionally associated with the poor and considered as an inferior good has slightly higher consumption levels amongst the rich group, with 27% of households recording consumption in the last 3 days as opposed to nearly 23% of poor households. The BRAC staff group demonstrate the highest percentage of households consuming in the recall period. This appears to verify the proposition that wheat, traditionally considered to be the cereal of the poor, is finding favour in the diet of the rich. Westernising cultural influences together with industrialisation maybe responsible for this consumption pattern.

Table 2.2 Consumption pattern of wheat flour by area and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Wheat flour consumption frequency of last three day (%)	30.8	13.5	25	23.3	39.1	22.7	22.3	26.9	23.4
Per capita wheat flour expenditure per day (Tk.)	0.67	0.43	0.44	0.68	0.98	0.51	0.6	0.59	0.55
% Of wheat flour to total food expenditure	3.51	1.66	2.08	3.02	3.11	2.93	2.42	1.95	2.59
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

The percentage of total food expenditure on wheat is low for all groups in comparison to rice but slightly greater in the poor and low vibrant areas, together with the BRAC staff group. This appears to support speculation that, out of necessity, wheat is consumed by the poor whilst, out of choice, it is consumed in the less traditional more “westernised” groups. The BRAC staff finding could be indicative of a transition towards higher wheat consumption and an increasing consumer preference for wheat, especially in the preparation of convenience foods.

Table 2.3 Sources of wheat flour consumed (%)

SOURCES	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home produced	33	4.8	12	11	12	2.56	-	14	5.2
Low level market*	22	48	54	67	41	53.85	-	57	52
Fixed market**	44	48	32	22	41	35.9	100	14	42.8

*Bought from neighbour/local trader, bought from *Haat,* bought from street trader
** Bought from fixed *Bazaar*, bought from shopkeeper
Source: Field survey 2003

Wheat is not as widely grown in Bangladesh as rice so the figures in Table 2.3 are more dependent on the types of crops being grown in the specific locality of the survey sites. In this survey very little wheat is from home production, though as with rice the rich have greater access to home production and the poor are more market dependent. The middle-income figures appear rather anomalous. The char and slum dwellers appear to be sourcing wheat from lower level markets.

Table 2.4: The extent of wheat flour processing (%)

EXTENT OF PROCESSING	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home processed	5.3	1	3.7	-	-	2.7	-	5.6	2.5
Processed outside	83.2	71	96.3	78.1	81	84	83	61	79.3
Processed and packaged	11.6	28	-	21.9	19	13	17	33	18.2

Source: Field survey 2003

Very little wheat is home processed; this is really a function of the limited production of wheat in the survey areas and the decline in home milling of cereals. The majority is bought processed but the interesting findings here relate to the degree of packaging. Wheat flour is generally sold loose from sacks but there are problems with storage and quality control. Packaged wheat does form a significant proportion of the market

for all areas except the char. One third of the rich group are purchasing packaged wheat flour and over 20% of the slum group are doing so. This is an important aspect of changes in the retail sector, with shops moving away from weighing out produce and selling pre-packaged items. This has ramifications for the retail sector and the distribution networks supplying them.

Table 2.5: Perception of changes in wheat flour consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	17	9.5	16	3.6	19	10	13	20	13
Decrease	44	49	44	89	62	58	51	37	52
No Change	39	41	41	7.1	19	32	36	43	35

Source: Field survey 2003

Table 2.5 contrasts with most of the other tables on perceptions of changing consumption in that a perception of decreasing consumption is witnessed in all sample groups. This is especially noticeable in the char area and amongst the poor group, this is possibly linked to the price equalisation of rice and wheat and combined with the consumer preference for rice this results in declining wheat consumption. This finding was supported by the focus group discussions.

The BRAC staff also recorded a decreasing consumption of wheat flour and this is contradictory to the belief that wheat consumption is increasing in this less traditional group. However, this transition in consumption pattern may still exist if we go on to look at the consumption of wheat based products (bread and biscuits).

Table 2.6 shows the perceived changes in consumption of bread, which are in marked contrasts to wheat flour. Bread consumption shows high levels of perceived increase, especially in the char and middle-income groups. The BRAC staff group demonstrates

a more even perception; this could be as a result of consumption changes already having taken place in this group prior to the recall period.

There does not appear to be a taste preference counting against wheat-based products, in fact there appears to be a transition towards processed wheat products. This could be associated with societal changes linked to increasing industrialisation and urbanisation of the population. Households, quite naturally, have a preference to avoid time-consuming preparation tasks such as converting wheat flour into wheat products. This is further supported by the later figures on biscuit consumption (Table 2.9)

Table 2.6 Perception of changes in bread consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	58	63	51	67	37	53	71	51	58
Decrease	14	15	31	21	37	25	9.2	16	18
No Change	28	23	17	13	26	22	20	33	24

Source: Field survey 2003

Table 2.7 also shows that bread represents a much higher percentage of total food expenditure for most groups than wheat flour expenditure. It is around 8% of total food expenditure for slum dwellers and the BRAC staff. The percentage of households consuming bread in the last 3 days is relatively high across all the sample groups and passes 40% for the rich, middle income and high vibrancy village groups. The lowest percentages for consumption in the recall period are for the low vibrancy village, the char and the poor group. This is clearly indicative that bread does not have negative consumer preference and is consumed by the higher income, less traditional groups.

Table 2.7 Consumption pattern of bread by area and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Bread consumption frequency of last three day (%)	32.3	41.3	37.5	33.3	34.8	32	41.5	41.8	36.6
Per capita bread expenditure per day (Tk.)	0.67	0.43	0.44	0.68	0.98	0.51	0.60	0.59	0.55
% Of bread to total food expenditure	3.51	1.66	7.89	3.02	8.69	2.93	2.42	1.95	2.59
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

Table 2.8 Intra-household consumption patterns (%)

CONSUMERS	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
All household members	17	23	31	17	36.8	21	18	32	22
Children below five year of age	41	45	26	50	32	39	47	35	41
School going children	24	19	29	21	11	20	21	26	21
College going children	0.9	-	-	-	-	-	1.1	-	0.3
Male earners	18	12	5.7	13	-	18	10	7	14
Guest	-	-	2.9	-	-	0.7	-	-	0.3
Ill and old	-	1.8	5.7	-	16	2	2.3	-	1.7

Source: Field survey 2003

Interestingly bread does not have the same intra-household consumption profile as rice, which all household members consume. Consumption by all household members only reaches one third in the case of BRAC staff and the rich group. Consumption of

bread is focused on children, both the young and school going age groups. Across all groups the percentage that perceive bread consumption as primarily for children is 62%. Amongst the poor groups, including low vibrant villages and slums, there is also significant consumption by male earners only. This could be associated with the changing patterns of employment and the nature of food consumption associated with the new industrial jobs. Bread could be considered as a convenience food for industrial workers and school going children for lunchtime consumption, if they are unable to return home. The percentage of households recording consumption primarily for young children is interesting, with bread apparently seen as having nutritional advantages for the young.

Table 2.9 Consumption pattern of biscuit (local) by area and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Biscuit (local) consumption frequency last three day (%)	39.1	61.1	55	36.7	47.8	37.8	58.5	65.7	49.2
Per capita biscuit (local) expenditure per day (Tk.)	0.97	0.95	0.75	0.71	1.26	0.66	1.03	1.36	0.91
% Of biscuit (local) to total food expenditure	1.19	1.96	1.58	0.93	1.87	0.99	1.94	2.18	1.5
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

Biscuits consumption shows high percentages of households consuming in the recall period, especially in the rich and high vibrancy village groups. Even in the char and poor group over a third of the households have consumed biscuits within the last 3 days.

Although expenditure is not large it does reach up to 2% of total food expenditure for certain groups, which is a large amount for a marginal product in the diet. As with bread products this consumption is strongly associated with children and to a lesser extent consumption by male earners.

Table 2.10 Consumption pattern of biscuit (brand) by area and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Biscuit (brand) consumption frequency last three day (%)	19.5	20.6	5.0	10	17.9	2.9	24.5	43.3	17.1
Per capita Biscuit (brand) expenditure per day (Tk.)	0.97	0.95	0.75	0.71	1.26	0.66	1.03	1.36	0.91
% Of biscuit (brand) to total food expenditure	1.19	1.96	1.58	0.93	1.87	0.99	1.94	2.18	1.5
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

For branded biscuits the percentages of households consuming are not as high as local biscuits, especially in the slum, char and poor groups, but a contrast is clearly visible with the rich group in which over 40% have consumed branded biscuits in the last three days. It is clear that branded biscuits are not a feature of the poor's diets but at the 40% level they are a feature of the rich group diet. The advantages in terms of quality, storage, and safety of branded biscuits are a factor and the market for branded biscuits could expand with income gains.

As for bread, Table 2.11 indicates that consumption of biscuits is not for all household members with high levels of household recording consumption by young and school age children. Only the BRAC staff group have high percentages of consumption by all household members at nearly 43%. For slum dwellers consumption strongly favours young children, here nutritious biscuits provided to poor groups may be an important feature of the diet.

Table 2.11 Intra-household consumption of biscuits (local) by sampled groups (%)

CONSUMERS	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
All household members	29	24	19	22	42.9	23	31	30	26
Children below five year of age	33	43	32	52	24	39	41	30	38
School going children	29	20	35	26	9.5	25	22	30	25
College going children									
Male earners	5.7	7.5	2.7	-	-	7.7	5.7	6.3	6.8
Guest	2.8	1.7	5.4	-	-	2.6	1.1	3.1	2.3
Ill and old man	-	3.3	5.4	-	24	3.2	-	1.6	2

Source: Field survey 2003

There are high levels of perceived increase in biscuit consumption (Table 2.12), some of the highest recorded for any food item. The rich and middle-income groups record perceived increases at over 70% of the sample. Local biscuit consumption would appear to be an increasingly important element of the diet for all households. The same perceptions of increases in branded biscuit consumption are seen in Table 2.13. For the rich group even higher perceived increases are recorded, however in the slum group the trend is reversed with perceived decreases in consumption higher than increases. This is similar to the pattern for many higher cost goods, they seem to be pricing themselves out of the diet of the very poor. The diet of the poor would appear to entrenching into an even more imbalanced pattern, with limited ability to consume higher value, higher protein items.

Table 2.12 Perception of changes in biscuit (local) consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	62	55	51	65	48	44	73	70	58
Decrease	11	22	35	17	24	29	13	6.3	20
No Change	26	23	14	17	29	27	15	23	23

Source: Field survey 2003

Table 2.13 Perception of changes in biscuits (brand) consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	65	54	30	69	50	37	68	76	56
Decrease	11	21	40	6.3	36	29	16	6.3	20
No Change	24	25	30	25	14	34	15	17	25

Source: Field survey 2003

2.5 Marketing

Wheat marketing exhibits many differences to rice marketing. Firstly wheat has a major import sector, more than 50% of wheat is imported. This involves a significant role for the private sector, offering employment opportunities in this chain. Secondly rice is sold for direct consumption whereas milled wheat can be processed into a number of different intermediate products and processed into specific end products for consumption.

Significant changes in the wheat market have taken place recently, even though overall wheat consumption has not increased. A key transition in the market has been from one dominated by the PFDS and involving simple processing chains to one dominated by millers and bakers with diversified end products targeted at industrial users (ref).

Unlike rice, wheat is still very important in the non-monetised PFDS channel, for example the food for work, food for education programmes and VGD programmes (rural rationing and ration shops have ceased). The Ministry of Food is still important in the wheat market, in spite of the growth of the private sector trade.

Nearly 33% of the grain required by the mills is provided via the PFDS channel. (Baulch, Das et al. 1998). Those receiving PFDS wheat under non-monetised programmes consume the rest of the PFDS supply as wholemeal flour crushed by roller mills and *atta chakas* (wheat crushers). There is nevertheless considerable leakage from the PDFS system with beneficiaries selling wheat to purchase other food items and loss from the LSDs (local supply depots) prior to distribution.

In the wheat marketing chain the millers are crucial actors with two basic categories, major or compact mills (300 in number) and roller mills (3,000). In addition there are numerous *atta chakkas* or wheat crushers. Roller mills and *atta chakkas* produce only *atta* whilst major or compact mills produce fine *atta*, white flour and by-products such as semolina, vermicelli and bran.

Apart from millers, there are other private actors in the chain including *beparis* and wholesalers. These make wheat available to the millers acquired from farmers, importers and PFDS beneficiaries. These traders are concentrated in a few markets and are often seasonal operators generally involved in multi commodity trading. Warehouses are important in the import sector for bulk storage and consequently privately owned provision is concentrated in Chittagong and Naryanganj.

Liberalisation adversely affected the *atta chakka* sector in urban markets. The wheat market shifted towards consumption of fine *attas* (less than 10% bran) and white flour with the development of brand name products. This shift in consumption patterns, especially in the urban areas, has increased the importance of product characteristics in the wheat market. It has also developed sections of the wheat market to serve differential product markets. There is evidence that brand name products are beginning to penetrate the rural market creating competition for rural roller mills and *atta chakkas*.

In the liberalised market millers and bakers have experimented with different varieties of wheat and flour and invested in specific technologies requiring high quality wheat. Consequently wheat can no longer be considered a homogenous product. Domestically grown wheat tends to be soft, white and low protein and is used predominantly in the household preparation of flat breads.

Government imports of wheat are determined by price and are normally low quality varieties. Private traders have therefore moved in to service the demand for high quality (harder, higher protein) wheat from bakers, millers, sweet manufacturers etc. However, in high domestic price conditions private traders will also import cheaper soft wheat for sale to non–mill consumers. India is currently the major source of this supply.

Traders favour concentration on the quality market as this market is subject to less government intervention. The number of private importers in the bulk wheat trade from outside the region is less than 10, though smaller traders are involved with the Indian market. Bulk trade in wheat requires high investment costs, and large traders maintain the trade with advances from flourmills and by combining shipments with other commodities e.g. oilseeds.

2.6 Processing

Wheat based food processing industries are expanding rapidly, especially the bread and biscuit industries. These products are being marketed throughout the country even into poorer rural areas. Some commentators have suggested that these products could

be fortified with Soya bean protein to provide nutrition supplements. This expansion would help the nascent industry and help in the diversification of diet. Cereal based baby foods are also an expansion possibility (Rahman Khan 2002).

2.7 Summary

Wheat production and consumption is very secondary to rice. Wheat production has increased though initial consumption figures suggest that consumption has fallen. Consumption of wheat flour does appear to be decreasing, though it is still a larger part of the poor's diet, mainly through the influence of the public distribution network.

The consumption of wheat-based products is increasing, especially amongst the less poor and the urban dwellers. The survey showed that bread and biscuits have the highest number of households perceiving " increasing" consumption for any food item. A significant proportion of this increased consumption is in the packaged and branded sector. Although this market is still small it does appear to growing amongst the less poor and the urban dwellers. Unlike rice, wheat and wheat-based product consumption is higher for specific household members, notably children and male earners.

The wheat sector market is witnessing increasing private sector involvement, as the public distribution network is diminishing in importance. The growth of the import sector has also encouraged this private sector involvement.

The changing nature of the market, with processed products replacing wheat flour purchases, is affecting the small-scale millers and they are loosing out to the larger scale automated millers. This may have negative impacts for the poor involved in this sector, but the whole growth of a processing and packaging sector may offset these losses.

3.The Fishery Sector

3.1 Introduction

The fishery sector in Bangladesh is complex, containing both capture fisheries and aquaculture. The capture fishery can be sub-divided into inland and marine fishing. Capture fisheries dominates total production, but aquaculture has grown rapidly since the early 1980s, whilst marine fishery has remained static (Thompson, Roos et al. 2002).

Fisheries are the second most important sub-sector of agriculture in Bangladesh with great significance for food supply, nutrition, employment, and foreign exchange earnings. Fish accounted for nearly 5% of GDP in 2001, and 8% of total export income came from fish products (ref). The sector provides full-time employment for 1.2 million people with a further 11 million people having livelihood strategies directly related to fishing activities.

3.2 Production

Total fish production was estimated at 1.55 million M.T. for 1998-1999, this amounted to 12 kg person p.a., some of the highest production levels in the world. Most rural people, especially the landless and marginal farmers, fish in some way, on a subsistence, seasonal, professional basis or commonly a combination of these. (Craig, Halls et al. 2002).

Aquaculture growth has increased overall production levels but reduced the levels from capture fisheries. Over the last decade fish production from inland waters has increased at a rate of nearly 6% p.a. A concentration on the production of larger species, such as carp, for market sales, has occurred. This appears to have removed a valuable source of local protein for the poor in favour of trade to the wealthy urban markets (EU 2000).

The national fisheries policy aims to; increase production, reduce poverty via the growth in employment opportunities, and increase foreign exchange with the growth in fish exports. This emphasis on poverty reduction has resulted in large-scale donor and NGO interest in the sector, many NGO-fisher community partnerships have evolved to develop production, harvesting and marketing activities in a sustainable manner (Craig, Halls et al. 2002).

3.3 Consumption

Despite this emphasis on fishery production there are concerns that fish availability, especially for the poor, is declining. The intensification and expansion of rice production has reduced the area of inland water bodies, as a consequence fish habitat has been reduced.

Fish is a critically important food item in both the rural and urban diet and provides 20% of the animal protein. Fish provided 15% of average daily protein intake, second only to cereals (60%) in 1999. Fish consumption increased by 9 % in the period 1991 to 2000 (Sattar Mandal 2002). However, fish consumption needs to increase to levels of 50 grams per day, up from 24 grams per day currently to reach more desirable patterns.

There are great seasonal and regional variations in the contribution of fisheries to consumption. Those people with access to *beel* fisheries have seen consumption increase, for those without access consumption has decreased as they become more dependent on purchased fish (Thompson, Roos et al. 2002), (ODA 1995)

Table 3.1 Average Per Capita Daily Intake

ITEM	1991-92			1995-6			2000		
	Nation	Rural	Urban	Nation	Rural	Urban	Nation	Rural	Urban
Food Total (grams)	887	878	938	914	911	931	893	899	871
Fish (grams)	34.5	32.5	47.8	43.8	42.2	51.7	38.5	37.8	40.89

Source: (BBS 2001a)

Table 3.1 indicates this fairly static picture of fish consumption, with the national figure increasing only slightly over the period, whilst consumption in urban areas has declined between 1991 and 2000, although the intervening figure in 1996 is higher for all areas. Shortage of supply in urban areas has increased the price and reduced consumption, especially amongst the urban poor.

3.4 Consumption of Fish: Survey Results

Fish has been a traditional component of the Bangladeshi diet and in the sample areas high percentages of households have consumed fish in the last three days. The rich/surplus group and BRAC recorded the highest percentages consuming in the 3 day period. There is a distinct trend through the poverty profile with access to local fish a further determinant In the slum group only 58 percent of households consumed fish in the recall period. The per capita expenditure on fish is low in the poor, slum and char categories. Consumption is slightly higher in the char areas, doubtless due to access to locally caught fish. In the rich and BRAC staff groupings the percentage of total expenditure spent on fish is high at over 10 percent.

Table 3.2 Consumption pattern of fish by sample and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Fish consumption frequency of last three day (%)	80	82	58	73	100	68	83	94	78
Per capita fish expenditure per day (Tk.)	2.24	2.67	1.36	1.4	3.23	1.3	2.43	4.25	2.21
% of fish to total food expenditure	8.36	9.27	6.07	5.81	10.1	6.7	8.79	11.1	8.17
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

Fish is clearly an item in the diet that is consumed by all household members as shown by Table 3.3

Table 3.3 Intra household consumption of fish by sampled groups (%)

CONSUMERS	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
All household members	100	98	97	100	95.7	99	98	99	99
Children below five year of age		1.7				.6	1.1		.6
Male earners		.8	2.7			.6	1.1	1.5	.9
Ill and old man					4.3				

Source: Field survey 2003

The sources of fish are fairly even distributed throughout the samples and the poverty profile, as expected the slum group is the most market dependent with no home caught fish. The rich group have the highest access to home caught fish at 23 percent of total intake. Most market-sourced fish comes from low level markets apart from the poor who source more from the fixed market. CHECK MIDDLE INCOME FIGURES

Table 3.4: Sources of fish consumed (%)

SOURCES	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home produced	11	13	10	0	15	12		23	
Low level market*	54	53	55	74	46	39		68	
Fixed market**	33	33	32	26	40	47	100	4.5	

*Bought from neighbour/local trader, bought from *Haat,* bought from street trader
** Bought from fixed *Bazaar*, bought from shopkeeper
Source: Field survey 2003

The perceptions of changes in fish consumption over the last 5 years are very interesting. The percentage of households perceiving decreases is higher than those perceiving increases for all groups except the rich. In the poor group over 60 percent perceived a decrease. The highest perceived decrease comes from the char area, this

could be as a result of the price pushing fish out of their consumption basket or reduced access to fish from open access resources. The price of market-sourced fish is clearly affecting the consumption patterns of the slum dwellers. This is another high value, high protein food item showing increasing levels of inequality in consumption patterns.

Table 3.5 Perception of changes in fish consumption over the last 5-year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle class	rich	Total
Increase	31	25	16	10	26	17	22	49	25
Decrease	47	52	57	67	35	61	48	28	51
No Change	23	23	27	23	39	22	30	22	25

Source: Field survey 2003

3.5 Marketing Structure

Over 95% of the capture fishery is for the domestic market (10^6 tons of fish annually) and consequently the market is extensive and complex. There are basically four levels of market involved in the distribution of fish; primary markets, assembly markets, wholesaling markets and central or terminal markets. The broad channel is Fisherman$\Rightarrow$ *Bepari*$\Rightarrow$ *Aratdar*$\Rightarrow$*Paiker*$\Rightarrow$Consumer. Fishermen rarely go directly to market rather *bepari* visit the fishers at the fishing grounds and transport the fish to a local assembly or wholesale market. Commissioning agents hold auctions at these markets to distribute to wholesalers, retailers or distributors (Craig, Halls et al. 2002). Although a broad market chain has been outlined there is, in fact, a wide variety of traders, most opportunistic fishermen will also be occasional traders when they have occasional catch to dispose of, others may be fairly regular seasonal traders

There is a social stigma attached to being fish-traders and fishermen, and as markets are public affairs many children can be seen selling small quantities of fish in the local *haats*. Given these social attitudes the recording of the importance of fish trading to incomes is unlikely to be accurate (ODA 1995).

There are professional fish traders, these are often fishermen who have been forced out of fishing by competition. The reverse can occur with fish traders becoming involved in the business of fish capture. At the large-scale wholesale market there are fish traders in urban areas dealing with the long distance movement of fish. These *chalani* or *aratdars* range from individual retailers to large-scale fish dealers with international connections (ODA 1995).

Table 3.6 Outline of Actors, Produce and Locations in the Fish production and Trading Networks

ACTORS	PRODUCE	LOCATION
Collectors	Hatchlings	River/ Hatchery
Fishermen		
Middlemen		
Nursery Pond Owner	Fingerlings	Nursery ponds
Fingerling Traders		
Wholesalers		
Local fingerling traders		
Village Pond Owners	Food fish	Food Fish Ponds
Commercial pond owners		
Fishermen		
Food Fish Traders		Rural and Urban Markets

Source (Lewis, Gregory et al. 1993)

In addition to fish trading there is an important market in fish–seed trading, large volumes of hatchlings are transported around the country. Traders sell to commission agents, who resell the fingerlings to small traders who travel around the villages and retail to pond owners. The smaller traders are often landless poor people who employ fish trading as a seasonal part of a portfolio of income generating activities (Lewis, Gregory et al. 1993) .

3.6 Processing Structure

Consumers in Bangladesh have an overwhelming preference for fresh fish, and as water sources are always nearby local fresh fish supplies are readily available. This may account for the limited development of fish processing industries. Fish processing does occur with salting, sun-drying and smoking but overall only around 15% of the catch is processed (Craig, Halls et al. 2002). Drying may be more common to preserve excess fish for home consumption. Even so it is more likely that excess fish are sold fresh in the readily accessible local market (ODA 1995). A processed market does exist, but is declining as transport improvements have allowed faster movement of fresh fish.

3.7 Issues in the Sector

3.7.1 Ownership

Open-water capture fisheries have traditionally been considered an open access resource, however this situation has been changing rapidly. Firstly, the *beel* fisheries have traditionally had tenure arrangements for rights to fish, but nowadays fishermen rarely have the resources to be directly involved in the ownership. There is a tier of leaseholders, often local landlords, businessmen, traders etc and the role of these fishing financiers is thought to be increasing. These tenurial patterns are spreading to floodplain fisheries as the value of the resource is realised. Owners build pits and brush piles to capture the fish with the receding flood-water (ODA 1995). The overall affect is the open access aspect of the fishery is declining, to the clear detriment of the poor. The poor have historically fished in the common pool resources using inexpensive homemade fishing gear, as such it is an important livelihood strategy. De

Graaf and Martin (2000) estimate that nearly 70% of households are involved in subsistence fishing, accounting for 33% of the catch, whilst only 1% of households are full time fishers.

3.7.2 Status of Fishers

Until the 1970s most fulltime fishermen were from traditional fisher groups and were mainly Hindu. However, the rising population, Hindu emigration, and competition for resources have led to an increase of fishermen from non-traditional groups (ODA 1995). Nevertheless fishing is still widely considered a lowly occupation, consequently many children, widows and very poor women are involved in opportunistic fishing and trading (ODA 1995). Generally women are rarely seen in capture or marketing roles, but work in home based activities such as net manufacture (Craig, Halls et al. 2002).

3.7.3 Agricultural sector changes

Changes in the structure of the rural economy and improved technology have altered livelihood opportunities within the fisheries sector. The switch to dry season irrigated rice production has complemented income generation from fishing. Now labour demands can be more evenly spread across the year with the wet season a focus for fishing activity, this had helped income stability for the poor (Craig, Halls et al. 2002). There has been a large increase in the fishpond culture with thousands of new ponds excavated. Fish farms are linked to hatcheries for fingerlings either directly or through hundreds of small vendors who carry them in pots and sell them at the farm-gate (Sattar Mandal 1999).

3.7.4 Fishing Livelihoods

In addition to those directly engaged in fish capture, around 2 million people are involved in activities related to fisheries including; traders (about 1.2 million on a relatively full time basis), transporters, packers, and processors. The fisheries are also a source of income (rent) for the “jalmahal” leaseholders and the water bailiffs they employ to enforce their property rights (Craig, Halls et al. 2002). Fish trading is a major livelihood opportunity for the rural poor. There is a complex system of

employment opportunities, from carrying baskets from landing points to point of sale to the large-scale *aratdars* organising national distribution networks.

3.8 Shrimp and Prawn Sub-Sector

3.8.1Production

This sector has been a major growth area, especially its contribution to foreign trade earnings. Shrimp and prawn production grew rapidly from 3,800M.T in 1976 to 31,5000 M.T. in 1996 (BBS 2000), of this 85% of this was from the cultured sector. The export trade is mainly frozen primary products with very little on- processing into semi-cooked products.
In the regions of Khulna and Bagerhat smallholders have switched from rice production to freshwater prawns bringing important livelihood changes (Ito 2002). Prawns are cultured in freshwater ponds known as *gher* and incomes can be many times more than rice farming. The traditional paddy landscape has been transformed, as has the local economy.

3.8.2Marketing

Prawn marketing consists of 5 layers of actors; at the top the processing and export companies, these employ commission agents to buy from the local middlemen; the local middlemen or *depot maliks* are the primary first buyers and have some storage facilities; they sometimes purchase from *farias* who collect directly from local producers.

The *depots maliks* operate a credit system (dadon), however, they often cheat on this, paying less than the original price. Increasing competition amongst *depot maliks* has helped to reduce these practices. Competition for produce has forced *depot maliks* to pay for labourers to assist farmers in harvesting to ensure sales.

3.8.3 Constraints

Shrimp cultivation has experienced significant criticism on ecological and economic grounds including; loss of mangrove swamps, increasing soil salinity, export production harming local food security, control by larger players, and traditional water management practices being damaged.

The rapid expansion in the sector has led to over capacity in the processing factories of Khulna. . Freezing capacity increased dramatically from 9 processing plants in 1971 to 123 in 1997, but the utilisation of these plants is now low due to a shortfall in supply of quality raw products (Rahman Khan 2002). Problems have arisen with the maintenance of quality standards for this market due to poor processing and transport infrastructure

3.8.4 Issues in the sub-sector

Unlike the shrimp sector, the prawn sector does not appear to be dominated by large landlords, in fact there is increasing small farmer involvement. Land prices have risen with the development of the freshwater prawn cultivation and these inland plots have more clearly demarcated ownership than the brackish water coastal margins. Consequently land consolidation is more difficult and the bad publicity associated with the development of shrimp lords also countered the process. There are risks in prawn cultivation, natural disasters such as floods remove the prawns from the *ghers,* and diseases in the densely packed *ghers* are common. Therefore many absentee landlords have lost money in prawn production and prefer to be involved in processing and transport leaving the greater production risks to the small farmers.

The employment opportunities have been significant; the landless poor were involved in the construction of *ghers* and obtained posts as caretakers of *ghers (pahari)*. These

caretakers earn 1,00TK to 1,800TK per month, this is less than the daily wage rate of 60 –100TK per day but the employment has more long-term security (ITO 2002).

There are also jobs guarding prawns, catching prawns, *gher* repairing, net making, snail shell breaking, and van driving (to Khulna processing areas). Evidence of the growth in labour opportunities has been seen by the influx of seasonal migratory workers.

The local market for other produce has also changed. Egg sellers would have previously gone to Khulna to sell their produce but increased income in the prawn villages has created new markets in the villages.

Women have become relatively more involved than in the crop sector. Undertaking tasks such as applying fertiliser, feed, cleaning channels, re-excavating channels, harvesting and preparing feed. This is especially true for Hindu women who also work as night guards protecting the prawns. Women and children work in teams for traders in the shelling of snails, the snails are brought in as feed from other districts. Processing factories provide employment opportunities, especially for poor women living in the slums of Khulna.

3.9 Summary

Production of fish is very high in Bangladesh and is showing an overall increase, but this has mainly come from the growth in aquaculture and open-access capture fisheries have declined. The latter is the normal source of fish for the rural poor. Figures tend to suggest that fish consumption is undergoing a slight increase or remaining static. However, there are worrying signs of declining consumption amongst the poor, especially the urban poor, who depend on the market.

Fish are mainly sourced from low level markets and the marketing and processing networks are very under-developed due to the social stigma of fish trading and the preference fro fresh. The poor market development is a factor in pricing of fish out of the shopping basket of the poor, together with the increasing demand from the growing urban surplus group.

The ownership of fishing resources is a key issue in the sector, the increasing value of fish has meant that traditional open access resources are being captured by landlords. When is combined with the drainage of land for rice cultivation this has led to decline in the availability of fish for poor consumers, especially the small fish consumed by the poor.

The shrimp and prawn sector is an important export earner, though it does not contribute greatly to the diet of the local poor. There are problems in the sector, relating to ownership and hygiene /quality standards in the processing sector, but the sector does provide evidence that diversification can result in increased incomes for poor people gaining employment in the transport and processing elements of the sector.

4.The Poultry sector

4.1 Introduction

The Bangladeshi diet is highly imbalanced with a very low contribution from animal proteins. The WHO recommends 55gram of animal protein per person per day (WHO 1983). The level in Bangladesh is 7.6grams per person per day. Consequently there is a need to increase the production and availability of meat, eggs and other high protein foods.

The government and NGO's have recognised this need, placing special emphasis on poultry production due to its suitability for poor producers. Poultry rearing is already an important source of nutrition, income generation and employment for rural households. Most rural households keep poultry for their family income and home consumption (Biswas et al 1999), with women normally responsible for poultry management. This is important, as it can provide an independent income helping to improve women's position in the household decision making process.

Although the sector has developed significantly over the last decade there is still need for further expansion. The importance of livestock can be seen by its contribution to

GDP. Livestock's contribution as a whole to agricultural GDP is 11.8% and 2.9% of total GDP, although the share of the sub sector to GDP has been declining (Alam 2002). Fowl are estimated to contribute nearly 14% to the total value of livestock output.

4.2 Production

There are currently estimated to be 97.55 million chickens and 29 million ducks in Bangladesh. In the period 1983 to 1996 the chicken population increased substantially with an annual growth rate of 3.6% (Alam 2002). Tables 4.1 & 4.2 provide further estimates of meat production, egg production, poultry populations and growth rates based on census data and BBS surveys. Poultry meat production nearly doubled in the 1990s whilst egg production more than doubled. The growth rates appear to have been highest in the late 1980's and early 1990's.

Table 4.1 Poultry Production and Trade

	1990/1991	1995/1996	1999/2000
Production of meat "000" M. Tons Chicken and Duck	79	106	154
Production of eggs (Fowl) million nos.	1,090	1,783	2,404
Trade in live poultry "000" Taka	NA	124,321	157,925

BBS Statistical Yearbook 2000

Table 4. 2 Poultry and Duck Populations and Growth rates

ANIMAL	LIVESTOCK POPULATION (MILLIONS)				COMPOUND GROWTH RATES %		
	Census 1983/4	BBS 1993/4	Census 1996	Adjusted BBS 1996 estimate	Census 84-- BBS 94	Census 84— Census 96	Census 84— BBS 96 adjusted
Chicken	61	120	98	119	6.12	3.6	5.11
Duck	13	22	29	34	4.89	6.43	7.65

Alam 2002

The growth rate in the chicken population is attributed to the large annual turnover and the recent expansion of commercial poultry farms. NGOs have also contributed with special programmes for poultry production amongst landless people.

Production growth has increased per capita availability of livestock products. However, there is evidence that the number of households owning livestock has declined. Major causes could be the shift to a semi intensive production system and the shortage of feeds. This has had consequences for the domestic consumption by poor households that no longer keep poultry.

In Bangladesh the poultry population density is high at 10.7 per hectare (Alam 2002). Despite this high density there is still an acute shortage of meat and eggs. Current production of eggs only meets 53% of minimum national requirements. However, the increase in egg production has been substantial over recent years. The availability of eggs from domestic production increased to 4424 million in 2001-02 from 1941 million in 1989-90. The growth rate was 6.3% per year (BBS 2000).

The price of eggs has declined at an annual compound rate of –1.1% (BBS 2000) suggesting that the prices paid for eggs in recent years were beyond the income of many consumers resulting in price and consumption declines. This is a disturbing development for poor producers who will be adversely affected by the low prices. The high growth rates in production are still inadequate to meet the minimum recommended intake of animal protein products as shown in Table 4.3, although the growth in egg production is close to the required rate.

Table 4.3 Required annual growth rate of meat and eggs to meet the minimum intake of calories over the next ten years.

FOOD ITEMS	GROWTH RATE REQUIRED TO MEET THE -		RECENT GROWTH RATES	
	Minimum intake	Effective demand	Production (89-02)	Consumption (88-00)
Meat (general)	8.1	6.0	4.4	5.2
Eggs	6.4	5.2	6.3*	-0.75

(Alam 2002)

* This does not match with the annual growth rate of poultry of (3.6%) in the recent past.

Commercial farms have been important in production increases, government policies encouraged the establishment of livestock farms in the 1990s and there was a rapid expansion of private sector commercial poultry farms. The number of poultry farms increased from 38,000 in 1990-91 to 106,000 in 2001-02, this is a simple annual growth rate of 14.57% and a compound growth rate of 8.42%. The failure rate of new farms is estimated at around 30% and so at least 65 % of farms reported are assumed to be still operational.

The government initiatives also encouraged many NGOs to develop dairy and poultry sectors. For example, BRAC's poultry programme engaged 1.2 million women and trained over 40,000 poultry vaccinators.

4.3 Consumption

Increased poultry production has not resulted in increased overall consumption levels. Production growth has been matched by population growth and net availability has fallen leading to a worrying decline in the consumption by poor income groups. Table 4.4 using BBS survey data indicates that although there were fluctuations in the consumption of broiler meat and eggs in the period 1984 to 1996 the long term trend remains fairly static

Table 4.4 Consumption of Meat and eggs in Bangladesh (per head per year)

YEAR	BROILER MEAT (KG)	EGG (NUMBER)
1984-85	3.9	11
1985-86	4.7	12
1986-87	4.7	12
1987-88	3.1	12
1988-89	3.2	13
1989-90	3.3	14
1990-91	3.3	14
1991-92	3.4	14
1992-93	3.5	16

1993-94	4.2	16
1994- 95	3.6	12
1995-96	3.7	12

BBS from Raha 2000

Table 4.5 broadly supports these findings but notes a substantial increase in total meat consumption in the late 1990's and the IFSNS data shows an increase in the consumption of egg for rural people. For urban areas the situation is different with substantial increases in meat consumption and more limited increases in egg consumption. As can be seen from Table 4.7 the contribution to protein intake from poultry meat sources is still low but it is has doubled in urban areas.

Table 4.5 Household expenditure survey (HES and Nutrition Survey (IFSNS) Consumption estimates (Kg/ per capita / per annum)

FOOD ITEM	HES YEAR				IFSNS YEAR	
	1988-89	1991-92	1995-96	2000	1981-82	1995-96
Meat (general)	2.34	2.96	4.23	4.85	1.83	2.19
Eggs	2.15	1.71	1.17	1.93	0.44	1.09

IFNSNS figures indicate per capita food consumption for rural people.

The consumption of animal protein is expected to increase, yet there is still a large gap between supply and demand for livestock products. However, if demand increases without the required increase in supply, prices will increase dampening the demand increase and adversely affecting poor people.

Table 4.6 Average per capita daily intake of poultry products

AVERAGE PER CAPITA DAILY INTAKE CHICK-DUCK (GRAMS)	1990/1991	1995/1996	1999/2000
National	2.0	4.0	4.5
Rural	1.9	3.4	3.52

Urban	3.1	7.5	8.41
Average per capita daily intake eggs (grams)			
National	4.7	3.2	5.27
Rural	4.6	2.6	4.61
Urban	5.8	5.9	7.89

BBS Statistical Year Book 2000

Table 4.7 Percentage of protein intake by food items (chicken and duck)

	1991/2	1995/6	
National	0.8	1.29	
Rural	0.74	1.07	
Urban	1.17	2.37	

4.3 Consumption of Poultry products: Survey results

The survey data concentrates on the consumption of eggs; meat consumption data was not separated into individual sources of meat. Table 4.8 illustrates the consumption patterns of eggs in a 3-day recall period by sample groups and poverty status.

Table 4.8 Consumption pattern of eggs by area and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Eggs consumption frequency of last three day (%)	48.1	47.6	45	13.3	65.2	32.6	51.1	65.7	44.4
Per capita eggs expenditure per day (Tk.)	1.19	1.26	0.65	1.72	1.47	0.65	1.53	2.18	1.21
% Of eggs to total food expenditure	1.82	1.71	3.1	0.47	2.07	1.7	1.87	1.93	1.80
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

Egg consumption is clearly shown to increase through the poverty profile, with the percentage consuming eggs more than double in the rich group than the poor. The lowest levels of consumption are seen amongst the char group, where only 13% of the char households consumed eggs in the period. Frequency of consumption in the slum area is comparable to village levels but in the slum egg consumption represents a higher share of total food expenditure, even though it is still low. This indicates the consumption of egg from home production in the rural areas. The BRAC staff group have the highest percentage of households consuming at over 65%.

Table 4.9 Frequency of eggs consumption (%)

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Once daily	16	18	18	-	30	11.0	17	28.4	16
Twice daily	6.7	8.3	2.5	-	8.7	5.2	6.4	9.0	6.7
Thrice daily	-	0.8	5	-	-	0.6	2.1	-	0.9
Once weekly	20	22	10	23	22	17.4	22.3	22.4	20
Twice/thrice weekly	16	14	20	13	26	10.5	18.1	28.4	16
Once fortnightly	13	7.5	7.5	23	8.7	15.1	9.6	1.5	11
Once monthly	5.8	3.3	7.5	23	-	9.9	3.2	1.5	18
Sometimes	2.5	5	2.5	-	4.3	22.1	18.1	7.5	3.3
Hardly ever						4.7	2.1	1.5	
On special occasion						-	-	-	
Never	0.8	2.5	5	3.3	-	3.5	1.1	-	2.1

Source: Field survey 2003

The consumption frequency pattern is as expected for this higher value protein item. The disturbing element is the very low consumption frequencies in the char area and amongst the poor. Over 50% of the poor group have no or very infrequent consumption of eggs. When this is viewed in the light of eggs being a cheaper source of protein than meat or fish then this is a disturbing finding. Again the BRAC staff group has the highest percentage of daily consumption, which indicates their higher income but also their switch to a higher protein diet.

Table 4. 10 Intra- household consumption patterns (%)

CONSUMERS	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
All household members	78	80	87	86	39.1	83	77	67	78
Children below five year of age	7.6	11	-	3.4	30	7.8	8.6	13	9.2
School going children	4.2	5.1	5.3	-	8.7	1.2	5.4	12	4.6
College going children	0.8	0.9	-	-	-	0.6	-	1.5	0.6
Male earners	8.4	1.7	7.9	10	-	6.6	8.6	6	7.1
Guest	-	0.6	-	-	-	0.6	-	-	0.3
Ill and old man	0.8	-	-	-	22	0.6	-	-	0.3

Source: Field survey 2003

Egg consumption in the majority of households is for all members, but significant percentages were recorded for special groups, notably children and male earners. The BRAC group shows 30% of households see egg consumption as predominantly for young children. This is far higher than the other groups and may be a collection error, but all groups, except the char, recognise that young children are favoured in the consumption of this high protein item. Interestingly it is in the middle income and rich groups that the highest recognition of consumption by children is noted.

Male earners also appear to be sole consumers in some households, up to 10% for slum households and high in low vibrant villages. This is important, especially in the poor areas where consumption levels are already low and consumption is weighted towards specific groups within the household.

There are definite differences in the sources of eggs consumed (Table 4.11), the poor rely on a variety of sources including home produced and market sources, the middle income groups are much more market dependent, especially the fixed market, whilst the rich group clearly have access to a supply of home produced eggs and do not rely

on market procurement. Although char consumption is low the majority comes from home production. It is in these very poor areas that the concerning finding of eggs being produced but not consumed locally is witnessed.

Table 4.11 Sources of eggs consumed (%)

SOURCES	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home produced	45	38	52	-	33	36	11	75	34.4
Low level market*	32	29	28	73	42	38	22	25	38.0
Fixed market**	23	33	20	27	25	27	67	-	27.6

*Bought from neighbour/local trader, bought from *Haat,* bought from street trader
** Bought from fixed *Bazaar*, bought from shopkeeper
Source: Field survey 2003

Table 4.12 Perception of changes in eggs consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	27	38	32	24	35	25	35	43	32
Decrease	33	32	47	41	30	41	32	24	35
No Change	40	30	21	35	35	34	32	33	33

Source: Field survey 2003

Changes in egg consumption amongst the sample groups indicate the assertion that poor groups are facing decreasing consumption, both the char and the slum dwellers have high percentages of "decreasing" consumption perceptions, as does the poor group in the poverty profile. In contrast the rich group, the BRAC staff and the high vibrancy village groups have higher levels of "increased" consumption perceptions.

This suggests a growing inequality in the consumption levels of eggs. Supply shortages may be pricing the poor and middle-income groupings out of egg consumption, whilst poor producers are forced to market the majority if not all of their production.

4.4 Marketing Structure

There are separate marketing chains for broiler meat and egg production. The small-scale producers tend to have longer chains with more intermediaries before the consumer whereas the commercial farms tend to have more direct linkages with retailers in city markets. Various studies have drawn out the marketing chains and the percentages using the different chains have been estimated. Simple marketing chain structures are shown in Figures 4.1 and 4.2 (adapted from Raha 2000).

Participants in the marketing of egg include; farmers, dalal, aratdars, wholesalers, hawkers, and retailers. 90% of eggs are sold at the farm-gate to aratdars and 10% to smaller wholesalers often through dalal (these are local people who arrange contact and collection between farmer and aratdars). The dalal receive around 5 TK for selling 100 eggs. They try to avoid disclosing the actual selling price to the farmers, so have the ability to earn more on the transactions.

The aratdars sell 66% to wholesalers and 33% to retailers. The wholesalers sell 66% to retailers and 25% to hotel owners. The remainder is sold to hawkers and directly to consumers. Retailers purchase 60% from wholesalers and 40% from aratdars and sell 70% to consumers and 30 % to hotel owners.

The actors involved in the broiler marketing chain are broadly similar. The aratdars are still the major purchaser from farms with around 80% of the market, which means wholesalers are relatively more important for the broiler trade. The other major difference is that wholesalers market about 20% of their trade directly to consumers avoiding retailers. This is in contrast to egg marketing where less than 5% is marketed directly from wholesalers to consumers.

Figure 4.1 Layer Farm Marketing Channels

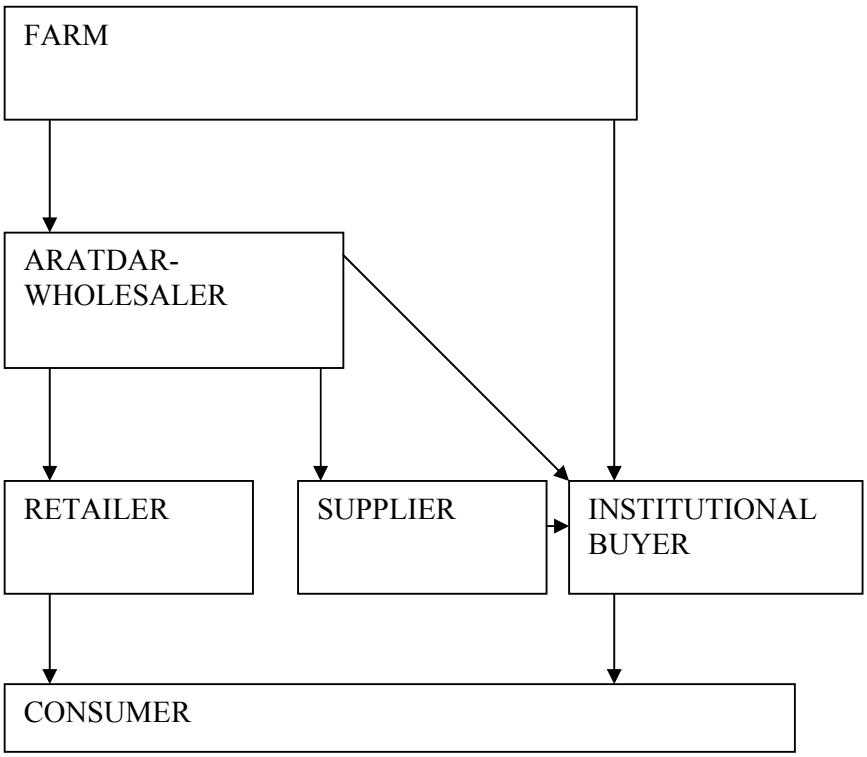
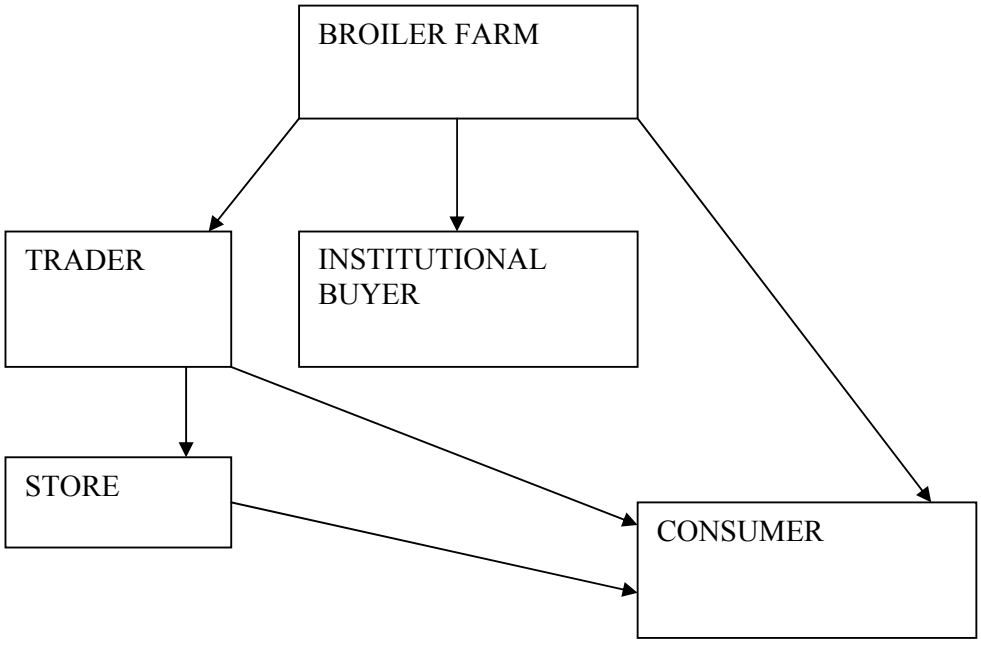


Figure 4.2 Broiler Meat Marketing Channels



Marketing chains are not well developed with numerous problems for producers, intermediaries and consumers. Producers often fail to receive a fair price for their products whilst consumers pay too much. This points to problems in the marketing chain and the ability of intermediaries to take advantage of the situation.

An important problem for the small-scale producers is the limited number of intermediaries acting in this sector. Competition is low and producers have to sell to whichever intermediary visits the village. Unscrupulous middlemen can take advantage of this situation to the detriment of the income of poor producers and consumers. Marketing problems are compounded by the fact that farmers and intermediaries have very limited storage for broiler meat and eggs. As perishable products that must be sold quickly and this may not result in the best prices being achieved.

The market in broiler chickens is especially dependent on selling at the right time. The broiler chickens should be sold at a certain weight regardless of market conditions and prices. Keeping the broilers for longer is uneconomic as they require feed but the value of the bird is not increasing. The transport system for broilers can also negatively impact upon the weight of the birds. Smaller birds are more popular and consequently achieve relatively higher prices.

The majority of consumers prefer the native "deshi" chicken meat, broiler meat is considered to be softer and have less flavour than local chicken. The market for broilers is negatively affected by the availability of "deshi" chicken.

Sabur (2002) looked at surveys of the problems in the marketing chains for both producers and intermediaries. The results are displayed in Tables 4.13 & 4.14.

Table 4.13 Problems faced by the layer farms in marketing eggs

PROBLEM	NO. OF RESPONDENTS	PERCENTAGE
Breakage of eggs in Transit	22	100
Hartal, strike and natural calamities	22	100
Higher demand for eggs of native birds	20	91
High transport costs	19	86
Fluctuation of demand	15	68
High cost of storage	12	55

Saha 1997

Table 4.14 Marketing Problems faced by egg traders (% of respondents)

PROBLEMS	ARATDAR	RETAILER	SUPPLIER	ALL
Breakage of ages in Transit	100	100	100	100
Lack of adequate and suitable transport system	100	71	100	90
Lack of operating Capital	59	67	57	63
No storage facilities	71	58	0	54
Inadequate market space	47	16	0	50
Spoilage	53	71	0	33

Saha 1997

The results reveal that poor transport is a major concern, reflected not only in high transport costs and the inadequacy of the system but also in the high breakage rates for egg traders. In addition storage, unrest and access to credit are cited as problems. These findings are similar to problems noted in the broiler marketing chain, listed as; illegal payments, hooliganism, terrorism, fluctuation of prices, death of birds, bird weight loss, increasing feed costs and delay in sale. For egg traders the additional problems were; poor communications, the presence of dalal, and hartals.

Many of these problems lead to high price variability, which is a major constraint to the expansion of the sector. This problem is often exacerbated by artificial shortages created by traders to maintain high prices.

The marketing system still requires development; in the present system middleman exploit deficiencies at the expense of the producers constraining growth. The larger producers have begun to develop contract arrangements with city retailers and have become involved in direct selling to consumers from sales centres in the city.

Sabur noted the marketing costs and the net margins for intermediaries in the marketing chains of egg and poultry meat (Tables 4.15 & 4.16) The total marketing cost for intermediaries for 100 eggs was calculated to be TK 12.67, of which 78% was faced by the aratdar (large wholesaler). Aratdars tend to move the products greater distances so face greater costs. However, the profit margins favour the retailers, their margins were 3 times higher than wholesalers. Retailers do assume greater risks, as they have to wait longer to sell a quantity of eggs and face the possibility of the stock perishing.

Table 4.15 Marketing Costs of Egg Intermediaries

TK per 100 eggs

COST ITEM	ARATDAR	WHOLESALER	RETAILER	TOTAL	PERCENTAGE
Transportation	5.32	0.38	0.55	6.25	49.33
Storage	0.63	0.10	0.00	0.73	5.76
Market Toll	0/28	0.15	0.12	0.55	4.34
Labour	0.31	0.05	0.08	0.44	3.47
Wastage	2.21	0.33	0.50	3.04	24.00
Rent	0.57	0.25	0.19	1.01	7.97
Miscellaneous	0.52	0.09	0.04	0.65	5.13
Total	9.84	1.35	1.48	12.67	100

Sabur 2002

Table 4.16 Marketing Margins of Egg Traders

TK per 100 eggs

INTERMEDIARIES	PURCHASE PRICE	SALE \PRICE	MARKETING MARGIN	MARKETING COST	NET MARGIN
Aratdar	229.76	249.15	19.39	9.84	9.55
Wholesaler	272.13	279.50	7.37	1.35	6.02
Retailer	281.86	303.33	21.47	1.48	19.99

Sabur 2002

For broiler marketing the aratdars again face the highest costs as they transport the product longer distances, with transportation, wastage and shortage of birds the highest cost elements. However, in contrast to eggs the wholesalers have the largest profit margins even though the retailer faces the greatest risk. This occurs as wholesalers market more directly to consumers and hotel purchasers.

4.5 Processing Structure

The egg sector still only considers the marketing of whole eggs and the diversified consumption of egg products is under-developed. Products need to be identified and popularised to allow market expansion, this is especially important for products that are easily stored.

Apart from modern outlets broilers are usually sold on a live weight basis. Farmers are not able to keep the birds long after the harvesting period as the bird will loose weight and so they have low bargaining power.

A small number of broilers are sold manually dressed and packaged in plastic bags. There appears to be a demand for dressed broilers, with people seen purchasing broilers, then dressing them in the corner of the market and reselling them. This system is not ideal and does not protect the interest of the producers. To boost production and cope with market demand, an improvement in slaughtering, dressing and preservation systems of broilers is needed.

A more systematic approach is required to allow for the functioning of broiler processing plants, they need a regular supply of live birds and a sound distribution channel for the processed product. Modern high standard plants would also meet the hygiene requirements of the export market. Contract growing broiler production systems could help the situation, as would the development of a frozen chicken processing, storage and distribution network. This should be driven by the growth in the high quality urban market and the export trade. Rapid urbanisation and changing lifestyles are likely to lead to the increasing demand for dressed chicken. Some companies such as Biman and Aftab have already begun partial processing of broilers.

Despite many constraints in the sector a small number of private poultry farms have been set up on a commercial scale. AFTAB Bahumukhi has established a huge poultry farm near Bajitpur producing more than 100,000 chicks per week in a modern hatchery. It has substantial backwards and forwards linkages that integrate the local poultry farmers into the market outlets. It is a contract-growing scheme distributing chicks, credit, feed, medicines and vaccines, and then buying back the broilers at the fixed rate for marketing through the ABFL sales centre. There is also a modern poultry processing plant at the local level (Sattar Mandal 1999).

4.6 Constraints

Many of the constraints in the sector have already been discussed in the marketing section, however constraints outside of marketing also exist. A major problem appears to be the shortage, and rising price, of feeds. Pressure on the land is increasing as it is turned to cereal production for human consumptio, reducing the amount of grazing land and land for feed production. Estimates of a 66% shortage of green fodder and 90% shortage of concentrates have been made; consequently concentrates are imported raising the price for the poultry industry. Feed is the major cost item and prices have risen; yet this has been accompanied by declines in the real prices of egg and minimal increases in the real price of broilers (Table 4.17). This has placed great pressure on the economic viability of the industry.

Poor rural women involved in semi-intensive production have been abandoning this system and returning to a scavenging system with reduced financial risk. This is leading to concerns about the large-scale promotion of poultry rearing as a poverty alleviation strategy, especially for the ultra-poor. Some commercial operations have also experienced difficulties and gone out of business. Under both the scavenging system and the intensive system the overall condition of livestock nutrition has worsened

For the individual farmer, especially the poor small-scale producer, a number of constraints exist. These are mainly related to the risks involved in rearing birds and the options to control these risks. Losses can be high due to the inability to finance disease control measures. This is combined with limited training opportunities in poultry raising techniques. There is a shortage of vaccines and price variability is very high. Birds can be lost through theft and by attack from predators, whilst protection against these eventualities is costly and time consuming.

Many of the farms, especially household farms, do not operate at full capacity, often due to credit constraints preventing investments. This is equally true for the processing sector which needs "coolers and freezer space, refrigerated delivery trucks, and storage space with refrigeration capacity in a supermarket style if the sector is to develop rapidly for the expanding urban market" (Rahman Khan 2002). Access to credit and FDI will be important to encourage this growth.

Table 4.17 Increase of nominal and real prices of poultry products.

ITEMS	NOMINAL PRICE			REAL PRICE		
	1981-2000	1981-1990	1991-2000	1981-2000	1981-1990	1991-2000
Chicken Meat	7.22	9.72	4.27	0.80	1.11	0.49
Eggs	6.15	9.29	2.69	-0.28	1.14	-1.10

(Alam 2002) Deflated by consumers price index base 1985

4.7 Issues in the Sector

4.7.1 Profitability of Poultry Farming.

A wide variety of poultry production systems exist in Bangladesh from small-scale scavenging to large-scale intensive systems. A number of studies have examined the productivity and profitability of these traditional, semi-intensive and intensive management systems. The data here concentrates on the survey cited in (Alam 2002)

Table 4.18 Comparison of the Productivity and Profitability of Poultry Production systems.

TYPE	TRADITONAL	SEMI INTENSIVE	INTENSIVE
SAMPLE	200	50	50
AVERAGE NUMBER OF BIRDS PER FARM	24.4	209	9704
EGG PRODUCTION PER LAYER PER YEAR	44	141	230
ANNUAL COST OF OPERATION TK	820	10733	715165
SHARE OF VARIABLE COST TO TOTAL COSTS %	91	97	94
COST PER BIRD	33.6	51.3	1067
COST PER EGG	0.49	2.02	2.16
NET RETURN	1588	3339	15968
UNDISCOUNTED BENEFIT COST RATIOS	2.9:1	1.3:1	1.2:1

(Alam 2002)

The higher productivity of the intensive systems is very marked with an increase from 44 eggs per bird per year to 230 eggs per bird per year. However, because of the higher costs associated with intensive production over the traditional scavenging system the cost benefit ratios are higher for the traditional system. This finding has begun to raise questions regarding the promotion of semi intensive production methods for poor landless groups.

The returns for the various systems accrue from different sources; egg sales represent the most important source of return for intensive farms whilst bird sales are more important for the traditional system (Table 4.19).

Table 4.19 Returns from Poultry Farming Systems

SOURCE	TRADITIONAL	SEMI-INTENSIVE	INTENSIVE
Sale of eggs	30%	31.5%	46.5%
Sale of Birds	38%	43%	37%
Value of present stock	32%	25%	16%
Other	0%	0.5%	0.5%

Poultry Science Association 2000

4.7.2 Linkages in the poultry production system

Poultry production has substantial input linkages that are important in developing the sector and creating employment and income opportunities. The major inputs are day old chicks, feed and medicine. Private companies and NGOs have become involved in input provision for the poultry sector, often in integrated systems.

About 100 poultry hatcheries exist to provide day old chicks. The larger farms fix the price on an informal basis and the smaller ones follow. Poultry farms normally have to place their order in advance with hatcheries through an agent. The distribution of chicks to poultry farms is organised by private brokers and agents of the NGOs, with some direct collection by farmers (Abul Quasem 2001). The average cost of a chick is placed at 16.5% of the sale price of the broiler and only 2% of the sale price of egg.

There are significant problems in the sector, often chicks are in short supply and farmers fail to get the numbers to operate efficiently. Quality identification is also very difficult to assess. The system and the shortages do not allow farmer any scope for bargaining and consequently they feel hatcheries are making abnormal profits.

The poultry feed sector is very important. Broiler farms purchase ready made feed whilst layer farms generally purchase ingredients and make their own mix. Feed mills work through an agent at fixed prices with little annual variation. Feed costs are a large proportion of total costs, estimated to be 47% of the sale price of broiler birds

and 77% of the sale price of eggs. Similar problems exist for feed as for chicks. There is a shortage of supply (sometimes artificially created by traders), selecting good quality feed is difficult and there are frequent problems with feed being adulterated.

The feedstuffs are mixed food grains and manufactured feeds known as “ready feeds”. The predominant feed grains are maize and wheat with rice polish and soybean meal added to the mix. There is potential for domestic maize and wheat production to help the poultry sector and even create an export market (Nabiul Islam 2001). Maize is beginning to dominate as the major poultry feed grain, it is cheaper, but also better in terms of calorie content and taste for the chicks (Abul Quasem 2001).

Medicines are generally purchased at fix prices from company agents. Prices can rise during large-scale disease outbreaks and the prices can vary markedly across companies for similar products. Farmers are unaware of the relative merits of the products and often purchase more expensive brand name products believing them to be better.

Although growth has occurred in the domestic input sectors it has been insufficient to meet demand. Poultry farming in Bangladesh is still largely import dependent with respect to feed ingredients and chicks and there is a need to develop national capacity Quasem (2001)

4.7.3 NGO Involvement in Small Livestock Development.

A major project in this sector was the Small Livestock Development Project commissioned in 1993 by the Department of Livestock Services and 3 national NGO’s BRAC, Proshika and Swanirvar Bangladesh. The project promoted a semi-intensive small-scale production method for poor rural women. Women were trained in various aspects of poultry rearing and provided with loans to create an integrated system of hatcheries, rearers, vaccinators and trainers. The impact of the project has been extensively studied notably by the 1997 survey by Alam (1997). Findings show that the SLDP had a substantial positive impact on poultry production, disease

control, adoption of new varieties, employment income, and poverty alleviation in rural areas. The SLDP households achieved rates far better than the national average for; the number of chicks per farm, the percentage of improved varieties, and bird mortality rates.

Loan repayments on the project were good, with only 7% reporting problems in loan repayment. The total net income per beneficiary per week increased by an average of TK 102.7; resulting in the average weekly income of beneficiary households increasing by 31%. Consequently beneficiary households were able to make savings whilst also increasing consumption of all food items and making investments in productive assets. The project has also helped the empowerment of women and improved socio-economic conditions.

There have been dropouts from the project where the women have not repaid loans or have returned to the scavenging system of rearing. They failed to make a profit from the poultry rearing, mainly due to high bird mortality rates. The high-risk of bird mortality even following investment in vaccines and feed meant that involvement could be negative for some rearers. Most of the dropouts from the project came from the poorer and less literate members. They did not have the capital to purchase the necessary feeds and medicines and reverted to the scavenging system. Also, they were the least able to take advantage of the available training and the more profitable employment opportunities

4.7.4 Poverty Reduction via small livestock development.

Production has been raised in the poultry sub sector and this should help poverty alleviation with increased incomes for households engaged in poultry production. Of course this is dependent upon the costs and prices received for poultry products. The decline in the real price of eggs is a worrying trend and could limit the poverty alleviating affects of increased production. Increased production should also lead to increased net availability of poultry production and increasing consumption. This should lead to improved nutritional status within the country. However, the production increases must be greater than population growth if net availability from

domestic supply is to increase. In fact per capita consumption of poultry products has only been maintained since the early 1980s. Poultry products were beyond the means of many poor consumers and this contributed to a decline in the real prices of eggs.

This could support the argument that a massive investment in the special programmes similar to the SLDP should be undertaken. However, there are currently nearly 300 NGOs in Bangladesh engaged in poultry production schemes in some form or another. The suitability of poultry rearing for the poor, especially women, made it attractive to NGO support. It can be argued that the levels of involvement are now too great; the declining price of eggs has increased the risk for poorer households. Many of the poorest households have been unable to access the schemes or maintain their involvement in them. Greater analysis of the successes and failures of the poultry projects should be undertaken to investigate for which groups it is a viable strategy and for which groups alternative interventions should be developed. Although broadly successful small-scale livestock rearing is not a panacea for poverty reduction and adoption should be on a more discerning basis.

4.8 Summary

The production of poultry meat and eggs has increased significantly and net availability has increased. Nevertheless this level is well below the requirement for a good nutritional balance and there is still a shortage in supply, and consumption patterns are polarising at the ends of the poverty spectrum.

The poor are recording decreasing consumption levels of poultry products and this is especially marked, if the poor are market dependent for their source of eggs. The shortages have pushed prices beyond the range of poor consumers and even producers have to market virtually all their produce. The rich group in the survey tend to have access to eggs from their own production

To compound this growing inequality in consumption, poor producers do not benefit from the supply shortages as the market is inefficient and intermediaries are capturing high margins. There are numerous constraints, including transport, refrigeration,

storage facilities and shortage of feedstuffs, which prevent the market and the sector as a whole developing.

NGOs are heavily involved in the sector, developing integrated schemes to encourage production, especially by poor women. However, there are now concerns regarding the profitability of these semi intensive systems and the entry of too many NGOs into the sector. The shortage of feed grains, results in high prices and in such circumstances the traditional scavenging system is more profitable and less risky for poor producers.

Poultry products appear to be another example where higher value, high protein products are declining in the diet of the poor from an already low base. The demand from the growing middle class in urban markets appears to be capturing the majority of the production and pricing the poor out.

5. The Dairy Sector

5.1 Introduction

The livestock sector in Bangladesh is extremely important as it provides a number of crucial resources. Cattle for example can provide; energy in the form of draft and traction power for various activities; fuel for cooking and other heating purposes; food in the form of milk, milk products and meat; raw materials in the form of hair, skins, hides, bones, hoof and horns; a number of products for pharmaceutical and industrial use; manure for crops; and as wealth stores to reduce vulnerability. The dairy sector especially has been the subject of much attention to increase the availability of many of these resources.

5.2 Production

Livestock rearing is an integral part in the mixed farming systems of Bangladesh. In 2001/02 there were about 23.72 million cattle, 0.86 million buffalo, 34.6 million goats and 1.24 million sheep. Milking cows account for about 45% of the total cattle population. Since 1991/92 the cattle population has increased about 0.89 million (DLS 2002) (Table 5.1).

Table 5.1 Number of livestock in Bangladesh by species (millions)

YEAR	CATTLE	BUFFALO	GOAT	SHEEP
1991–92	22.83	0.73	25.40	0.95
1992–93	23.01	0.73	27.49	0.99
1993–94	23.12	0.78	29.74	1.04
1994–95	23.15	0.80	32.18	1.05
1995–96	23.19	0.80	33.02	1.07
1996–97	23.32	0.81	33.33	1.08
1997–98	23.40	0.82	33.50	1.11
1998-99	23.48	0.83	33.67	1.14
1999-2000	23.56	0.84	33.84	1.17

2000-2001	23.64	0.85	34.01	1.21
2001-2002	23.72	0.86	34.19	1.24
Total increment from base year (%)	3.89	17.8	34.6	30.5
Annual Increment (%)	0.39	1.78	3.46	3.05

Source: Directorate of Livestock, Bangladesh (2002).

Around 90% of total milk production comes from cows and the remaining 10% from goats and buffalo. The majority of cattle are raised by small- and medium-sized farms with average landholding of 0.05-2.49 acres and 2.50-7.49 acres respectively)[3] and these produce most of country's milk. Large farms with landholding more than 7.5 acres own 32.4% of the cattle population.

For decades, Bangladesh has had a large domestic market for milk and milk products. Milk production has increased from 0.82 million metric tons in 1991/92 to 1.76 million metric tons in 2001/02 (Table 5.2). This is attributed to recent government policy and to NGOs' involvement in credit and service provision. However, the current per capita availability of milk and milk products (32.6 ml per person per day) is much lower than the demand[4] of 129 gm, which is still lower than the FAO recommendation of 250 gm.

The supply deficit was largely filled by imported milk and milk products at subsidized rates, the latter has initially declined from 55 thousands metric tones in 1991/1991 to 13 thousands metric tones in 1997/98 but has increased subsequently.

Table 5.2 Trends in milk production and availability in Bangladesh

YEAR	MILK PRODUCTION IN THE COUNTRY	IMPORT OF POWDER MILK	CONVERTED LIQUID MILK FROM POWDER	PRICE PER KG MILK POWDER	PRICE PER KG IMPORTED LIQUID

[3] In Bangladesh 80% of the rural households are small scale farmers holding 0.05–2.49 acres of land

[4] Demand for milk has been calculated by Ahmed (2000) considering consumers' willingness and economic ability to buy the product

	(MILLION M. TONS)	(THOU. M. TONS)		(US$)	MILK (TK.)
1991–92	0.82	55	440	1.66	7.92
1992–93	0.94	45	360	1.99	9.74
1993–94	0.94	35	280	2.14	10.70
1994–95	1.08	25	200	2.48	10.75
1995–96	1.57	21	168	2.33	11.89
1996–97	1.59	14	112	3.79	20.23
1997–98	1.67	13	104	3.46	19.66
1998-99	1.65	15	120	3.73	22.41
1999-2000	1.68	16	128	3.35	21.07
2000-2001	1.71	19	152	3.26	21.99
2001-2002	1.76	20	160	3.35	23.97

Majority of dairy farms in the country are private and can be categorized into five different groups: dairying for home consumption (the large and medium size farmers keep 1-3 cows to meet their household demand for milk products, the surplus being sold in the local market; rearing of cows for the dual purpose of draft power and milk production (households depending mainly on draft power for cultivation usually keep 2-6 cows including both bulls and dairy cows and often have to use their dairy cows for ploughing. During the off season when cows are free from agricultural farm use they produce milk which is usually sold in the market); small-scale dairy farming (the small- and medium-sized livestock households with financial and technical support from the government, NGOs and cooperatives managed to procure 2-5 cows. They usually sell all their milk and milk products in the market); medium sized commercial dairy farming (the medium sized households receiving mostly government incentives or cooperative support establish dairy farms where they usually rear 6-25 cows for market sale of all the milk and milk products); private large commercial dairy farms (these commercial operations establish modern dairy farms and keep 26 + cows).

There are also eight government dairy farms; these are basically used as breeding farms for supplying of heifers to small-scale farmers.

5.3 Consumption

Table 5.3 Average Per Capita Daily Intake

ITEM	1991-92			1995-6			2000		
	Nation	Rural	Urban	Nation	Rural	Urban	Nation	Rural	Urban
Food Total (Grams)	887	878	938	914	911	931	893	899	871
Milk (grams)	19.1	18.5	23.2	32.3	30.3	42.1	29.7	28.9	32.6

Source: (BBS 2001a)

The consumption of milk appears to have increased though the 1990s, this is seen in both rural and urban areas. The levels of consumption are still very low and analysis has suggested that consumption is increasing amongst the less poor whilst the poor who depend on market supply for milk are unable to purchase milk, which is increasingly going to the urban markets.

5.4 Consumption of milk and milk products: Survey Results

Table 5.4 presents summary results on consumption frequency of milk and milk products, per capita per day expenditure on milk and its share to total food expenditure. Almost 60% of the respondents reported that they had had milk items in their food basket at least once within the last 3-day reference period. Milk consumption was highest in Char areas followed by BRAC staff. Within low and high vibrant villages milk consumption was higher for low vibrant remote villages where market linkages were less developed and consequently producers were not always able to sell their milk for cash. The lowest consumption of milk was found amongst the slum dwellers whose per capita milk and total food expenditures were the lowest. The BRAC staff spends comparatively more on milk than other food items, possibly due to their knowledge of the food value of milk and milk products.

Mean results by poverty category give the indication of the relationship between milk consumption and households' ability to purchase certain food items – i.e., the richer the household, the higher the probability of consuming high price food such as milk.

Table 5.5 presents results on how frequently a household consumes milk and milk products. Of those who reported consumption, 85% of the rich consumed milk at least once daily in marked contrast to the poor, especially slum dwellers. About 18% of the slum dwellers, who source the majority of items from the market, cannot afford to buy milk even once during year. Among the total sample only 50% could have milk in their food basket at least once daily.

Table 5.4 Consumption pattern of milk by sample groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Milk consumption frequency of last three day (%)	61.7	58.7	42.5	73.3	69.6	43.6	69.1	88.1	59.8
Per capita milk expenditure per day (Tk.)	1.23	1.21	0.64	1.61	1.47	0.64	2.18	2.26	0.55
Of milk to total food expenditure	4.68	4.36	2.61	7.42	5.34	3.28	5.8	6.35	4.61
Per capita food expenditure (Tk.)	24.24	24.95	19.38	21.64	32.05	18.38	26.30	36.62	24.28

Source: Field survey 2003

Table 5.5 Frequency of milk consumption (%)

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Once daily	30.8	31.7	17.5	46.7	43.5	18.6	37.2	53.7	30.9
Twice daily	17.3	15.9	5.0	6.7	13.0	8.1	18.1	23.9	14.1
Thrice daily	1.5	5.6	5.0	3.3	17.4	2.3	6.4	7.5	4.5
Once weekly	8.3	5.6	5.0	10.0	4.3	9.3	7.4		6.9
Twice/thrice weekly	9.0	2.4	2.5	10.0	4.3	6.4	6.4	3.0	5.7
Once fortnightly	6.8	8.7	10.0	3.3	-	7.6	9.6	4.5	7.5
Once monthly	5.3	5.6	2.6	10.0	8.7	7.6	5.3		5.4
Sometimes	9.8	14.3	20.0	3.3	8.7	16.9	6.4	7.5	12.0
Hardly ever	6.8	4.0	10.0	3.3	-	10.5	1.1		5.7
On special occasion	2.3	1.6	5.0	-	-	3.5	1.1		2.1
Never	2.3	4.8	17.5	3.3	-	9.3	1.1		5.1
Total	100.0	100.0				100.0	100.0	100.0	

Source: Field survey 2003

Table 5.6 presents data on the intra-household consumption of milk. A positive aspect was that in 75% of cases all the household members consumed the milk. Around 16% of the households feed milk only to the children under five.

A quarter of the milk consumed by the household is home produced, another 51% usually purchase it from the local haat i.e., lower level market and 22% buy from the permanent market place (Table 5.7). In Char areas 69% of the milk consumed was home produced, here proportionately higher percentages of the households keep dairy cows because of the favourable environment for livestock rearing. On the other hand, 100% of the slum dwellers and BRAC staff had to depend only on market sources.

Dependence on market sources was also higher among the poor who usually can't afford to keep dairy cattle of their own.

Table 5.6 Intra –household consumption patterns (%)

CONSUMERS	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	Total
None	2.3	4.8	2.9	17.5	5.1	9.3	1.1	-	5.1
All household members	76.7	78.6	79.4	57.5	75.4	72.1	78.7	79.1	75.4
Children below five year of age	14.3	15.9	14.7	20.0	15.6	15.7	16.0	14.9	15.6
School going children	5.3	.8			2.4	2.3	2.1	3.0	2.4
College going children	1.5		2.9	5.0	1.5	.6	2.1	3.0	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Field survey 2003

Table 5.7 Sources of milk consumed (%)

SOURCES	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	Total
Home produced	28.4	26.5	69.0	-	-	19.0	26.1	44.8	26.6
Low level market*	51.7	59.3	24.1	29.0	69.6	58.2	48.9	37.3	51.0

Fixed market**	19.8	14.2	6.9	71.0	30.4	22.9	25.0	17.9	22.4

*Bought from neighbour/local trader, bought from *Haat,* bought from street trader

** Bought from fixed *Bazaar*, bought from shopkeeper

Source: Field survey 2003

Table 5.8 describes the extent of processing of the milk consumed at the household level. Only the city dwellers in fact had market access to processed or packaged milk, with the rest of the sample relying on local supply. Interestingly although processed and packaged milk is more expensive, about 52% of the slum dwellers choose processed and packaged milk, purchasing from the retail shops. Clearly though milk consumption by slum dwellers has declined over the last 5 years (Table 5.9). The respondents were asked their perceptions of whether milk consumption had increased or decreased over the last 5 years. Thirty-seven percent reported positive changes, whilst 39% reported negative changes, negative responses were much higher among the poor, which if representative would have nutritional implications on health. This is a further food item, which appears to be showing increasing inequality in consumption patterns.

Table 5.8 The extent of milk processing (%)

	SAMPLE GROUPS					POVERTY			
Extent of processing	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	Total
Locally processed	93.2	85.1	96.6	27.3	91.3	81.4	83.9	88.1	83.5
Processed outside	6.8	14.9	3.4	21.2	8.7	12.2	9.7	10.4	11.1
Processed & packaged	-	-	-	51.5	-	6.4	6.5	1.5	5.4
Total	100	100	100	100	100	100	100	100	100

Source: Field survey 2003

Table 5.9 Perception of changes in milk consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	38.0	32.5	27.3	48.3	52.2	26.5	47.3	47.8	37.1
Decrease	36.2	42.1	48.5	34.5	34.8	45.2	38.7	26.9	39.4
No Change	25.8	25.4	24.2	17.2	13.0	28.3	14.0	25.3	23.5

Source: Field survey 2003

5.5 Marketing

5.5.1 Unprocessed fresh milk

In rural Bangladesh almost two out of three households rear cattle, the small-scale producers primarily meet their own consumption needs. A part of their surplus milk goes to neighbours who buy from local producers.

There are also *Goala* who collect milk from the farmers' houses through door-to-door visits and also from the local market, they prepare *ghol* and *ghee* with the collected milk and sell those products in the local market. Sometimes the small-scale producers bring their milk to the market place on a regular basis if they can't make any regular arrangements to sell it from their own house.

Small dairy farms producing more than 5 litres of milk/day also sell part of their milk in the local market, often through *Paikars* who do regular business buying and selling milk in larger quantities. They usually have regular contact with all the commercial dairy farms producing larger quantities of milk for market sale and also with the market intermediaries (*Ghoshes* and chilling centres), who buy milk in larger quantity

on a regular basis. The *paikers* after collecting milk from the producers and from the local market supply it to; *Ghoshes*, (who use milk to prepare curds and ghees and sell them to the sweetshops); and chilling centres of different milk processing plants.

Chilling centres have also established their own network by organizing cooperative dairy farms or groups to collect their required quantity. In the country there are already 9 milk processing manufacturers/plants involved in collecting, processing and marketing of fresh milk from dairy farms to the urban markets (Figure 5.1).

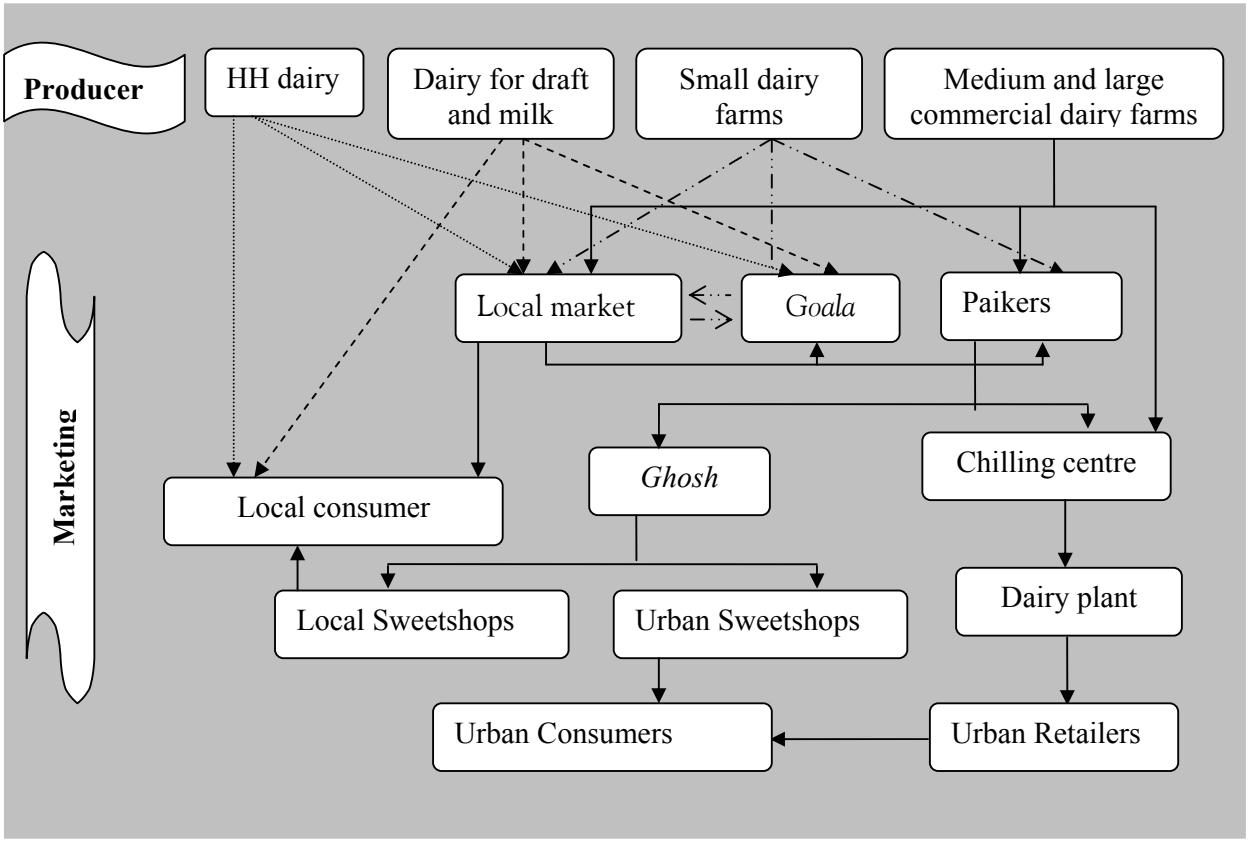
5.5.2 Processed fresh milk

Processing and marketing of fresh milk in Bangladesh goes back to 1952 with the formation of the Eastern Milk Products Ltd., trading under the name Milk Vita.

In 1973, the Government initiated a dairy co-operative of smallholder dairy farmers following the Indian experience and launched a dairy development program. Today there are around 65,000 smallholder dairy farmers from 925 villages in 15 districts who have joined as members of around 565 primary Milk Vita co-operatives, supplying over 538,000 litres of milk per day.

Farmer members pool their surplus production at the primary dairy co-operative societies which arrange regular cash payment on the basis of fat content and the Bangladesh Milk Producers' Co-operative Union Ltd. (BMPCUL) ensures regular collection, processing and marketing of milk and milk products. The dairy co-operatives also provide support services to members for animal breeding, feeding, health and training in animal management. In addition, a major part of the surplus earned by the central dairy co-operative through marketing milk and milk products is paid to the members.

Figure 5.1. Milk Production and Marketing of unprocessed milk



The price of fresh milk in rural and peri-urban markets is usually stable across the seasons, with variations of plus/minus Tk. 2-5 at the beginning and end of any lactating periods. Prices of milk supplied to different chilling centres are determined/fixed by fat content, i.e., higher the fat the higher the price. Since all the milk manufacturers have some kind of verbal (and sometimes written) agreements with their milk producing groups/co-operatives to service their demand and fix a limit for each and every group/co-operative society, a little fluctuation in market price does not usually affect their rate. If the market price increases significantly then the manufacturers are bound to increase their price rate to receive adequate quantities

According to Malhotra (1997) Bangladeshi milk producers receive only 47% of the consumer price, meaning that the intermediary agents linking the producers with the market enjoy a major share of the retail price. However, the emergence of new entrants has increased market competition and producers are benefiting. Producers currently get an assured market for their product, which encourages them to scale up

production. Field discussions indicated that with increased competition among milk processing plants, total market demand for milk has increased and fairer prices are being paid. Table 5.10 illustrates the growth in the processed milk sector and the increase in prices received by producers.

Milk is a relatively cheap source of protein in comparison to fish and meat and the price of milk is relatively stable. Therefore, it is more popular with the poor, consumption as well production of milk among the poor has increased. Although there are concerns that the increases in prices received and the developing market chains are encouraging small scale producers to sell more of their produce and reduce their own consumption levels. Collection, processing and marketing of milk also creates employment opportunities for the poor.

Table 5.10 Milk collection and price paid to the rural producers by Milk Vita Dairy

SL. NO.	YEAR	MILK	AVERAGE	AVERAGE	TAKA
		(Million Litres)	Fat %age	Price/litre	(Million)
1	1990-91	6.22	4.4	10.77	66.99
2	1991-92	6.48	4.6	11.68	75.69
3	1992-93	10.24	5	11.57	118.51
4	1993-94	12.05	5.1	11.77	141.94
5	1994-95	17.45	4.4	13.49	235.57
6	1995-96	18.33	5.2	14.33	262.77
7	1996-97	19.46	5	15.67	305.04
8	1997-98	26.52	4.7	15.87	420.04
9	1998-99	29.47	4.4	15.85	467.56
10	1999-00	33.99	4.7	16.1	547.56
11	2000-01	41.31	4.5	16.5	647.1
12	2001-02	53.81	4.4	16.16	869.6
Source: Milk Vita Primary Data, 2002					

5.6 Constraints

Constraints in the sector include the lack of appropriate transport to move milk to lucrative urban markets and the widespread price differential between producer and consumer. The producer is often exploited by the middleman, particularly during the high supply seasons.

In the nineties Milk Vita monopolized the market and total demand for unprocessed milk was therefore relatively low where Milk Vita was in a position to manipulate the price. In the late nineties when Aarong entered into the market and offered higher prices to the producers Milk Vita had to respond helping to redress the balance between producers and consumers prices, reducing this gap still further would encourage expansion in the sector

Low growth in the sector can also be explained by: low milk productivity of local breeds; small and scattered animal holdings; shortage of feed and limited availability of grazing; import of milk powder and butter oil from developed countries at subsidized prices; high incidence of parasitic animal diseases; inadequate institutional and infrastructural facilities; inadequate public and private investment in the sector; poor quality of animal health care and breeding services; lack of professional management; and lack of a well-defined national policy for dairy development

There is substantial scope for increasing productivity and there is a huge unmet demand of dairy products in the domestic market. There is plenty of surface water available for seasonal fodder cultivation on common lands; extensive waterways available for cheap transportation; good scope for establishing feed manufacturing plants; good scope for culling of less productive/unproductive animals; and a good stock of indigenous cattle breeds adapted to the local feed resources, so the sector could expand significantly if the constraints are addressed.

5.7 Issues in Dairying

5.7.1 Employment generation through processing and marketing of fresh milk

Marketing of processed and packaged fresh milk in the urban areas is an emerging area in agri-business creating direct and indirect employment for people involved in processing, packaging, transportation, distribution and marketing. Table 5.11 provides results of an estimation of how many direct employment opportunities the sector has created. The estimation indicates that more than 80,000 farmers are actually linked with the marketing chains, together they actually supply more than 300,000 litres milk daily to 9 milk processing manufacturers. Collection, processing and marketing of this quantity of milk also creates employment opportunities for over 3000 individuals. If we considered indirect employment opportunities created in other linked sectors, say in the production of packaging materials, the figures would be higher.

Table 5.11 Estimated Probable Employment generation, 2002

PARTICULARS	AARONG	MILK VITA	AFTAB[A]	AMOMILK[A]	SHELAIDA[A]	BIKRAMPUR[A]	SAFA[A]	TULIP[A]	TOTAL
No of society members	10000	65000	1714	1210	1140	850	850	1150	82494
No of employee	150	1000	5	12	5	5	5	5	1192
No of distributors	22	50	6	5	4	3	3	4	99
No of milk collectors	160	556	17	22	14	10	10	14	810
No of transporters	295	500	40	33	27	20	20	27	975
Total beneficiary	627	2106	68	72	50	38	38	50	3076
Milk production (litre/day)	46000	240000	6000	5000	4000	3000	3000	4000	313000
Milk sale (litre/day)	35000	118000	6000	5000	4000	3000	3000	4000	180000

Source: Field survey 2003, Milk Vita 2002

5.7.2 Herd size and labour requirements

Dairy farms are still very small scale in Bangladesh, Saadullah and Hussain (2000) found the overall average herd size per livestock farm households was 3.5 cattle which was 2 cattle for the landless farm, 2.9 cattle for the small farm, 3.7 cattle for medium farm and 4.4 cattle for the large farm households (Table 5.12). Patterns of utilization of labour on daily farms (Alam 1994) show that each mini dairy farm creates the opportunity for employment of 1.78 person-days/day of which 1.07 days for male and 0.71 days for female labour. The use of female family labourers was highest in the case of small farms (l person-days/day for female against 0.5 person-days/day for male) (Table 5.13).

Table 5.12 Average herd/flock size by different types of livestock farm households

TYPES OF LIVESTOCK	AVERAGE HERD/FLOCK SIZE (NUMBER) BY TYPE OF FARM HOUSEHOLD				OVERALL AVERAGE HERD/FLOCK SIZE (NUMBER)
	Landless farm	Small farm	Medium farm	Large farm	
Cattle	2	2.9	3.7	4.4	3.5
Goats and sheep	4.8	12.1	11.7	1.2	7.45
Poultry	8.6	14.9	14.7	7	11.3

Source: Saadullah and Hossain (2000).

Table 5.13 Pattern of Utilization of labour on dairy farms.

TYPE OF FARM	MAN-DAYS USED/FARM FAMILY PER DAY			TOTAL (MAN-DAYS)	OVERALL TOTAL (MAN-DAYS)
	Family labour	Casual labour	Permanent labour		

	Male	Female	Male	Female	Male	Female	Male	Female	Male + female
Large	0.25	–	0.5	–	1.5	0.25	2.25	0.25	2.5
Medium	0.5	0.75	0.4	–	–	–	0.9	0.75	1.65
Small	0.5	1	–	–	–	–	0.5	1	1.5

Source: Alam (1994).

Animals are clearly of great importance for landless and small farmers, they depend largely on the livestock for their subsistence. The self-employment generation and total income share of the animals tend to increase as the farmers' resources, especially land area, decrease.

5.7.3 Breeds of cattle

Around 97% of the cattle are indigenous and only 2.8% are crossbred with *Sahiwal, Sindhi or Harian* varieties *(*Miyan 1996). Indigenous cows are characterized by low yields, short lactations and long calving intervals. The average milk yield of indigenous cows is about 200-300 litres in a lactation period of 180-240 days while the crossbred cows can produce 800-1000 litres in a 210-240 day lactation period. The cows are mostly maintained as bull mothers with little surplus milk (0.5 to 1.5 litres per day) available for household consumption. Although the local cattle produce less milk compared to the crossbred ones, they are well adapted to the local feed resources[5], local housing facilities and scavenging systems. The feed requirements i.e., kg feed required/kg of product, are lower for local breeds.

5.7.4 Profitability of milk production

Research indicates that the production cost of milk per litre from both local and crossbreed cows far exceeds its market/selling price (Table 5.14) One of the main

[5] Cattle are principally fed by agricultural by-products, mainly rice straw which constitutes more than 90% of total cattle feed energy intake. They are also grazed on natural pastures of non-arable land including land around canals, rivers, roadsides and railways, communal grazing land, homestead forest or fallow land. Using of shrub and tree leaves, tender shoots and twigs are also traditionally using in the village as fodder. (Tareque and Saadullah, 1998)

reasons for the high cost of production is the low milk yield per cow (1.5 litres/day for local and 2.5 litres/day for crossbred cows) (Alam, 1995; Kabir and Talukdar, 1997).

However, milk is only one of the many direct products from dairy cattle rearing. Calves can be sold at a very good prices, cow dung is in demanded for fuel and fertilizer use, and the use of cows for draft power also reduces production costs in agriculture. Kabir and Talukdar (1997) conducted a financial analysis and demonstrated that dairy farming is highly profitable if the value of all the other direct and indirect products is considered. The study also revealed that the earning capacity from investment in dairy, especially on crossbred dairy cows far exceeds the opportunity cost of capital in the formal capital market, which was about 6.5% annually. Sustaining the increasing gross return will largely depend on the assured supply of accompanying inputs such as feed and veterinary services, and improved milk marketing facilities closer to the doorsteps of the farmers.

Table 5.14 Estimated gross costs and benefits earned from dairy farming

LACTATION YEAR	TOTAL COST (TK)		GROSS RETURN (TK)	
	Local (n = 10)	Crossbred (n = 10)	Local (n = 10)	Crossbred (n = 10)
1	54,524	58,179	4380	4380
2	92,585	98,798	148,636	247,966
3	117,054	124,911	173,007	297,117
Total	264,163	281,888	326,023	549,463

Note: US$ 1 = Taka 57 at 2001 exchange rate.

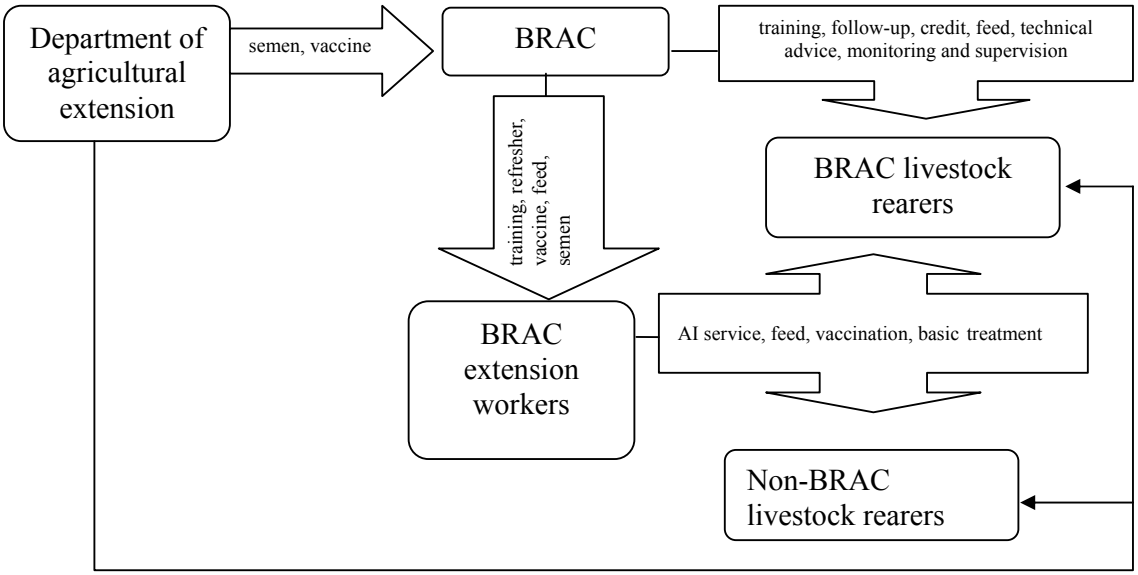
Source: Kabir and Talukder (1997).

5.7.5 NGO Involvement in Dairying

The NGO sector is heavily involved in the livestock sector, although the focus has been small livestock they have become involved in dairy development. BRAC Dairy provides a good example of how their involvement is structured.

BRAC provided small-scale loans to the landless for cattle rearing as part of its micro-finance programme from 1978 to 1982, but no other services were available. It was realised that sector development required, in addition to financial support, a package of services. The current livestock programme targets landless and marginal farmers, particularly women, as part of their rural development and income-generation activities. They provide credit and support services to small-scale dairy farms. Figure 5.2 describes how BRAC's livestock rearing model functions. As shown in the figure, BRAC made an official agreement with the Department of Agricultural extension to provide BRAC with imported HYV semen and vaccines. The livestock rearers receive these services from BRAC through trained field level extension workers who provides door to door services at a very low price

Figure 5.2. The BRAC model for Livestock Rearing

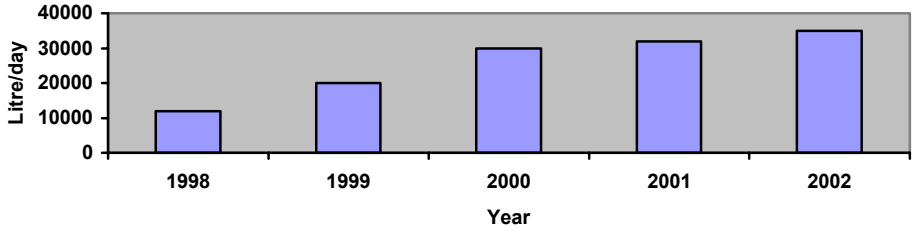


As previously noted**,** milk can be an important source of income for the rural poor if they can find an ensured market with competitive prices. The market in rural areas is limited and the urban market is not well connected, therefore the producers have to sell their product at very low prices to the local market intermediaries - *Paikars, Goalas, Ghoshes,* and sweetshops. To link the poor producers with the urban market and to provide fair prices to the poor producers BRAC initiated the Dairy and Food Project in 1998. This involved the establishment of chilling centres, especially in the Pabna region.

Like Milk Vita, BRAC follows the group approach in fresh milk collection. Initially BRAC formed groups with a minimum of 20 milk producers. The milk producers have a verbal agreement to sell to the BRAC chilling centres. They generally employ one person to collect and supply to chilling centres twice daily. The milk collectors receive TK. 1 per litre from the farmers as commission, of which 50% is spent on transportation. BRAC now has 161 primary societies with a total membership of 4493. From each society BRAC receives 40-1800 litres of milk daily.

BRAC dairy currently produces 8 different products[6] of which fresh milk is the most important. Production of fresh milk has increased more than three times within the very short period since its initiation (Figure 5.3). Production of other products has also increased. Currently BRAC is controlling approximately 20% of the market for fresh milk second to Milk Vita (Table 5.15). Processed fresh milk constitutes only 5% of the total fresh milk consumed in the country and is concentrated in Dhaka city. Aarong milk, like other manufacturers, market to urban city centres, mainly to Dhaka city and nearby city centres.

Figure 5.3. Production of Aarong fresh milk (litre/day)



Importantly Table 5.15 shows that the processing plants have surplus handling capacity, illustrating a shortage in market demand from urban centers.

BRAC dairy has a similar marketing strategy to other processors. It has its own distribution and sales centers in the urban centers. Commission agents are used to distribute the milk, on average they employ 10 rickshaw/van pullers who receive milk from a fixed delivery point and then supply to the retailers. It has been estimated that BRAC dairy for the marketing of 35 thousands litres/day of fresh milk a total of 627 days employment has been created. That is 0.02 person/days of employment per litre.

[6] Includes fresh milk, low fat milk, chocolate milk, butter, ghee, yoghurt, mango milk drink and UHT milk packet.

Table 5.15 Daily sales of processed liquid milk by manufacturers.

NAME OF ENTERPRISE	NUMBER OF CHILLING CENTRES	HANDLING CAPACITY '000 LITRES/DAY	AVERAGE MILK SALES ($\times 10^3$ LITRES/DAY)	MARKET SHARE (%)
Milk Vita	12	135	118	63.79
Aarong	20		35	18.92
Amomilk	1	14	5	2.70
Shelaida			4	2.16
Bikrampur			3	1.62
Savar Dairy			2	1.08
Aftab Dairy	2	11.5	6	3.25
Safa Dairy			3	1.62
Tulip Dairy			4	2.16
Others			5	2.70
Total			185	100

Source: *G. C. Saha and S.A.M.A. Haque.* Small-scale processing and marketing in Bangladesh including reference to micro-credit facilities (good market access)—Milk Vita: A case study

Discussions with processing plants employees, together with the differences between the handling capacity and marketable volumes of milk indicate that currently plants have extra capacity to collect more milk. Milk marketing is concentrated in relatively few urban areas and a dispersal of the marketing framework is required.

5.8 Summary

The summary for the milk sector holds many similarities with that for eggs and other high value, high protein produce. Production has been increasing but not sufficient to meet the large demand. Although consumption has increased levels across the country are very low. Worryingly milk is another product where consumption appears to be declining for the poor as middle/upper income urban markets capture the available milk supply. The increase in collection networks both NGO and private have encouraged increased production but this has not increased consumption at the local

level. In this case remoteness from markets can be an advantage nutritionally for poor producers as they are likely to produce for home and neighbourhood consumption. However, producers with market access fail to fully benefit from the high urban demand as intermediaries capture higher margins.

The most vulnerable to declining milk consumption are market dependent poor groups, the landless rural poor and slum dwellers.

The urban market for processed and packaged milk products, though still very small, is expanding rapidly. Collection and distribution networks, together with chilling centre and refrigerated transport infrastructure is developing under private sector and NGO control. This provides hygienic, high quality products, whilst also providing a range of employment opportunities throughout the sector. If development could proceed so that further employment was generated whilst expanding availability to a wider range of consumers this could be a positive development.
Given the demand for land increased productivity in the sector will be based on increasing yields, which are currently very low.

6. Fruit and Vegetable Sector.

6.1 Introduction

Vegetables and fruit production offers great potential in Bangladesh, there are a number of crops and produce whose financial and economic returns could be higher than HYV rice (Shahabuddin and Dorosh 2001). The production of fruit, vegetables, and livestock products could all provide higher value alternatives. However, in Bangladesh the extent of diversification has been limited. This is attributed to a number of factors; the high risk associated with the marketing of these food items; the provision of poor infrastructure, especially storage and rural feeder roads; the perishability of most vegetables; the high price volatility of these commodities; and possible consumer preference issues.

Vegetables appear to be highly competitive in both financial and economic returns and one would expect vegetables to be more widely represented in the production patterns, whilst fruit production is still largely undeveloped and the sector has potential for increased incomes for producers and value-added opportunities.

If agro-processing and marketing networks were developed then these would provide effective means for reducing price variability and risk for smallholder producers. The diversification of agricultural production and the consequent development of new marketing and processing chains would offer wide-ranging livelihood opportunities especially in rural areas. These new developments could be carefully constructed and spatially targeted to address problems affecting “poor regions”.

Nutritional deficiencies could be counteracted by greater consumption of fruits and vegetables. *% Of the population suffers from vitamin C deficiency and 1 million children have clinical signs of vitamin A deficiency.

6.2 Production

Bangladesh has the potential to grow significant quantities of vegetables and fruits. It does produce large quantities, of high nutritional value crops, but wastage is often quite high. The major fruits are mango, banana, jackfruit, litchi, papaya, pineapple, watermelon, guava, lemon, star fruit and honeydew melon. These are available in the summer season between May and July. The major vegetables are potato, tomato, carrot, brinjal, cauliflower, cabbage, broccoli, green beans, peas, pumpkin, cucumber, and bitter gourd; these are available in the winter season between November and February.

Table 6.1 Production of Fruit 1994-95 to 1997-98

CROP	1994-95 000 M/TONS	1995-96 000 M/TONS	1996-97 000 M/TONS	1997-98 000 M/TONS
Banana	630	634	628	625
Mango	183	186	186	186
Pineapple	149	148	148	148
Jackfruit	255	265	265	267
Papaya	35	38	39	41
Melon	101	96	97	96
Litchi	12	12	13	13
Guava	31	40	44	46
Ber	11	13	14	15
Pomelo	11	13	14	15
Lime &Lemon	10	12	12	12
Other fruit	21	21	20	20
Total	1449	1478	1480	1484

BBS 2000 in (Haque 2001)

Table 6.1 indicates that the production of fruits increased slightly over the 4 year period shown but this is not the scale of increase required to improve nutrition and create a widespread improvement in employment opportunities. Banana is the most important fruit crop; they are widely grown in Bangladesh and account for 44% of total fruit production. They have a short growing period helping food availability and they can be eaten as a staple food. Pineapple, mango and jackfruit are the other main fruits with the first two offering definite export potential.

Table 6.2 Production of vegetables in Summer 1994-95 to 1997-98

CROP	1994-95 "000" M/TONS	1995-96 "000" M/TONS	1996-97 "000" M/TONS	1997-98 "000" M/TONS
Pumpkin	33	34	36	37
Brinjal	59	60	61	61
Patal	23	23	25	27
Ladies Finger	15	16	13	17
Jhinga	23	24	26	26
Bitter Gourd	21	21	21	21
Arum	103	105	107	108
Roof Cucumber	29	32	33	34
Cucumber	16	17	18	18
Long Bean	8	8	8	9
Puisak	16	16	17	17
Chichinga	10	10	11	11
Danta	20	11	11	11
Other vegetables	10	11	11	11
Total	386	388	398	408

(BBS 2000)

The production of summer vegetables has shown a slightly higher production increase in the 4 year period shown but again not the rate of increase required to raise availability. Arum, brinjal and pumpkin are the three largest crops, but no crop has increased production greatly.

Fruit production covered about 185,00 hectares, only 1.31% of total cropped area and vegetable production covered 200,000 hectares or 1.42% of total cropped area. Only 4.72% of the countries arable land is put over to horticultural crops. This figure is very low and is a major factor in the poor nutritional balance of the diet.

Table 6.3 Total area under horticultural crops (1997-98)

CROP	AREA (000'HA)	% OF TOTAL CROPPED AREA	PRODUCTION 000'MT	YIELD/HA MT
Vegetable (Summer)	80.6	0.57%	418	5.19
Vegetable (winter)	120.2	0.85%	887	7.38
Total Vegetables	200.8	1.42%	1305	6.28
Fruits	184.6	1.31%	1494	7.01
Spices & condiments	143.7	1.02%	316	2.20
Potato	136.43	0.97%	1553	11.39
Total Horticultural Crops	675.6	4.72%	4468	6.72

(Haque 2001)

With the most important horticultural production unit is the homestead garden. Approximately 80% of fruit and vegetable production is in home gardens, based on subsistence production scales. Women play a crucial role in managing production, and it can be an important source of home produced high protein food.

Commercial production is very limited with just a few large landlords mainly associated with fruit cultivation. Recently commercial vegetable production has been making progress with NGO involvement and some private enterprise. Ccommercial production has concentrated around major cities. The North West, and western part of the country (flood free) have developed as the main vegetable production areas. However, land pressure is so acute that the expansion of area under vegetables is difficult. Production increases are more likely to come from yield improvement. Off-season production of vegetables is difficult due to limited climatic variation and elevation in Bangladesh.

6.3 Consumption

Consumption levels of fruit and vegetables are very low in Bangladesh. The annual estimated requirement for fruit is 6351,000 M. Tons and for vegetables 10,585,000 M. Tons but production in 1997-98 was only 14,94120 and 62,4735 M. Tons respectively so the country is clearly deficient in the production of horticultural produce. (BBS2000)

Population growth and the increase in land put to rice cultivation have meant the per capita availability of fruit and vegetables has declined, this is an especially negative development for the poor. Table 6.4 shows the average per capita intakes during the years in the decade. The year 1995-6 appears to show increasing levels of consumption, but the longer-term trend comparing 1991-2 to 2000 shows declining consumption levels in certain sectors. Vegetable intake nationally has shown a very slight increase, whilst consumption in urban areas has declined. For fruits the situation is better with increases in consumption shown. Consumption of pulses, which are a major source of cheap protein for the poor, has declined.

Table 6.4 Average Per Capita Daily Intake

ITEM	1991-92			1995-6			2000		
	Nation	Rural	Urban	Nation	Rural	Urban	Nation	Rural	Urban
Food Total (Grams)	887	878	938	914	911	931	893	899	871
Vegetables	137.4	135.3	150.9	152.5	154.4	142.9	140.5	141.1	137.9
Fruits	16.9	15.9	23.4	27.6	25.3	38.8	28.4	26.5	35.6
Pulses	17.9	17.3	21.7	13.9	12.9	19.4	15.77	14.97	19.04
Potato	43.7	41.4	58.3	49.5	46.7	64.4	55.45	54.71	58.38

Source: (BBS 2001a)

6.4 Consumption of Fruit and Vegetables: the survey results

Table 6.5 Consumption pattern of vegetables by area and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Frequency of Vegetable consumption (last three days %)	92.5	90.5	87.5	100	95.7	87.2	95.7	98.5	91.9
Per capita Vegetable expenditure per day (TK.)	1.73	1.78	1.37	1.58	2.69	1.3	1.86	2.47	1.69
% Of Vegetable to total food expenditure	7.25	7.24	6.66	7.89	8.69	7.19	7.58	6.88	7.24
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

The frequency of vegetable consumption is high throughout the groups (Table 6.5), though increasing poverty results in reduced vegetable consumption, with nearly 13% of the poor households and slum dwellers not consuming vegetables in the last three days. The slum dwellers have the lowest frequency of consumption, whilst the char dwellers have the highest. There is a clear increase in expenditure through the poverty profile with per capita expenditure nearly doubling from poor to rich groupings. The highest expenditure comes from the BRAC staff grouping where it

accounts for nearly 9% of total food expenditure. This is linked to income but may also be associated with education levels and the awareness of the health benefits of vegetable consumption. The slum dwellers display the lowest levels of expenditure and when this is combined with very limited access to home production, this would appear to make this group the most disadvantaged in terms of vegetable consumption.

Table 6.6 indicates that vegetable consumption is for all household members, the slight anomaly in the BRAC staff data would suggest a collection error.

Table 6.6 Intra–household Consumption patterns by sampled groups (%)

CONSUMERS	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
All household members	100	100	97	100	91.3	99	99	99	99
Male earners	-	-	2.6	-	-	0.6	1.1	1.5	0.9
Guest									
Ill and old man	-	-	-	-	8.7	-	-	-	-

Source: Field survey 2003

Table 6.7 Sources of vegetables consumed (%)

SOURCES	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home produced	44	38	39	-	29	17	-	23	27.5
Low level market*	32	39	42	86	45	47	-	70	40.7
Fixed market**	24	22	18	14	25	34	91	6.7	31.8

*Bought from neighbour/local trader, bought from *Haat,* bought from street trader
** Bought from fixed *Bazaar*, bought from shopkeeper
Source: Field survey 2003

Table 6.7 illustrates that the source of vegetables and the market dependence of groups, of the groups the slum dwellers and the BRAC staff are the most market dependent. There is little discernable difference between the rural groupings. As noted

earlier access to home production is higher for the rich grouping, however this table does have an anomaly with the middle-income grouping.

Table 6.8 Perception of changes in vegetables consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	37	43	49	27	57	32	48	52	41
Decrease	19	20	26	30	13	32	11	7.6	21
No Change	44	38	26	43	30	36	41	40	39

Source: Field survey 2003

Vegetable consumption is perceived to be increasing in the middle income and rich grouping with few declining consumption records. Amongst the poor the situation appears to be more static with equal numbers perceiving decrease and increase in consumption. Interestingly the poor urban dwellers perceive an increase in consumption, whilst the poor rural dwellers in the char area have a higher perception of decreasing consumption. This may be associated with the availability of fruit in urban markets and the development in marketing chains, which are removing vegetables from the rural areas. BRAC staff has the highest increase, this could be linked to income growth, health awareness, and a transition in diet to the more diversified goal.

Table 6.9 Consumption pattern of fruits by area and poverty groups

INDICATOR	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	
Fruits consumption frequency of last three day (%)	12	19.8	20	-	39.1	9.3	17	28.4	15.3
Per capita fruits expenditure per day (Tk.)	0.5	0.47	0.68	0.13	0.6	0.33	0.50	0.19	0.47
% Of fruits to total food expenditure	2.39	4.1	5.01	2.68	5.83	1.98	4.55	5.33	3.38
Per capita food expenditure (Tk.)	24.7	25.6	21.6	20.6	32	18.4	26.4	36.6	24.3

Source: Field survey 2003

Fruit consumption trebles through the poverty profile, but even in the rich grouping less than a third have consumed fruit in the last 3 days and the per capita expenditure on fruits is very low especially in the char group (rich group figure here?). Interestingly consumption is relatively high in the slum areas, and this group together with the BRAC staff group and the rich profile expend over 5% of their total food budget on fruit. This points to the increasing availability of fruits via market sources.

Table 6.10 Intra-household Consumption patterns (%)

CONSUMERS	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle class	Rich	
All household members	82	82	91	82	52.2	80	81	80	80
Children below five year of age	8.5	15	3	-	35	15	10	9.1	12
School going children	6.9	2.8	6.1	5.9	8.7	4.2	5.6	6.1	5.1
College going	-	-	-	5.9	-	-	-	1.5	0.4

children									
Male earners	3.2	-	-	5.9	-	0.8	2.2	3	1.8
Guest									
Ill and old man	-	0.9	-	-	4.3	-	1.1	-	0.4

Source: Field survey 2003

Fruit consumption is mainly by all household members but there is a clear association with consumption for children, in the poor grouping 15% of consumption is for children under 5. This could be recognition of the health benefits of fruits, or the association with fruit as a treat item. The limited availability due to seasonality and market deficiencies also results in high prices and this limits consumption to a specialised item for children. Although only small percentages, consumption solely by male earners is recorded, mainly in the slum and the low vibrant villages.

Table 6.11 Sources of vegetables consumed (%)

SOURCES	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Home produced								33	-
Low level market*	37	44	38	67	56	50	25	67	38
Fixed market**	63	56	63	33	44	44	63		62

*Bought from neighbour/local trader, bought from *Haat,* bought from street trader
** Bought from fixed *Bazaar*, bought from shopkeeper
Source: Field survey 2003

An important issue here is that only the rich in this sample produce their own fruit for home consumption. Having sufficient land to allow fruit trees to grow is clearly an indicator of wealth. Market source fluctuates between the groups and it is difficult to highlight any particular trend. The urban dwellers, BRAC staff and the rich grouping appear to source more frequently from lower level markets, this is likely to be a function of the availability of these products in lower level markets in upazila centres and urban areas.

Table 6.12 The extent of Fruit processing (%)

EXTENT OF PROCESSING	SAMPLE GROUPS					POVERTY			TOTAL
	Low vibrant village	High vibrant village	Char	Slum	BRAC staff	Poor	Middle	Rich	
Locally /home processed	0.9	-	-	-	-	0.8	-	-	0.4
Processed outside	88.9	80.9	100	39.4	95.7	75	85	88	81.5
Processed and packaged	10.2	19.1	-	60.6	4.3	24	15	12	18.2

Source: Field survey 2003

This is an interesting table to interpret and clarification is needed to ascertain the precise nature of what is meant by processing and packaging of fresh fruit. The slum areas appear to show a very high consumption of processed and packaged fruit.

Table 6.13 Perception of changes in Fruits consumption over the last 5 year period (%)

CHANGE	SAMPLE GROUPS					POVERTY			
	Low vibrant village	High vibrant village	Slum	Char	BRAC Staff	Poor	Middle	Rich	Total
Increase	32	38	27	29	30	17	44	50	34
Decrease	27	32	55	65	39	50	31	15	36
No Change	41	30	18	5.9	30	33	25	35	31

Source: Field survey 2003

Fruit consumption is another food item that demonstrates the growing inequality in consumption patterns. 50% of the rich group perceive an increase in consumption whereas 50% of the poor group perceive a decrease. Decreasing perceptions are especially strong in the char and slum areas, though surprisingly decreases out weigh increases in the BRAC staff group. This is another high protein item, which appears to be declining in the diet of the poor, concentrating consumption amongst the rich. The limited supply and the market inefficiencies mean that only the rich can afford these

items from market sources and the poor have insufficient land to allow production of fruit.

6.5 Marketing

Marketing channels vary from district to district but follow a basic pattern common to most foods. The key "players" are growers, *beparis*, wholesalers, retailers and consumers. Small-scale producers often sell directly to consumers from small roadside stalls or local markets. An FAO survey (FAO 1990) shows that farmers sell 36% of produce to retailers, 27% to traders and 22% directly to consumers.

The larger farmers sell direct to *farias, s*maller farmers retain some crop and sell the remainder directly at markets or to neighbours. Occasionally in the peak periods traders do go to producers. The market is not well developed, as there is high risk associated with the marketing of these high value crops.

Currently although spatially diversified the export market is still quite small, the majority of exports going to the UK and the Middle East, this is generally associated with demand from expatriate communities but there are growing markets for products such as green beans in the European markets (Hortex Foundation 2000). Fruits and vegetables are being imported into the country, especially from India. This is often unofficial border trade.

6.6 Processing

Domestic consumption of fruit and vegetables is predominantly fresh produce, with 82 % of the horticultural crop is sold immediately after harvest (FAO 1990). This is associated with the preference for fresh produce but also the limited processing and storage capacity.

There are traditional processing activities such as pickling or drying but these are limited. These processes are small-scale cottage industries with some medium scale activities. Jams, jellies, chutneys etc are locally made and are available in a variety of regional markets. However, domestic demand for processed food items is rather

limited, with 85% of processed food consumers from municipal areas and the market linkages not in place to develop the trade (Shahabuddin 2002).

The extent of commercial preservation industries, such as canning, pulping and juicing is also very limited. Processed foods such as jams and jellies are only really available in urban centres.

The growth of fruit and vegetable processing industries is constrained by limited development in the packaging industry, with tin–can and glass bottle manufacture being very small scale. The local canning plants lack the lacquering process, which is a pre requisite for food usage. There is some development of the fruit processing industry for the large urban markets with juices and pulps, but the processing of vegetables is very limited.

Clearly there is scope for extending fruit and vegetable production and developing a processing sector. Concentration on products with an export demand would seem to be a sound strategy, not forgetting that the expanding urban market is very large.

Mangoes provide a good example of problems in the marketing and processing chains. They are produced in the north and west of the country and are of high quality. However, many are lost, left to rot due to poor preservation facilities and the inability to move them to market quickly enough during the peak season (Rahman Khan 2002). If processing was established in the production areas post harvest losses could be reduced whilst also creating employment opportunities and if suitable for export, foreign exchange (Shahabuddin 2002). Roy estimated DRC's for various processed products and noted that canned mango and pineapple juice have strong comparative advantage for export (Roy 1999). Questions do arise regarding this comparative advantage when, for example, the long-term implications of the loss of trees to homesteads for timber and flood protection are included. Land availability for fruit production is also clearly an issue.

There is a clear need to develop packaging and transport infrastructure and together with access to institutional credit this would stimulate the development of horticultural produce processing (Rahman Khan 2002). The packaging materials on

average account for 35-40% of total cost and tin cans and bottles are mostly imported. The tin and bottles produced domestically are of inferior quality and not up to international health standards (Shahabuddin 2002). The development of local bottling, packaging, and canning industries has featured in a number of food items, it would help access markets, improve preservation helping trading opportunities, and create employment for poor people in the developing industries.

6.7 Constraints

As mentioned constraints in the sector include the seasonal nature of production; lack of storage; poor processing infrastructure; inefficient handling, and under-developed marketing systems. There are additional constraints for producers associated with; infestations; loss to pests; water management and irrigation systems not allowing alternate production of rice and non-rice crops; and the hazards linked to the annual floods.

There are generally large economies of scale in the marketing of vegetables and fruit and farmers can't take advantage of these as risk prone crops can only be grown on small parcels of land for the risk averse farmer. The water management practices often means that farmers would have to allocate all or the majority of their land to non-rice crops, which is a high-risk strategy, and one that they therefore avoid.

6.8 Issues in the Sector

6.8.1 NGO Initiatives

The World Bank HORTEX project in conjunction with BRAC is an attempt to develop the production and marketing skills for the export of high quality vegetables to the European and US markets. Initially the results were disappointing but since 1998 progress has been made. The project highlighted suitable contract farmers and potential buyers, selected the seeds and developed contracts for export quality packaging, trained grading staff and organised export logistics. Within this chain there is a wide range of new employment opportunities, not least the initial development of

the packaging industries. The improved production practices and handling procedures are improving quality and reducing loss through damage.

The latest BRAC figures for vegetable export show 108 M.T (French beans) for 2001 and 53.4 M.T. in the first half of 2002. BRAC note that the HORTEX project is beginning to develop the link between the producer and the quality export market. Vegetable export does appear to provide opportunities for producers and for value added along the supply chain from processing and packaging that could offer income generation.

6.8.2 Homestead Cultivation

As noted vegetable cultivation is primarily on homestead land and many NGOs have been pushing the development of this sector. Clearly this has nutritional benefits for the household but also a study on the impact of the adoption of vegetable and fishpond technology on poor households (Hallman, Lewis et al. 2002) observed that many of the very poor often distribute some of their vegetable production to family and neighbours. This practice helps to build and maintain social solidarity that in turn reduces vulnerability. The vegetable technology was relatively easy to adopt and was unlikely to increase vulnerability.

Vegetable cultivation can be integrated alongside the many other household tasks for household gardens. However, for those who wish to cultivate vegetables beyond the homestead, the sale of vegetables in the market is a problem, especially for women. The non-poor tend to cultivate a narrower range of vegetables on the homestead land as they can purchase some easily at market (e.g. chillies), the non-poor can therefore spend more time on household work such as paddy husking, seed preservation and *kata* sewing for winter.

6.8.3 Livelihood opportunities

The Golda Care project provides an example of opportunities gained by the increased production and marketing of vegetable produce. The project attempted to create a tier of entreprenurial gher farmers who would act as traders for the gher farmers in

general and sell the vegetable produce at central markets. This link to the central market and aratdars should increase the prices received by remote gher farmers.

Farmers' income from the sale of vegetables increased by some 30%. Farmers gained around 1TK per kg for the vegetables sold, with the advantage that market information could be shared allowing changes in the crop production. Small quantities could also be sold at more distant markets thus ensuring higher prices.

Traditionally the produce would be sold at the local market where there was over supply and consequently low prices. As women were widely involved in the production of vegetables their influence in the decision making processes and their status was improved. Time was saved in the individual marketing of crops; wastage and storage problems were solved.

Income for the entrepreneurs also increased by 20%. The net daily income from marketing activities was 150-300 TK per day. Further jobs were also created for local people who were hired in by the entrepreneurs to do the grading, cleaning and transportation tasks. The systems generally increased the cohesiveness of the community, with entrepreneurs gaining respect especially with aratdars, which allowed for the establishment of credit lines.

6.9 Pulse Sub-Sector

The production and consumption of pulses declined during the 1990s and this has been associated with the switch to HYV rice and the increase in rice monoculture. Cereal prices have been falling and consumption rising whilst the reverse has been true for pulses with prices rising and consumption declining. The poor have been substituting rice for pulses, between 1991/2 and 1995/6 per capita consumption of pulses fell by 27% in rural areas (a similar pattern occurred for edible oils). So although there has been a quantitative improvement in diet of the poor there has been a qualitative decline (EU 2000). The nutritional implications of this, especially for the rural poor, have been negative. The micronutrient intake associated with the consumption of pulses has declined and it is a relatively cheap source of protein for the rural poor.

This move away from production of pulses does not appear to be economically rational, as many pulses, especially *masur*, appear to be competitive as a non-irrigated *rabi* crop for import substitution and export (Shahabuddin and Dorosh 2001).

6.10 Potato Sub-Sector

Potato warrants attention for a number of reasons: it is the most heavily traded vegetable, it produces very high calorie levels per unit area and therefore increased production would benefit nutritional aims; and it is a high value crop that could improve incomes for producers and traders.

Bangladesh has shown a fourfold increase in the production of potatoes since the early 1970s (Sattar Mandal 2002), and in the period 1991-92 to 2000 potato consumption increased by 25%. Nevertheless the per capita production of potatoes is still very low.

Post-harvest losses are a major problems and 10-12 % of the production is lost every year due to poor preservation facilities. Improved storage methods and facilities are needed for the humid climate. These include domestic short-term storage and long-term cold storage for the wider market. A further problem lies in the transport facilities to these storage centres (Rahman Khan 2002).

Potato chips and potato flakes are also growing in importance, entering even into remote domestic markets. Despite the growth, these products are still marginal to the consumption patterns of the majority of people in Bangladesh. The financial profitability of potato, both fresh and chilled is very high. Production of modern varieties has a strong comparative advantage for import substitution but not for export (Shahabuddin and Dorosh 2001). With the number of processing opportunities and the nutritional benefits of potatoes more widespread diversification must warrant further study.

6.11 Summary

The percentage of cultivatable land under vegetable and fruit production is very low, yet Bangladesh has the potential to produce a wide range of high value horticultural produce. Despite attempts to diversify, production has not expanded greatly. The growth in HYV rice production has reduced cultivation of other crops, especially pulses. These are the traditional source of cheaper protein for the poor.

Marketing difficulties appear to be the major constraint preventing producers moving into commercial production of horticultural crops. Homestead gardens are the most important production unit, mainly for domestic and local consumption. Inadequacies in marketing chains mean that the market dependent urban poor are those who are the most vulnerable.

Rich, and in the case of vegetables middle/breakeven consumers have perceived consumption increases, for the poor the picture is more static, the likely explanation is that although supply shortages and market inefficiencies are increasing the price for the poor, they are substituting increased vegetable consumption for increasingly inaccessible fish and livestock products.

Fruit consumption is especially low, across the entire poverty profile, this is as a consequence of low production but also the seasonality and the inability to store produce resulting in significant wastage. Fruit exhibits the same pattern as other higher value products with growing inequality in consumption patterns; with only the rich able to access the market sourced fruit, especially imported fruits.

If the sector is to develop, making a contribution to improved nutrition, improved incomes, and increased employment opportunities it is crucial to develop the associated processing and packaging industries and the linkages to producers.