



GCP/RAS/171/JPN  
Field Document No. 2/NEP/3

IMPROVEMENT OF AGRICULTURAL STATISTICS  
IN ASIA AND PACIFIC COUNTRIES  
(GCP/RAS/171/JPN)

**Proceedings of the National Seminar  
on the System of Food and Agriculture  
Statistics in Nepal**

Kathmandu, 15-16 December 1999

Volume II

Papers presented at the seminar

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
BANGKOK, 2000**

This publication is produced by

**The FAO Regional Project  
For the Improvement of Agricultural Statistics in Asia and Pacific Countries  
GCP/RAS/171/JPN**

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**A METHODOLOGICAL REVIEW OF DATA COLLECTION,  
ANALYSIS, USE AND DISSEMINATION:  
THE NATIONAL SAMPLE CENSUS OF AGRICULTURE, NEPAL**

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**1. Background**

Nepal has participated in the World Census of Agriculture programmes of 1960, 1970, 1980 and 1990. The censuses were undertaken by Nepal's national statistical office, the Central Bureau of Statistics (CBS).

As we know, there are three levels of administration in Nepal. The national government is in the country's capital, Kathmandu. The country is divided into 75 districts, each of which is headed by a chief district officer. All the main government departments and ministries have offices in each district serving between 20 000 and 60 000 households. Districts are divided into wards. Each ward has between 50 and 1000 households and is headed by a ward chief. The ward chief has limited local administrative responsibilities. There are approximately 20 000 wards all over the country.

Districts are grouped into five development regions and three ecological belts. The development regions – Eastern, Central, Western, Mid Western and Far Western – provide convenient grouping for development planning purposes. The ecological belts are Mountain, Hills and Terai.

The National Sample Census of Agriculture 1991/92 covered the whole of Nepal, including urban areas. In terms of scope, however, only the household sector was included; agricultural activities undertaken by government organizations, businesses and institutions were excluded. The National Sample Census of Agriculture 2001/2002 will cover the same activities.

**2. Census methodology**

FAO guidelines call for all agricultural units to be included in agricultural censuses, regardless of their size. This is appropriate where small operators make a significant contribution to agricultural production. However, very small units are often omitted for cost or operational reasons.

All four agricultural censuses were undertaken on a sample basis, using a similar methodology. A two-stage sample design was used with a sample of enumeration areas selected at the first stage and a sample of agricultural holdings selected in each sample enumeration area. Enumeration areas were defined as wards or groups of wards, usually containing between 30 and 100 agricultural holdings. The total sample size was 122 270 agricultural holdings, representing 4.47 percent of all holdings. Between 1 250 and 2 000 holdings were sampled in each district. An agricultural holding was

defined as an economic unit of agricultural production under a single management including all livestock and poultry kept, and all land used wholly or partly for agricultural production purposes.

A holding was considered to be an agricultural unit satisfying any one of the following conditions:

1. having an area under crop greater than or equal to a quarter of a *ropani* (or four *annas*) or one *matomuri* in Hills or Mountain districts (0.01272 hectare,  $\pm$  15 percent), or greater than or equal to eight *dhur* (0.01355 hectare,  $\pm$  15 percent) in the Terai; or
2. keeping two or more head of cattle or two buffaloes; or
3. keeping five or more sheep or goats; or
4. keeping 20 or more poultry; or
5. keeping any combination of livestock considered equivalent to two head of cattle or two buffaloes (e.g. 1 cattle and 4 sheep).

The agricultural holding was usually the same as the household (a group of persons living and eating together). In rare cases, one household may comprise more than one holding or, alternatively, one holding may be operated jointly by more than one household.

The census methodology used involved identifying agricultural holdings on the basis of the place of residence of the person operating the holding; i.e. the holder. The land operated by an agricultural holding comprised all land under the control of the holding, regardless of location, and may therefore include land in different wards or districts.

A population census was undertaken before the agricultural census and included two questions concerning agricultural activities of households – “total area of holding operated” and “total number of livestock”. This information was used to identify whether each household constituted an agricultural holding for the purposes of the agricultural census. This was used as an aid in the selection of the sample for the agricultural census.

Sample agricultural censuses are now becoming the norm. It would be very difficult for Nepal to carry out a full enumeration of all 2.7 million agricultural holdings in the country. According to CBS, the sample size and design were adequate to provide district data of “sufficient reliability to be useful for most purposes”. Higher-level data were even more reliable. It was not possible to provide reliable data at the ward level.

The two-stage sampling approach is used in many agricultural censuses and surveys around the world. The co-ordination of the population and agricultural censuses was a feature of the agricultural census planning and design.

### 3. Data collected

The scope of data coverage this time around will be more or less the same as that of the 1991/92 census, except for the soil type. The data content of the census was based on FAO guidelines for the 1990 World Census of Agriculture Programme. This is very similar to the 2000 programme. The data collected were:

- 01 Identification: holding and holder identification.
- 02 General characteristics of farm holdings: age and sex of holder; type of other work done by holder; holder's main occupation; whether hired manager is used.
- 03 Characteristics of farm households: age and sex of household members.
- 04 Farm labour: (for each household member) whether economically active, employment and unemployment, reasons for not looking for a job, whether work is done on holding, duration of work on holding; (for hired labour) number of permanent workers by sex, whether occasional workers are employed.
- 05 Land and water resources: (for each parcel) area, wet land and dry land, whether irrigated, source of irrigation, land tenure, land use; (for holding) number of parcels, area, whether land is rented out, whether holding is irrigated during the year, whether there are any drainage facilities.
- 06 Crop cultivation: (for each parcel) crop stand, type of annual crop and area harvested, type of permanent crop, compact area and number of productive and non-productive trees, number of scattered trees; use of fertilizers for main crops, type and quantity of fertilizer used; use of pesticides; use of irrigation; use of improved seeds.
- 07-08 Livestock: animal number by type according to age and sex; poultry number.
- 09 Farm machinery: use of items of machinery and equipment; number and source of items.
- 10 Farm buildings and structure: whether non-residential buildings are used for agricultural purposes; tenure and type of these buildings.
- 11 Ancillary activities on farm holdings: existence of forest trees and fishery on the holding; number of forest trees; type and area of fishing installation.
- 12 Agricultural credit: whether agricultural loan is received, and loan source.

The census questionnaires and procedures were tested in 1991. Instruction manuals were prepared for field staff. Not all data items proposed by FAO were collected in the census. Some items of special interest to Nepal were added, including labour force characteristics of household members and the age and sex breakdown of livestock.

The need for careful planning and design of statistical collections has been highlighted throughout this working paper. The development of an agricultural census takes a minimum of 18 months. The design and testing of questionnaires and field procedures is a very important component of the census development work. Instruction manuals are essential for the training of enumerators and for use in the data collection.

#### **4. Organization of census operations**

CBS appointed a district census officer and several field supervisors in each district to oversee the census field operations. Some 1 100 enumerators were appointed to undertake the census data collection. A three-week training course for district census officers and supervisors was held in Kathmandu. This was followed by two-week training courses for enumerators in each district.

The census data collection was carried out in two phases: Hills and Terai between January and March 1992, and Mountain between April and June 1992. This split was necessary because of the climate and the shortage of data collection staff.

Census enumerators first visited each selected enumeration area to prepare a list of all agricultural holdings. Supervisors selected the sample holdings from these lists. Enumerators then returned to collect the data by interview with each selected holding.

#### **5. Computer processing system development**

The data processing was undertaken by CBS in Kathmandu using microcomputers. CBS developed computer systems for data entry, editing and tabulation for the census, using the software package CLIPPER 5.01. The computers used for census processing in Nepal were of the 386 model, with an 80MB hard disk and 4MB RAM – quite primitive and slow by today's standards.

#### **6. Data entry**

The data entry work was contracted out to nine private data-processing firms. CBS monitored the quality of the data entry by checking questionnaires on a sample basis. It was decided to contract out the data entry work because CBS did not have sufficient staff and computers for the task. Contracting out data entry work can lead to quality control problems; sample checks, as used in Nepal, are needed.

The data entry work was completed within six months, which was a very satisfactory outcome.

#### **7. Editing and checking**

Once data entry had been completed, more than 100 computer checks were applied to verify the data on each questionnaire. An interactive system was used. The computer displayed onscreen each apparent error, which was checked and amended on the spot by CBS staff.

The editing was carried out over a 15-month period. It was time-consuming work but essential to ensure that the data were of a high quality. The editing was designed to identify several types of errors: missing data, data inconsistencies and unusual figures.

The use of interactive editing was an interesting approach, which proved to be very successful.

## 8. Output tables

The computer system was designed to produce a set of 22 output tables for each required geographic level, that is, one set for each district, development region and ecological belt, as well as one for the whole country. The tables present data on each of the topics covered by the census. The contents of each table are organized by size of holding.

The holding size grouping was: holdings with no land; under 0.1 ha; 0.1 ha and under 0.2 ha; 0.2 and under 0.5 ha; 0.5 ha and under 1.0 ha; 1.0 ha and under 2.0 ha; 2.0 ha and under 3.0 ha; 3.0 ha and under 4.0 ha; 4.0 ha and under 5.0 ha; 5.0 ha and under 10.0 ha; and 10.0 ha and over.

### Output tables for the National Sample Census of Agriculture, Nepal, 1991/92

No.	Description
<i>Table 1</i>	Number of holdings; area of wet and dry land; number of land parcels; average number of parcels per holding; distribution of holdings by number of parcels
<i>Table 2</i>	Number of holdings and area for each land-tenure type
<i>Table 3</i>	Number of holdings and area for each land-use type
<i>Table 4</i>	Number of holdings and area for each source of irrigation; number of holdings renting out land; number of holdings with drainage facilities
<i>Table 5</i>	Number of holdings and area for each main temporary crop group (cereals, legumes, tubers and bulbs, cash crops, oilseed, spices, vegetables)
<i>Table 6</i>	Number of holdings and area according to pure stand and mixed crops
<i>Table 7</i>	Number of holdings and area for each temperate crop (i.e. early paddy, main paddy, upland paddy, wheat, etc)
<i>Table 8</i>	Permanent crops: number of holdings and area for productive and non-productive plantation trees; number of plantation and scattered trees
<i>Table 9</i>	Number of holdings using improved seeds, insecticides, irrigation, organic and inorganic fertilizers; area treated with inorganic fertilizer and quantity used
<i>Table 10</i>	Number of holdings and number of animals for each livestock and poultry type classified by age and sex
<i>Table 11</i>	Agricultural implements: number of holdings and buildings for each building type
<i>Table 12</i>	Number of non-agricultural buildings: number of holdings and buildings for each

<b>No.</b>	<b>Description</b>
	building type
<i>Table 13</i>	Number of holdings with forest trees; number of forest trees; distribution of holdings classified by number of forest trees; number of holdings with fishery by type of fishery; area of fish ponds
<i>Table 14</i>	Number of holdings receiving agricultural credit according to source
<i>Table 15</i>	Number of holdings classified by age and sex of holder
<i>Table 16</i>	Farm population classified by age and sex
<i>Table 17</i>	Number of holders according to whether the holder is head of household; number of holdings with and without a hired manager; number of holders doing work outside the holding
<i>Table 18</i>	Number of holdings classified by number of economically active household members; number of male and female economically active household members
<i>Table 19</i>	Number of male and female household members classified by duration of work
<i>Table 20</i>	Number of male and female household members classified by duration of work on holding
<i>Table 21</i>	Economically inactive household members classified by reason for not being active
<i>Table 22</i>	Number of holdings employing permanent and occasional outside workers; number of male and female permanent outside workers

Source: Nepal, CBS, 1993

## **9. Census reports**

CBS issued 85 reports presenting the main census results: one national-level report, five development regional reports, three ecological-belt reports, 75 district reports and one report summarizing data for development regions and ecological belts. Each report contained the 22 output tables with explanatory text. The reports were produced by computer in camera-ready form and were progressively issued between March and December 1993.

The use of microcomputers for processing censuses and surveys has made it easier to prepare statistical publications. The release of all 85-census reports within 18 months of the completion of the census data collection was a very satisfactory outcome, which could not have been achieved without the reports being generated by computer.

The release of such an extensive set of census reports helped to promote wide use of the census results.

The release of publications district by district as the processing was completed ensured that users would be provided with data as early as possible in hard-printed copies. Data will be disseminated on floppy disks for the convenience of date users.

## **10. Census analysis**

Besides the 85 main census reports, CBS issued three additional reports. The main highlights of the census were issued in January 1994. The report contained some graphical presentations, commentary on the main findings, and summary tables. A detailed analysis of the census results was provided in a second analytical report issued in June 1994. A technical report, containing a description of the census methodology, presentation of sampling errors, an assessment of the sample design and an evaluation of data quality, was issued in February 1994.

The analysis was a feature of the agricultural census. The detailed output tables presented in the main census reports provided the information required by 'serious' users – though casual users may be overwhelmed by the large volume of data given. The analytical reports helped to pave the way to a better understanding of the data and its policy implications, and to stimulate interest in the census results.

The final technical report is an extremely valuable document. It helped in interpreting the census results and understanding the limitations of the data. The analysis of sampling errors, which included a presentation of various sample design parameters, such as standard error, relative standard error, coefficient of variation, design effect and measure of homogeneity, will be invaluable in the planning and design of future agricultural censuses and surveys.

The publication tables were also available to users on diskette. To meet the need for additional tables in the future, data files were converted for use by the statistical analysis package SPSS. CBS staff members were trained to use the SPSS package.

An agricultural census is costly and it is important that the results be fully used. Because censuses are carried out only every ten years and the data cover aspects that do not change very much over time, the census results are of interest to users for many years.

## **11. Use of agricultural censuses for policy analysis and research**

Data from agricultural censuses can be useful for policy analysis and research studies on a wide range of issues, including

- role of women in agriculture;
- characteristics of a particular crop (e.g. cassava);
- problems faced by small farms;
- characteristics of a particular livestock production system (e.g. pigs);
- structure of agriculture in a particular district;
- relationship between crop and livestock production; and
- sources of farm labour.

## **12. Problems, issues and proposed solutions**

Agriculture has been identified as the lead sector for development and poverty alleviation programmes in the country. Agricultural information is crucial to the success of any agricultural development plan. CBS is currently receiving assistance for improving annual agricultural estimates. CBS uses a master sample frame based on the 1991/92 agricultural census. The 2001/02 National Sample Census of Agriculture will, most likely, be the basis for a similar sampling frame for the next ten years.

Considering the inadequate specialized knowledge of the personnel available and more ambitious plans for the next agricultural census, technical assistance has become indispensable. The objectives of the required assistance will be, among others, to develop the capability of CBS for agricultural census taking (particularly methodology and data processing), to develop a census data dissemination strategy (including electronic media) catering to the needs of a wide range of users within and outside the country and to develop a sampling frame for the ongoing annual agricultural survey system. In view of the complexity of census operations and of the limited staff available, preparation for the census should start as soon as possible.

**COMPILATION AND USE  
OF THE FOOD BALANCE SHEET OF NEPAL**

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**I. INTRODUCTION**

**1. Background**

The food balance sheet of a country presents a comprehensive picture of the pattern of food supply and use in that country during a specified period. It includes a large number of unprocessed and processed food commodities available for human consumption, their sources of supply and areas of use. The total quantity of foodstuffs produced in a country, added to the total quantity imported, and adjusted to any change in stocks that may have occurred since the beginning of the reference period, gives the supply available during that period. On the food-use side, a separate calculation is made of quantities exported, fed to livestock, used for seed, put to manufacture for food use and non-food use, losses during storage and transportation and other losses, and food supplies available for human consumption. The per capita supply of each food item available for human consumption is then obtained by dividing the quantity of food supply of each item by the mid-year population of the period under survey. Data on per capita food supplies are expressed in terms of quantity and also in terms of calorie, protein and fat contents.

The annual food balance sheet tabulated over a period of years shows the trends in the overall national food supply and reveals the extent to which the food supply of the country as a whole is adequate in relation to nutritional requirements. It is useful in food and nutritional planning and in the analysis of food security policies. It also serves in the detailed examination and appraisal of the food and agriculture situation of the country. A comparison of the quantities of food available for human consumption with those imported will indicate the extent to which a country depends upon imports. The amount of food crops used to feed livestock in relation to total crop production indicates the degree to which primary food resources are used to produce animal feed. Data on per capita food supply serve as a major element for the projection of food demand.

**2. Objectives**

The objectives of this paper are to present the methodology of FBS preparation and the status of use at national and district levels in Nepal and to find out the weaknesses of FBS in order to make suitable recommendations.

### **3. Chronological development of the food balance sheet of Nepal**

The development of food balance sheets started during the Second World War. They were first developed by the US military to obtain food balance information and to calculate the food stock situation for the army. After the Second World War, many countries became aware of their importance and began to develop their own.

In Nepal, collection of food production statistics started in 1961/62. The first food balance sheet was prepared by the Economic Analysis and Planning Division of the then Ministry of Food and Agriculture in 1970/71.

The annual publication of FBS started in 1974/75, by the then Department of Food and Agricultural Marketing Services. At first, the sheet merely contained the edible cereal production, requirement and net balance (surplus or deficit) of rice, maize, wheat, millet and barley in the 75 districts of Nepal.

The contents of FBS were augmented in 1980/81, with the inclusion of potato, tubers, processed food, sugar, confectionery, pulses, vegetables, fruit, milk and milk products, meat, fish, eggs, oil, ghee, butter, spices, alcoholic beverages, tea, coffee, etc. From then on, the food balance sheet of Nepal has provided the real food scenario of the country. The preparation of FBS is now a continuing process. At present, the compilation, analysis and preparation of FBS is the responsibility of the Marketing Development Division of the Department of Agriculture of the Ministry of Agriculture.

### **4. Framework of the food balance sheet**

The study of the food balance sheet of Nepal contains two parts; the food balance sheet at the national level, and edible cereal production and requirements at district level.

#### **4.1. The food balance sheet at the national level**

The national food balance sheet covers some 65 commodities, including cereals, pulses, vegetables, fruit, meat, milk, eggs, fish and oils. The total availability of each food commodity is found out; it is known as the total food supply in the

country. The availability of total supply of a particular commodity is obtained by the following equation.

Availability of a commodity = Domestic food supply – Loss – Feed requirement – Food/non-food manufacturing – Seed requirement

in which

Domestic Supply = Output + Import ± Stock change – Export

*Example*

Population: 21 904 878

**Unit: MT**

Food commodity	Production		Import	Stock in Change	Export	Domestic supply
	Input	Output				
1	2	3	4	5	6	7
Paddy	-	3 640 860	8 489	1 980	-	3 647 369
Rice	3 200 434	2 076 122	4 499	- 18 959	20 196	2 079 384

Food commodity	Feed	Seed	Manufacturing	Wastage & non-food use	Food	Supply
			Food for use		Other losses	
1	8	9	10	11	12	13
Paddy	-	82 849	3 200 434	-	364 086	-
Rice	-	-	-	-	36 389	2 042 995

Food commodity	Per capita supply per year (kg)	Per capita supply per day			
		Gram	Calorie	Protein (gm)	Fat (gm)
1	14	15	16	17	18
Paddy	-	-	-	-	-
Rice	93.27	255.53	882	16.86	1.28

(The food balance sheet of Nepal prepared for 1997/98 is presented in Appendix 1.)

#### **4.2. Edible cereal production and requirements at district level**

In the study of edible cereal production and requirement, edible production, requirement and net balance (surplus/deficit) of rice, maize, wheat, millet and barley of each district and of the country as a whole are calculated.

The edible production of each cereal commodity is calculated as follows:

Edible commodity production = [Total raw production (un-milled) – Wastage – Seed requirement – Feed requirement] x Extraction-rate coefficient

Similarly, total requirement is calculated on the following basis:

Edible requirement = 190 kg of cereals per capita per year in the Mountain  
 = 201 kg of cereals per capita per year in the Hills  
 = 181 kg of cereals per capita per year in the Terai

The edible requirement is based on the total calorie requirement as defined in the Basic Needs Plan of Nepal. Total requirement for each district is calculated by multiplying the per capita requirement and the total mid-year population of the district, to find out whether the district is self-sufficient or not.

*Example*

**Unit: MT**

District	Mid-year population	Edible production						Total edible requirement	Surplus or deficit
		Rice	Wheat	Maize	Millet	Barley	Total		
Jhapa	703 533	141 142	20 225	14 223	2 873	3	178 465	127 339	51 126

(Edible cereal production and requirement prepared for 1997/98 are presented in Appendix 2.)

**5. FBS components**

**5.1. Commodity coverage**

In the food balance sheet of Nepal, all the food commodities and their production and consumption patterns are included. Eighteen columns are used for finding out the food supply per capita by commodity. The first column of FBS contains the name of the commodities. The other columns are systematically arranged to produce a comprehensive presentation of the food supply situation. To make the balance sheet more comprehensive, the definitions used are given as follows:

**Production**

This includes estimates of the total amount of food produced (un-milled and milled) in the country during a given period. The column of production is subdivided into input and output. The output column lists the production of certain crops (e.g. paddy) as output. The input column denotes net volume of production (output) ready for processing minus import, export, feed, seed, losses, etc. The processed volume of the output (e.g. rice) is then shown in the output column.

**Stock changes**

At the end of a year, there is usually some leftover food grain. This is known as the closing stock. In the food balance sheet, the closing stock of one fiscal year becomes the opening stock of the next

fiscal year. The stock involves household stock of food grain, miller's stock, stock held by importers, exporters, wholesalers and retailers at various levels. In practice, information on food stock at such levels is not available in many countries, including Nepal. Due to this difficulty, the food-grain stocks of the Nepal Food Corporation and the Salt Trading Corporation are used in the preparation of FBS.

### **Import and export**

Import (column 4) covers all movements of the commodity into the country. This includes commercial imports and food aid granted by foreign countries. Export (column 6) covers all movements of the commodity out of the country during the reference period.

### **Domestic supply**

Domestic supply = Production + Import ± Stock change (increase or decrease) – Export

### **Domestic use**

This column shows the use pattern of a commodity by items such as feed for livestock, seed for next year's production or volume of losses. All these items are clearly mentioned in FBS.

### **Feed**

The amount of cereals fed to livestock and poultry is estimated by applying certain parameters to production.

### **Seed**

This comprises the amount of commodity required for the forthcoming agricultural production. Seed requirement is calculated by multiplying the total area of a particular crop by the seed rate, which is expressed in kilograms per hectare (column 9).

### **Manufacturing**

A distinction is made between manufacture for food and manufacture for non-food use. The amount of commodities used for manufacturing those processed commodities that are not convertible into the original primary commodities (e.g. sugar or vegetable ghee) are classified under manufacture for food. The quantity of the commodities manufactured for non-food purposes (e.g. bran oil for soap) are shown under manufacture for non-food use.

### **Wastage**

This comprises the amount of food wasted after harvest, i.e. the quantity of food lost from the first stage of production all the way to the kitchen. Losses of food supplies due to waste may be

classified into waste on farms, processing waste and waste in distribution or storage. The amount of food wasted after harvest differs from crop to crop.

### **Food supply**

This refers to the total amount of food directly available for human consumption, which is calculated by deducting animal feed, seed, manufacturing and waste from domestic supply.

### **Per capita food supply**

The per capita food supply is the amount of food available for individual human consumption in terms of quantity, calorie, protein and fat contents.

The volume of per capita supply represents the volume of supply available for the population as a whole and does not necessarily indicate what is actually consumed by individuals. There could be considerable variations in consumption among individuals.

### **Extraction rates**

For converting un-milled cereal commodities to milled ones, the coefficient of extraction rate is used (e.g. paddy to rice, maize to maize flour).

### **Population coverage**

The population coverage of FBS is the total number of nationals living in the country, meaning that nationals living abroad during the reference period and foreigners living in the country are excluded from the analysis. The population figures used in FBS are for the mid-year.

## **II THE FBS METHODOLOGY**

### **1. Sources and methods of data collection**

#### **1.1 Production data on food crops, livestock, fish, vegetable and fruit**

Data on area and production of paddy, maize, wheat, millet, barley, potato and pulses and on livestock and poultry population and production are collected from the Agricultural Statistics Division of the Ministry of Agriculture. The division publishes annual statistical information reports on the Nepalese agriculture which include district as well as national data. Almost all the data used in FBS are collected from secondary sources and published in the annual reports of various agencies. Production data on fish, vegetables and fruit are collected by the Agricultural Statistics Division from the Fishery Development Division, the Vegetable Development Division and the Fruit Development Division respectively. All these data are published annually as Statistical Information on Nepalese Agriculture. The data are collected through correspondence and personal visits.

#### **1.2 Processed food products**

This group of food products comprises wheat flour, maize flour, bread, biscuits, noodles, processed fruit, spirits, beer, soft drinks and others. Data on processed food product output are published annually in the Industrial Statistics reports and the Economic Survey published by the Department of Industries and the Ministry of Finance respectively. Data about processed food products are collected from the concerned agencies through visits.

### **1.3 Stock changes**

Data on volume of stocks for paddy, rice, wheat, wheat flour, maize, sugar, pulses, oil, vegetable ghee, etc are obtained from the Food Corporation of Nepal, the Salt Trading Corporation and the National Trading Corporation annually. The collection method is through correspondence and personal visits.

### **1.4 Foreign trade statistics**

Data on the quantity of imported and exported food items used in FBS preparation are collected from the *Foreign Trade Statistics* report published annually by the Department of Customs. Along with this department, the data on food aid are collected from the World Food Programme and the amount of food aid granted by foreign countries is collected from the Nepal Food Corporation. The collection method is through correspondence and personal visits.

### **1.5 Domestic use ratio**

Ratios used to estimate allowances for seeds, wastage and extraction rates are collected from the Central Food Research Laboratory, the Post-Harvest Loss Reduction Division and the Department of Agriculture.

### **1.6 Nutrient value**

The nutrient value of food commodities in terms of calorie, protein and fat is obtained from the Central Food Research Laboratory and the published reports of the National Institute of Nutrition, ICMR, Hyderabad, India (Appendix 3).

### **1.7 Mid-year population**

The population figures of the country used in FBS are collected from the Central Bureau of Statistics.

## **2. Data processing and method of estimation**

FBS must take into account all food commodities from production to consumption and show the quantities of each food commodity. This is done through a distribution of figures across 18 columns. Accurate figures for total population and for the appropriate extraction rates, seed rates, wastage

rates and nutrient conversion factors must be used in order to ensure reliable estimates of national average food supplies and nutrients available per head.

## **2.1 Extraction rate**

Except cereals, oilseeds and sugarcane, food commodities (e.g. vegetables and fruit) need not be milled for human consumption. The extraction rate for cereals, sugarcane, oilseeds and milk is used for estimating the processed products, which are presented in Appendix 4.

### **Paddy/rice**

To make production estimates of milled rice, the extraction rate is used in the data of paddy production. Since there are modern mills, traditional mills, with leg-pounding and hand-pounding systems prevailing in Nepal, the extraction rates of different methods are different. On average, the recovery rate is estimated to be 58 percent, 62 percent and 66 percent for Mountain, Hills and Terai, respectively. The milling recovery rate used for paddy in aggregate is 64.87 percent.

### **Wheat**

Wheat is converted to wheat flour by applying the recovery rate of 96 percent.

### **Maize**

Maize is converted to maize flour by applying the recovery rate of 97 percent.

### **Millet/barley**

Millet is converted to millet flour and barley to barley flour by applying recovery rates of 93 percent and 32 percent respectively.

### **Oilseeds**

To convert oilseed to oil, the recovery rate is estimated at 38 percent.

### **Sugarcane**

The extraction rate of sugar from sugarcane is estimated at 8.46 percent. From sugarcane to *khandsari*, the rate is 6.47 percent and from sugarcane to raw sugar, 9 percent.

### **Milk**

It is estimated that only 5 percent of buffalo milk is turned into ghee and butter and the rest (95 percent) is skimmed milk. In the case of cow milk, the proportions are 4 percent ghee and butter and 96 percent skimmed milk.

## **2.2 Seed rate**

The seed rates of different crops are different. These rates are collected from the Crop Development Division of the Department of Agriculture.

The seed rate for paddy is 55 kg per hectare, for wheat 100 kg, for maize 20 kg, for millet 20 kg, for barley 40 kg, for potatoes 1000 kg, for sugarcane 3 500 kg and for oilseed 10 kg. In the case of pulses, the seed rate for lentil is 40 kg per hectare, for red gram (*arahaar*) 40 kg, for black gram 25 kg, for chick pea (*chana*) 60 kg and for other pulses 45 kg.

### **2.3 Wastage and losses**

FBS tabulates only post-harvest losses and losses during processing, storage, transportation, etc. The people perform puja during Dashain, Tihar and on many other occasions. Food grains used in such activities are not available for human consumption.

The estimates of wastage and losses used for FBS are prepared by the Marketing Development Division in consultation with the technicians of the Post-Harvest Loss Reduction Section of the Department of Agriculture. The estimates are as follows:

- for paddy, wheat, maize, millet and barley, 10 percent of the amount is deducted as wastage before processing or milling; after processing, 1.75 percent in the case of rice and 1 percent in the case of wheat flour and maize flour;
- for potatoes, tuber crops and fruit, the wastage rate is 15 percent;
- for fresh vegetable, the wastage rate is 10 percent; and
- for pulses, oilseeds, milk and eggs, the wastage rate is 5 percent.

### **2.4 Production of alcoholic and non-alcoholic beverages**

Beverage production is converted from litres to metric tons by multiplying the average production in litres by 1.109 then dividing by 1000.

### **2.5 Estimation of livestock feed**

The animal feed requirement for milking cows and buffaloes, oxen and breeding bulls has been estimated on the basis of requirement per head calculated by the then Department of Food and Agricultural Marketing Services in consultation with the relevant departments. (Appendix 5)

In the case of the poultry feed calculation, the poultry population of only 20 Terai districts is taken into account, because they are assumed to be the commercial poultry-raising districts. The feed requirement is calculated according to their share of the population.

### **2.6 Production of livestock and poultry**

Since we do not have the number of animals slaughtered for meat production, we simply use the total amount of meat production by type. In the case of eggs, it is estimated that each egg weighs 50 grams.

## **2.7 Estimation of domestic food supply**

The domestic food supply is calculated as follows:

$$\text{Domestic food supply} = \text{Production} + \text{Imports} + \text{Beginning stock} - \text{Exports} - \text{Ending stock}$$

## **2.8 Estimation of net food supply**

The food supply available for human consumption is obtained by deducting the amount of commodity used for other purposes (e.g. feed, seed, wastage, manufacturing) from the total domestic food supply.

## **2.9 Estimation of per capita food supply**

The amount of available food supply per capita in kilograms per year is obtained by dividing the total food availability (million tons) by the mid-year population during the reference period, then multiplying by 1000.

The amount of available food supply per capita in grams per day is obtained by dividing the amount of food in kilograms per year by 365 days and then multiplying by 1000.

## **2.10 Estimation of nutrient supply**

The nutrient content of food supply in terms of calorie, protein and fat is computed by multiplying the food availability (in grams) per day column by the nutrient value per gram of the edible portion of the food item.

## **3. Dissemination and reporting**

The food balance sheet (national and district levels) prepared by the Marketing Development Division is published annually in the *Special Issue of the Agricultural Marketing Information Bulletin*. Data are updated manually and by computer. Reports are circulated to government offices, public corporations, FAO, UNDP, the universities, TPC, the Agro Enterprise Centre, the Nepal Rastra Bank, other institutions and interested individuals.

### **III USE OF FBS**

#### **1. Planning and evaluation**

Agricultural development programmes in Nepal are evaluated every year at the district, regional and national levels. The improvements in the food security status of districts, regions and the nation as a whole are evaluated by using the information provided by FBS.

The Agriculture Perspective Plan (1997-2016) now under implementation in Nepal used the FBS data to project food levels for the next twenty years. It aims at a per capita food production of 426 kg by 2016. Similarly, the Ninth Plan (1997-2002) has used this information to target a reduction of the poverty level by 10 percent within five years.

## **2. Management of food crises at district level**

In Nepal, food deficits occur frequently in various districts for several years due to excess rainfall or drought. Such deficits are managed through special food production programmes mooted by the Ministry of Agriculture and based on FBS information.

## **3. Nutrition-related planning**

Supply of adequate nutrition to the general public is one of the aims of the national development plans, and the National Planning Commission, the Ministry of Health and the Central Food Research Laboratory have widely used FBS information to help formulate such plans. Universities, non-governmental and international organizations also use this information extensively to evaluate nutritional levels and carry out necessary action plans.

## **4. Demand and supply estimates**

FBS studies various food-related issues including the demand and supply of several food commodities. Various agencies, including the Ministry of Supplies, the Department of Agriculture, the Department of Livestock Services and the Ministry of Commerce, as well as related projects and organizations, have benefited from this information especially for policy formulation and decision-making.

## **5. Implementation of food subsidies**

The food subsidy programmes focus on the remote Mountain districts, where local food production cannot meet local demand. Huge amounts of money are involved in the process of food transportation by air or portage. At this juncture, subsidies are provided for the transportation of food to these districts through the Nepal Food Corporation. The food information of FBS provides an adequate basis for the identification of food-deficit Mountain districts.

## **6. Parliamentary affairs**

Members of parliament addressing the burning national issue of food security to draw the attention of fellow MPs and ask the government to revitalize the concerned programmes, routinely use the food-related information available in FBS.

## **7. Food-for-work programmes**

Development projects have been launched in various districts and areas through the implementation of food-for-work programmes. Among the agencies involved in such activities are the World Food Programme and the Ministry of Local Development.

## **8. Indication of domestic and export market**

The import and export situation of fruit, vegetables, spices, tea, coffee and honey are included in the analysis of FBS. The Association of Traders, Industrialists and Exporters, the Department of Agriculture, the Ministry of Commerce and related organizations have used FBS information to assess the prospects of the domestic and export markets of various commodities.

## **IV FBS ISSUES**

### **1. Consistency**

Data have to be collected and compiled from secondary sources, i.e. sundry ministries and organizations. The quality of the data derived from various sources varies due to methodological differences. The quality of compiled data should be consistent to be relied upon by the users.

### **2. Conversion of data**

In this analysis, the production of commodities is converted into their edible form. Similarly, the edible production is converted into nutrient values. The conversion of these values requires special knowledge if the accuracy and reliability of FBS is to be maintained.

### **3. Dependence**

Most of the data necessary for FBS are derived, as we have seen, from the Department of Customs, the Department of Industry, the Agricultural Statistics Division, the *Economic Survey Report* and others. The timeliness and accuracy of information of these organizations determine the accuracy and timeliness of information provided by FBS.

### **4. Reliability**

Most of the data used in FBS are derived from secondary sources. Several data are derived from field surveys and norms determined by the Marketing Development Division of the agriculture ministry. The greater the frequency of updates of data derived from field surveys, the higher the reliability. The secondary data needs to be checked for accuracy and reliability against various other data. The specialists involved in preparing FBS have to use their judgement on the reliability of secondary data and explore alternative sources when in doubt.

## **5. Food requirement data in general**

FBS provides information on per capita food supply in general but does not consider seasonal and other fluctuations of consumption. Neither does it record demand variations among age groups.

## **V PROBLEMS ENCOUNTERED IN THE PREPARATION AND USE OF FBS**

### **1. Lack of co-ordination**

The preparation and publication of FBS comes under the annual programme of the Marketing Development Division of the Department of Agriculture. The punctuality and reliability of FBS depends on the punctuality and reliability of the different agencies providing the data.\* It is obvious that preparation of food-security-related information has been a common interest for all the government, semi-public and private organizations involved countrywide. But providing essential data has been a neglected and low-priority task for them. The specialists involved in the preparation of FBS do not have quick and co-operative responses from these organizations.

### **2. Inadequate food-consumption surveys**

In order to prepare FBS, it is necessary to conduct food consumption surveys regularly. Food consumption surveys were carried out by the then Department of Food and Marketing Services in six districts representing the Mountain, Hills and Terai belts in 1983/84 and 1984/85 only. It is doubtful whether the updated data about food demand are still fully representative and valid. The present manpower of the Marketing Development Division is inadequate to carry out field surveys for FBS.

### **3. Food requirements for local brewing and worship purposes not included**

A large volume of food grain is used for local brewing at various places, as well as for worship purposes countrywide. The Nepalese FBS does not have a system to include the food grain used in these ways. It is therefore likely that FBS information does not reflect realities accurately in this respect.

### **4. Food taken by Indian labourers not included**

The border between Nepal and India is open. There is a tendency for Indian labourers to come to Nepal to work in farms. They are paid in kind or cash or both. The food grain received by Indian labourers is not included in FBS, because such data cannot be collected through field studies by the marketing division, given its lack of manpower.

### **5. Lack of representative import/export data**

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\* The agencies providing data are the Department of Customs, the Department of Industries, the Ministry of Finance, the Livestock Department, the Agriculture Statistics Division, the Nepal Food Corporation, the Central Food Research Laboratory, the Salt Trading Corporation, the National Trading Corporation, the World Food Programme, and others.

The published data are found to be inadequate to provide the real status of trade because food commodities not submitted to custom duties are not mentioned in custom records. The open border between Nepal and India adds to the flow of unrecorded movements. Again, the manpower of the division is inadequate to carry out field surveys to meet this gap.

## **6. Inadequate manpower and budget**

Currently, one agricultural marketing economist looks after the preparation of FBS. Government budgetary allocations are inadequate to conduct field surveys related to FBS. Given the lack of co-ordination between organizations, the preparation and timely publication of FBS has been a great problem. Various norms, including seed use, feed requirement, extraction and wastage, have not been updated.

## **VI CONCLUSION AND PROPOSALS FOR IMPROVEMENT**

### **1. Conclusion**

The Food Balance Sheet prepared by the Marketing Development Division has helped various organizations to formulate and evaluate food- and nutrition-related programmes since way back. But the present manpower and budget of the division are inadequate to overcome various obstacles or problems in the process of data collection, processing and publication.

### **2. Proposals for improvement**

- All the organizations concerned with data collection and preparation of FBS should be involved in the process of preparation. It is suggested to set up a central-level technical co-ordination committee for the preparation and publication of FBS. The members of the committee would include the concerned staff members of the Marketing Development Division, Department of Customs, Department of Industries, Ministry of Finance, Department of Livestock Services, Central Food Research Laboratory, Nepal Food Corporation and Ministry of Health. The committee would be responsible for data collection and publication of FBS.
- It is necessary for the Department of Customs to collect the data about import and export by commodity and for this information to be published on time. Necessary budget and manpower should be allocated to the department for such a task. The import and export data which are unrecorded in the official statistics should be found through field surveys by the marketing division.
- A food consumption survey should be carried out every three years. At the moment, it is necessary to expand the capability of the marketing division and ask for the technical co-operation of the relevant specialized organizations.
- The present manpower capability of the marketing division should be increased. Other trained officers are needed to support the work of the one agricultural marketing economist in charge of FBS.

- The FBS-related norms about feed requirement, extraction, wastage and unrecorded import and export should be updated with the technical co-operation of specialized organizations and the manpower of the marketing division should be increased.

## REFERENCES

- *Food balance sheet manual of the Philippines*, Republic of the Philippines, National Statistical Co-ordination Board, Economic and Social Statistics Office, Manila
- *Food balance sheets, 1995-77 Average and per capita food supplies, 1961-65 Average, 1967 to 1977*, 1980, FAO/UN, Rome
- *Food balance sheet of Nepal 1990-91*, HMG, Ministry of Agriculture, Department of Food and Agricultural Marketing Services, Marketing Services Division, Food and Price Unit, 2049 [1992]
- *Agricultural perspective plan (1995)*, Agricultural Project Service Centre, Kathmandu and John Mellor Associates Inc, Washington

## Appendix 1

FOOD BALANCE SHEET OF NEPAL (PRELIMINARY) – FISCAL YEAR 2054/55 (1997/98 AD)

POPULATION: 21 904 878

Unit in Mt.

FOOD COMMODITY	Production		Import	Stock in		Domestic			Manufacturing		Wastage and other losses	Food supply	Per capita supply  Per Yr(Kg.)	Per capita supply per day			
	Input	Output		Change	Export	Supply	Feed	Seed	Food for use	Non- foodus e				GRAM	CALO- RIE	PRO- TEIN	FAT
																(gm)	(gm)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<b>TOTAL</b>													388.187	1063.526	2361.739	64.891	34.177
<b>TOTAL CEREALS</b>													185.594	508.476	1756.587	43.231	8.773
PADDY		3640 860^	8 489	1980*		3647369		82 849	3 200 434		364 086						
PADDY/RICE	3 200 434	2 076 122	4 499	-18 959*	20 196	2079384					36 389	2042995	93.27	255.53	882	16.86	1.28
PADDY/BRAN	3 200 434	256 035			10 500	245 535	219 976			13282	12 277						
WHEAT		1030 320^	7 858	-1 564*	1 112	1038630		64 003	871 595		103 032						
WHEAT/WHEAT FLOUR	871 595	836 731	970	303*	22 000	815 398	13 617		33 790		8 154	759 837	34.69	95.04	324	11.50	1.62
LOAF & OTHERS	30 256	59 105@	255		1 392	57 968						57 968	2.65	7.25	26	0.67	0.52
WHEAT/BRAN	871 595	33 992			10 799	23 193	20 874				2 319						
MAIZE(CORN)		1367340^	10 334			1377674		15 981	1 224 959		136 734						
MAIZE/MAIZE FLOUR	1224959	1188210				1188210	225 638				11 882	950 690	43.40	118.91	422	10.94	4.64

MILLET		285 120^	872		398	285 594		5 249	251 833		28 512						
MILLET/MILLET FLOUR	251 833	234205				234 205					234 205	10.69	29.29	95	3.02	0.70	
BARLEY		37 150^	66		38	37 178		1 424	32 039		3715						
BARLEY/BARLEY FLOUR	32 039	10 252				10 252					10 252	0.47	1.28	4	0.15	0.02	
OTHER CEREALS			890		60	830					830	0.038	0.10	0	0.01	0.00	
O/PROCESSED CEREALS	3 534	3 973@	5 995		1 333	8 635					8 635	0.39	1.08	4	0.09	0.00	
<b>POTATO,ROOTS &amp; TUBERS</b>												41.15	112.74	110	1.83	0.12	
POTATO		971 680^	105 649		1 368	1075961		116 290			145 752	813 919	37.16	101.80	99	1.63	0.10
PROCESSED POTATO			40			40					40	0.002	0.005	0	0.00	0.00	
ROOTS & TUBERS		102 755#	81			102 836					15 413	87 423	3.99	10.93	11	0.20	0.02
<b>SUGAR,HONEY AND OTHER CONFECTIONERY</b>												8.36	22.90	85	0.05	0.01	
SUGAR CANE		1762580^	11		46	1762545		170 800	1 580 793		10 952	0.50	1.37	0	0.00	0.01	
SUGAR	762 896	64 541@	20 197	-12 701*	648	96 791					96 791	4.42	12.11	48	0.01	0.00	
KHADSARI	47 002	3041@				3 041					3 041	0.14	0.38	2	0.00	0.00	
RAW SUGAR	770 895	69381	5 597		2 625	72 353					724	71 629	3.27	8.96	35	0.04	0.01
HONEY/OTHER HONEY		65\$	111		19	157					157	0.01	0.02	0	0.00	0.00	
CONFECTIONERY&OTHERS			2189		1 683	506					506	0.02	0.06	0	0.00	0.00	
<b>PULSES</b>												6.59	18.06	62	4.39	0.23	
LENTIL (MUSURO)		113 520^			2 292	111 228		6 496			5 676	99 056	4.52	12.39	42	3.11	0.09
RED GRAM (ARAHAR)		18 978^				18 978		1 041			949	16 988	0.78	2.12	7	0.47	0.04
BLACK GRAM (MAS)		17 674^	308			17 982		676			884	16 422	0.75	2.05	7	0.49	0.03
CHICK PEAS (CHANA)		13 512^			150	13 362		1 157			676	11 529	0.53	1.44	5	0.30	0.08
OTHER PULSES		47 566^	19964	-65*	61 379	6 216		3 413			2 378	425	0.02	0.05	0	0.01	0.00

PROCESSED PULSES																											
<u>VEGETABLES</u>													63.53	174.07	49	3.38	0.56										
VEGETABLE		1449472^	98 589		1 712	1546349				154 635	1 391	63.53	174.07	49	3.38	0.56											
											714																
OTHER PROCESSED VEG.													0.00	0.00	0	0.00	0.00										
DRIED VEGETABLE			6			6					6		0.00	0	0.00	0.00											
<u>FRUITS</u>													16.46	45.11	25	0.32	0.14										
FRESH FRUITS		415 167^	28 736		24 258	419 645		1 350		62 947	355 348	16.22	44.44	24	0.32	0.14											
PROCESSED FRUITS	1 350	1 800@	2 807		1 320	3 287					3 287	0.15	0.41	1	0.00	0.00											
DRIED FRUITS			2 025			2 025					2 025	0.09	0.25	1	0.01	0.00											
<u>MILK &amp; MILK PRODUCTS</u>													43.70	119.73	94	4.67	5.71										
COW'S MILK		318 680^				318 680		153 129		15 934	149 617	6.83	18.71	13	0.60	0.77											
BUFFALO'S MILK		729 360^				729 360		247 709		36 468	445 183	20.32	55.68	65	2.39	4.90											
DRIED SKIM MILK			3091			3 091					3 091	0.14	0.39	1	0.15	0.00											
COW'S MILK/SKIM MILK	153 129	145 473^				145 473				7 274	138 199	6.31	17.29	6	0.59	0.02											
BUF'S MILK/SKIM MILK	247 709	232 847^				232 847				11 642	221 204	10.10	27.67	9	0.94	0.03											
OTHER MILK																											
<u>MEAT</u>													9.89	27.11	38	4.38	6.18										
BUFFALO MEAT		117 350^	38 308		5 354	150 304					150 304	6.86	18.80	23	3.33	4.93											
GOAT MEAT		38 543^	6 424		822	44 145					44 145	2.02	5.52	9	0.74	0.68											
PORK/PIG MEAT		13 090^	1 587		5 259	9 418					9 418	0.43	1.18	3	0.14	0.29											
POULTRY MEAT		11 692^	992			12 684					12 684	0.58	1.59	3	0.16	0.29											
OTHER MEAT			199		24	175					175	0.01	0.02	0	0.00	0.00											
<u>EGGS</u>													1.02	2.80	5	0.37	0.37										
EGGS'000,NO.	440 910	22 046^	1 562		79	23 529				1 176	22 353	1.02	2.80	5	0.37	0.37											
<u>FISH</u>													1.18	3.24	4	0.72	0.62										
FISH FRESH		24 866^	477		1	25 342					25 342	1.16	3.17	4	0.69	0.61											
FISH DRIED/PROCESSED			602			602					602	0.03	0.08	0	0.03	0.00											

<u>OILS &amp; OILS SEEDS</u>													1.69	4.62	42	0.00	4.62
OIL SEEDS		110 226^	17 375		43 603	83 998		1 792	76 695		5 511						
OIL	76 695	29 144	44 406	50*	176	73 324			36 411			36 913	1.69	4.62	42	4.62	
OIL CAKES	76 695	47 551	26 385		33 532	40 404	38 384			2 020			0.00				
<u>GHEE &amp; BUTTER</u>													2.17	5.95	54	0.00	5.95
GHEE & BUTTER	400 838	18 510	52		173	18 389					184	18 205	0.83	2.28	20	2.28	
VEGETABLE GHEE	36 411	32 803@			3 407	29 396						29 396	1.34	3.68	33	3.68	
<u>SPICES</u>													5.37	14.71	33	1.44	0.87
SPICES		92 224 <sup>x</sup>	58 133		26 587	123 770					6 188	117 582	5.37	14.71	33	1.44	0.87
OTHER SPICES																	
<u>LIQUORS</u>													0.77	2.12	2	0.01	0.00
LIQUOR (DISTILLARY)		5 790@	97			5 887						5 887	0.27	0.74	2	0.00	
BEER		11 048@			11	11 037						11 037	0.50	1.38	1	0.01	
<u>SOFT DRINKS</u>													0.69	1.90	2	0.10	0.01
TEA		3 021&	817		509	3 329						3 329	0.15	0.42	1	0.10	0.01
COFFEE		56&				56					3	53	0.00	0.01	0		
PROCESSED COFFEE																	
SOFT DRINKS		11 789@	19			11 808						11 808	0.54	1.48	0		

Sources: ^ *Statistical information on Nepalese agriculture*, Agricultural Statistics Division, Ministry of Agriculture, 1997/98

\$ Bookeeping Development Section, X Ginger and Cardamom Development Section,  
Godawari

& National Tea and Coffee Development Board

\* Stock of NFC, Salt Trading Corp and National Trading Corp

# *National sample census of agriculture 1991/92*, Nepal, CBS

@ *Industrial Statistics 2054/55*, Department of Industries, Kathmandu and other sources

Import and export data are from the Department of Customs and WFP

**Appendix 2**  
PRELIMINARY ESTIMATE OF  
TOTAL EDIBLE FOOD AVAILABILITY AND REQUIREMENT OF CEREALS 1997

**Quantities in Mt**

DISTRICT	POPUL	RICE	WHEAT	MAIZE	MILLET	BARLEY	TOTAL EDIBLE	"REQU.	SUR. OR DEFI.
1. Taplejung	133 689	7 050	2 122	10 840	5 210	51	25 274	25 535	-261
2. Sankhuwasabha	162 428	9 324	1 990	12 322	6 145	77	29 859	31 024	-1 165
3. Solukhumbu	111 423	775	3 532	4534	1 234	263	10 337	21 282	-10 945
<b>E. MOUNTAIN</b>	<b>40 7540</b>	<b>17 149</b>	<b>7 644</b>	<b>27 696</b>	<b>12 590</b>	<b>391</b>	<b>65 470</b>	<b>77 841</b>	<b>-12 371</b>
4. Panchathar	202 817	10 078	6 155	21 796	5 728	128	43 886	40 766	3 120
5. Illam	274 489	14 306	5 214	33 040	2 779	1	55 340	55 172	168
6. Terhathum	118 255	12 109	3 760	15 004	3 288	29	34 190	23 769	10 421
7. Dhanakuta	168 896	11 826	3 564	23 163	6 700	7	45 259	33 948	11 311
8. Bhojpur	223 525	20 001	3 815	22392	7 930	25	54 164	44 929	9 235
9. Khotang	241 831	10 184	5 540	20 573	8 780	86	45 163	48 608	-3 445
10. Okaldhunga	15 6171	7 360	2 190	11 203	6 138	26	26 917	31 390	-4 473
11. Udayapur	27 0503	15 590	7 406	18 801	2 396	10	44 203	54 371	-10 168
<b>E. HILLS</b>	<b>1 656 487</b>	<b>101 455</b>	<b>37 642</b>	<b>165 972</b>	<b>43 741</b>	<b>312</b>	<b>349 122</b>	<b>332 953</b>	<b>16 169</b>
12. Jhapa	703 533	141 142	20 225	14 223	2 873	3	178 465	127 339	51 126
13. Morang	804 289	133 653	23 258	14 953	945	8	172 816	145 576	27 240
14. Sunsari	562 271	90 336	27 171	3 008	794	1	121 310	101 771	19 539
15. Saptari	550 970	95 549	18 166	0	246	3	113 963	99 726	14 237
16. Siraha	545 106	87 600	22 300	141	155	3	110 199	98 664	11 535
<b>E. TERAI</b>	<b>3 166 169</b>	<b>548 280</b>	<b>111 120</b>	<b>32 324</b>	<b>5 012</b>	<b>18</b>	<b>696 754</b>	<b>573 076</b>	<b>123 678</b>
<b>E. REGION</b>	<b>5 230 196</b>	<b>666 884</b>	<b>156 407</b>	<b>225 993</b>	<b>61 343</b>	<b>720</b>	<b>1 111 346</b>	<b>983 870</b>	<b>127 476</b>
17. Dolakha	201 849	2 536	6 416	6 158	3 132	38	18 280	38553	-20 273
18. Sindhupalchok	299 986	7 283	8 533	21 611	13 094	234	50 755	57 297	-6 542
19. Rasuwa	43 369	1 344	1 337	1 606	1 264	150	5 702	8 283	-2 581
<b>C. MOUNTAIN</b>	<b>545 204</b>	<b>11 163</b>	<b>16 286</b>	<b>29 376</b>	<b>17 491</b>	<b>422</b>	<b>74 738</b>	<b>104 133</b>	<b>-29 395</b>
20. Ramechhap	218 245	6 406	3 439	20 213	5 818	57	35 933	43 867	-7 934
21. Sindhuli	264 141	13 544	7 235	30 807	11 370	41	62 996	53 092	9 904
22. Kavre	369 932	18 299	16 309	31 771	1 553	193	68 124	74 356	-6 232
23. Bhaktapur	203 112	12 479	7 145	5 058	1 523	11	26 217	40 826	-14 609
24. Lalitpur	307 997	13 220	5 568	8 733	1 341	73	28 934	61 907	-32 973
25. Kathmandu	857 851	28 957	10 788	10 414	1 137	3	51 299	172 428	-121 129
26. Nuwakot	285 600	20 781	8 570	19 466	5 891	23	54 730	57 406	-2 676
27. Dhading	324 659	15 939	5 663	22 280	8 160	88	52 130	65 256	-13 126
28. Makawanpur	377 553	14 623	6 610	28 379	2 825	10	52 447	75 888	-23 441
<b>C. HILLS</b>	<b>3 209 090</b>	<b>144 247</b>	<b>71 326</b>	<b>177 121</b>	<b>39 617</b>	<b>498</b>	<b>432 809</b>	<b>645 026</b>	<b>-212 217</b>

(continued)

**Appendix 2**  
**PRELIMINARY ESTIMATE OF**

**TOTAL EDIBLE FOOD AVAILABILITY AND REQUIREMENT OF CEREALS 1997/98**

DISTRICT	POPUL	RICE	WHEAT	MAIZE	MILLET	BARLEY	TOTAL EDIBLE	"REQU. EDIBLE	SUR. OR DEFI.
29.Dhanusha	647 392	78 449	28 101	0	1 180	6	107 737	117 178	-9 441
30.Mahotari	518 685	64 837	28 692	2 533	1 391	19	97 472	93 882	3 590
31.Sarlahi	584 543	61 225	28 350	6 769	509	35	96 888	105 802	-8 914
32.Rautahat	491 941	66 226	23 673	3 887	107	91	93 984	89 041	4 943
33.Bara	500 443	95 257	38 014	11 117	99	25	144 512	90 580	53 932
34.Parsa	449 197	72 637	31 624	7 645	255	38	112 199	81 305	30 894
35.Chitwan	431 555	48 726	14 732	38 700	1 165	186	103 509	78 111	25 398
<b>C. TERAJ</b>	<b>3623756</b>	<b>487356</b>	<b>193 186</b>	<b>70 651</b>	<b>4 706</b>	<b>401</b>	<b>756 300</b>	<b>655 899</b>	<b>100 401</b>
<b>C. REGION</b>	<b>7378050</b>	<b>642 765</b>	<b>280 798</b>	<b>277 148</b>	<b>61 814</b>	<b>1 322</b>	<b>1 263 847</b>	<b>1 405 058</b>	<b>-141 211</b>
36.Manang	5 553	0	456	357	0	55	868	1 061	-193
37.Mustang	16 421	0	564	535	0	329	1 428	3 136	-1 708
<b>W. MOUNTAIN</b>	<b>21 974</b>	<b>0</b>	<b>1 020</b>	<b>892</b>	<b>0</b>	<b>384</b>	<b>2 296</b>	<b>4 197</b>	<b>-1 901</b>
38.Gorakha	288 269	19 387	5 441	22 471	12 288	89	59 675	57 942	1 733
39.Lamjung	171 559	12 543	4 988	13 166	9 043	48	39 788	34 483	5 305
40.Tanahu	313 837	18 007	3 752	25 942	8 112	3	55 816	63 081	-7 265
41.Kaski	352 914	18 729	7 112	18 563	9 857	57	54 318	70 936	-16 618
42.Parbat	164 755	8 980	5 895	14 328	7 366	79	36 647	33 116	3 531
43.Syangja	333 765	16 054	8 781	31 838	10 800	25	67 498	67 087	411
44.Palpa	269 967	12 165	9 091	25 952	2 712	76	49 996	54 263	-4 267
45.Myagdi	112 826	3 758	4 338	10 036	3 265	442	21 840	22 678	-838
46.Baglung	264 190	7 008	6 378	17 432	5 974	173	36 965	53 102	-16 137
47.Gulmi	305 359	13 115	6 331	24 428	6 312	258	50 444	61 377	-10 933
48.Arghakhanchi	208 438	7 984	6 619	18 809	817	223	34 452	41 896	-7 444
<b>W. HILLS</b>	<b>2785879</b>	<b>137 730</b>	<b>68 724</b>	<b>222 964</b>	<b>76 547</b>	<b>1 472</b>	<b>507 437</b>	<b>559 961</b>	<b>-52 524</b>
49.Nawalparasi	535 793	62 097	21 153	7 565	3 520	28	94 363	96 979	-2 616
50.Rupandehi	637 285	95 478	23 814	0	57	19	119 369	115 349	4 020
51.Kapilbastu	453 762	34 767	17 699	0	98	30	52 594	82 131	-29 537
<b>W. TERAJ</b>	<b>1626840</b>	<b>192 342</b>	<b>62 665</b>	<b>7 565</b>	<b>3 676</b>	<b>77</b>	<b>266 326</b>	<b>294 459</b>	<b>-28 133</b>
<b>W. REGION</b>	<b>4434693</b>	<b>330 072</b>	<b>132 409</b>	<b>231 421</b>	<b>80 223</b>	<b>1 933</b>	<b>776 058</b>	<b>858 617</b>	<b>-82 559</b>
52.Dolpa	28 905	243	219	1 752	573	158	2 945	5 521	-2 576
53.Mugu	40 913	407	543	0	565	270	1 785	7 814	-6 029
54.Humla	40 375	273	408	0	1 231	174	2 087	7 712	-5 625
55.Jumla	87 114	1 224	1 291	1 428	1 105	710	5 757	16 639	-10 882
56.Kalikot	102 076	1 174	5 803	1 108	1 009	397	9 492	19 497	-10 005
<b>M.W. MOUNTAIN</b>	<b>299 383</b>	<b>3 321</b>	<b>8 264</b>	<b>4 289</b>	<b>4 483</b>	<b>1 709</b>	<b>22 066</b>	<b>57 183</b>	<b>-35 117</b>

(continued)

**Appendix 2**  
**PRELIMINARY ESTIMATE OF**

**TOTAL EDIBLE FOOD AVAILABILITY AND REQUIREMENT OF CEREALS 1997**

DISTRICT	POPUL	RICE	WHEAT	MAIZE	MILLET	BARLEY	TOTAL EDIBLE	"REQU.	SUR. OR DEFI.
57.Rukum	181 405	5 451	12 247	24 090	1 174	287	43 249	36 462	6 787
58.Rolpa	203 869	4 864	9 765	12 664	901	554	28 749	40 978	-12 229
59.Pyuthan	201 117	7 711	9 172	12 741	2 050	389	32 063	40 425	-8 362
60.Salyan	209 829	5 992	16 718	21 514	4 454	363	49 040	42 176	6 864
61.Jajarkot	132 036	3 024	7 453	8 685	2 138	1 035	22 334	26 539	-4 205
62.Dailekh	216 429	6 109	6 310	8 001	2 738	223	23 381	43 502	-20 121
63.Surkhet	273 814	15 211	21 650	20 460	1 547	314	59 182	55 037	4 145
<b>M.W. HILLS</b>	<b>1418499</b>	<b>48 363</b>	<b>83 315</b>	<b>108 154</b>	<b>15 002</b>	<b>3 164</b>	<b>257998</b>	<b>285 119</b>	<b>-27 121</b>
64.Dang	427 832	57 342	20 110	30 379	296	19	108 146	77 438	30 708
65.Banke	353 633	54 548	8 529	6 646	0	8	69 731	64 008	5 723
66.Bardiya	360 095	47 392	18 347	9 720	8	29	75 497	65 177	10 320
<b>M.W. TERAI</b>	<b>1141560</b>	<b>159 282</b>	<b>46 986</b>	<b>46 745</b>	<b>304</b>	<b>57</b>	<b>253 374</b>	<b>206 623</b>	<b>46 751</b>
<b>M.W. REGION</b>	<b>2859442</b>	<b>210 966</b>	<b>138 565</b>	<b>159 189</b>	<b>19 788</b>	<b>4 930</b>	<b>533 438</b>	<b>548 925</b>	<b>-15 487</b>
67.Bajura	105 644	2 823	3 987	0	2 105	362	9 277	20 178	-10 901
68.Bajhang	159 468	3 111	4 292	0	1 228	269	8 900	30 458	-21 558
69.Darchula	116 833	3 530	5 244	5 738	935	144	15 591	22 315	-6 724
<b>F.W. MOUNTAIN</b>	<b>381 945</b>	<b>9 465</b>	<b>13 523</b>	<b>5 738</b>	<b>4 267</b>	<b>775</b>	<b>33 768</b>	<b>72 951</b>	<b>-39 183</b>
70.Achham	223 923	7 762	8 286	3 712	1 641	77	21 479	45 009	-23 530
71.Doti	190 461	7 578	10 126	670	2 099	117	20 591	38 283	-17 692
72.Baitadi	230 010	4 995	8 126	7 143	1 256	228	21 748	46 232	-24 484
73.Dadeldhura	122 351	8 331	9 082	4 625	1 227	96	23 361	24 593	-1 232
<b>F.W. HILLS</b>	<b>766 745</b>	<b>28 666</b>	<b>35 620</b>	<b>16 151</b>	<b>6 223</b>	<b>519</b>	<b>87 179</b>	<b>154 117</b>	<b>-66 938</b>
74.Kailali	531 578	81 901	25 672	12 252	66	41	119 932	96 216	23 716
75.Kanchanpur	322 229	65 005	23 855	12 875	41	3	101 779	58 323	43 456
<b>F.W. TERAI</b>	<b>853 807</b>	<b>146 906</b>	<b>49 527</b>	<b>25 127</b>	<b>107</b>	<b>45</b>	<b>221 712</b>	<b>154 539</b>	<b>67 173</b>
<b>F.W. REGION</b>	<b>2002497</b>	<b>185 037</b>	<b>98 670</b>	<b>47 016</b>	<b>10 597</b>	<b>1 339</b>	<b>342 659</b>	<b>381 607</b>	<b>-38 948</b>
<b>NEPAL</b>	<b>21904878</b>	<b>2035725</b>	<b>806 849</b>	<b>940 767</b>	<b>233 764</b>	<b>10 244</b>	<b>4027348</b>	<b>4178077</b>	<b>-150 729</b>

(-162 158)

Note: The figure in parenthesis indicates the total deficit (-162 158 Mt) including 11 429 Mt of rice supplied to Bhutanese refugees (Jhapa and Morang) through local procurement

**Appendix 3**  
**TABLE OF FOOD VALUES**  
(Nutrients Per 100 grams of Edible Portion)

S.NO.	FOOD STUFF	Calorie	Protein (gm)	Fat (gm)	S.NO.	FOOD STUFF	Calorie	Protein (gm)	Fat (gm)
	CEREAL GRAINS AND PRODUCTS					ROOTS AND TUBERS			
1	BARLEY	336	11.5	1.3	48	CARROT	48	0.9	0.2
2	BUCKWHEAT (PHAPER)	323	10.3	2.4	49	COLOCASIA	97	3	0.1
3	BISCUITS, SWEET	450	6.4	15.2	50	ONION, BIG	50	1.2	0.1
4	BISCUITS, SALT	534	6.6	32.4	51	ONION, SMALL	59	1.8	0.1
5	BREAD, WHITE	245	7.8	0.7	52	POTATO	97	1.6	0.1
6	MAIZE, DRY	342	11.1	3.6	53	RADISH, PINK	32	0.6	0.3
7	MAIZE, TENDER	125	4.7	0.9	54	RADISH, WHITE	17	0.7	0.1
8	MILLET (VARAGU)	309	8.3	1.4	55	SWEET POTATO	120	1.2	0.3
9	PAPPAD	288	18.8	0.3	56	TURNIP	29	0.5	0.2
10	RICE, PARBOILED, MILLED	346	6.4	0.4	57	YAM, ELEPHANT	79	1.2	0.1
11	RICE, RAW, MILLED	345	6.8	0.5	58	YAM, WILD	110	2.52	0.3
12	RICEFLAKES	346	6.6	1.2	59	YAM, ORDINARY	111	1.4	0.1
13	RICE PUFFED	325	7.5	0.1		OTHER VEGETABLE			
14	RAGI (MILLET)	328	7.3	1.3	60	BITTER GOURD	25	1.6	0.2
15	SUJI (SEMOLINA)	348	10.4	0.8	61	BOTTLE GOURD	12	0.2	0.1
16	VERMICELLI	352	8.7	0.4	62	BRINJAL	24	1.4	0.3
17	WHEAT (WHOLE)	346	11.8	1.5	63	BROAD BEANS	48	4.5	0.1
18	WHEAT FLOUR (WHOLE)	341	12.1	1.7	64	CAULIFLOWER	30	2.6	0.4
19	WHEAT FLOUR (REFINED)	348	11.0	0.9	65	CHO-CHO-MARROW	27	0.7	0.1
	PULSES AND LEGUMES				66	CUCUMBER	13	0.4	0.1
20	BENGAL GRAM (WHOLE)	360	17.1	5.3	67	COWPEA PODS	48	3.5	0.2
21	BENGAL GRAM DAL	372	20.8	5.6	68	DRUMSTICK	26	2.5	0.1
22	BLACK GRAM DAL	347	24.0	1.4	69	FRENCH BEANS	26	1.7	0.1
23	COW PEA	323	24.1	1	70	GIANT CHILLIES (CAPSICUM)	24	1.3	0.3
24	FIELD BEAN DRY	347	24.9	0.8	71	KNOL-KHOL	21	1.1	0.2
25	GREEN GRAM (WHOLE)	334	24.0	1.3	72	LADIES FINGERS	35	1.9	0.2
26	GREEN GRAM DAL	348	24.5	1.2	73	PAPAYA GREEN	27	0.7	0.2
27	HORSE GRAM	321	22.0	0.5	74	PEAS	93	7.2	0.1
28	KHESARI DAL	345	28.2	0.6	75	PARWAR	20	2	0.3
29	LENTIL	343	25.1	0.7	76	PUMPKIN	25	1.4	0.1
30	PEAS DRY	315	19.7	1.1	77	RIDGE GOURD	17	0.5	0.1
31	RAJMAH (FRENCH BEAN)	346	22.9	1.3	78	SNAKE GOURD	18	0.5	0.3
32	RED GRAM DAL (PIGEON PEA)	335	22.3	1.7	79	SWORD BEANS	44	2.7	0.2
33	SOYABEAN	432	43.2	19.5	80	TOMATO, GREEN	23	1.9	0.1
	LEAFY VEGETABLE				81	VEGETABLE MARROW	17	0.5	0.1
34	AMARNATH, TENDER	45	4.0	0.5		NUTS AND OILSEEDS			
35	BAMBOO, TENDER SHOOTS	43	3.9	0.5	82	ALMOND	655	20.8	58.9
36	CABBAGE	27	1.8	0.1	83	CASHEWNUT	596	21.2	46.9
37	COLOCASIA LEAVES (GREEN VARIETY)	56	3.9	1.5	84	CHILGOZA	615	13.9	49.3
					85	COCONUT, DRY	662	6.8	62.3
38	CORIANDER LEAVES	44	3.3	0.6	86	COCONUT, FRESH	444	4.5	41.6
39	FENUGREEK LEAVES	49	4.4	0.9	87	GROUNDNUT	567	25.3	40.1
40	GIRIA SAG	26	2	0.4	88	GROUNDNUT, ROASTED	570	26.2	39.8
41	IPOMEA LEAVES	28	2.9	0.4	89	GINGELLI SEEDS	563	18.3	43.3

42	MUSTARD LEAVES	34	4	0.6	90	LINSEED SEEDS	530	20.3	37.1
43	PUMPKIN LEAVES	57	4.6	0.8	91	MUSTARD SEEDS	541	20	39.7
44	RADISH LEAVES	28	3.8	0.4	92	NIGER SEEDS	515	23.9	39
45	RAPE LEAVES	48	5.1	0.4	93	SUNFLOWER SEEDS	620	19.8	52.1
46	SPINACH	26	2	0.7	94	WALNUT	687	15.6	64.5
47	TURNIP GREENS	67	4	1.5					

**TABLE OF FOOD VALUES**  
(Nutrients Per 100 grams of Edible Portion)

S.NO.	FOOD STUFF	Calorie	Protein (gm)	Fat (gm)	S.NO.	FOOD STUFF	Calorie	Protein (gm)	Fat (gm)
	CONDIMENTS AND SPICES					FISHES AND OTHER SEA FOODS			
95	ASAFOETIDA	297	4	1.1	147	BAM	100	16.1	0.9
96	CARDAMOM	229	10.2	2.2	148	HILSA	273	21.8	19.4
97	CHILLIES, DRY	246	15.9	6.2	149	KATLA	111	19.5	2.4
98	CHILLIES, GREEN	29	2.9	0.6	150	PRAWN	89	19.1	1
99	CLOVES, DRY	286	5.2	8.9	151	RAHU	97	16.6	1.4
100	CORIANDER	288	14.1	16.1	152	SARDINE	101	21	1.9
101	CUMIN SEEDS	356	18.7	15	153	SINGHI	124	22.8	0.6
102	FENUGREEK SEEDS	333	26.2	5.8	154	TENGRA (FRESH)	144	19.2	6.4
103	GARLIC, DRY	145	6.3	0.1	155	TENGRA (DRIED)	255	54.9	3.9
104	GINGER, FRESH	67	2.3	0.9		OTHER FLESH FOODS			
105	MACE	437	6.5	24.4	156	DUCK	130	21.6	4.8
106	NUTMEG	472	7.5	36.4	157	EGG, DUCK	181	13.5	13.7
107	OMUM	363	17.1	21.8	158	EGG, HEN	173	13.3	13.3
108	PEPPER, DRY	304	11.5	6.8	159	FOWL	109	25.9	0.6
109	TURMERIC	349	6.3	5.1	160	LIVER GOAT	107	20	3
	FRUITS				161	LIVER, SHEEP	150	19.3	7.5
110	AMALA	58	0.5	0.1	162	MUTTON, MUSCLE	194	18.5	13.3
111	APPLE	59	0.2	0.5	163	PIGEON	137	23.3	4.9
112	APRICOTS, FRESH	53	1	0.3	164	PORK, MUSCLE	114	18.7	4.4
113	APRICOTS, DRIED	306	1.6	0.7		MILK AND MILK PRODUCTS			
114	BANANA, RIPE	116	1.2	0.3	165	BUTTER MILK	15	0.8	1.1
115	BLACK BERRY	37	1.3	0.5	166	CURDS (COW'S MILK)	60	3.1	4
116	CAPE GOOSE BERRY	53	1.8	0.2	167	CHEESE	348	24.1	25.1
117	DATES, DRIED	317	2.5	0.4	168	KHOA (WHOLE COW MILK)	413	20	25.9
118	GRAPES, BLUE VARIETY	58	0.6	0.4	169	KHOA (WHOLE BUFFALO MILK)	421	14.6	31.2
119	GRAPES, PALE GREEN VARIETY	71	0.5	0.3	170	KHOA	206	22.3	1.6
120	GUAVA, COUNTRY	51	0.9	0.3		(SKIMMED BUFFALO MILK)			
121	GUAVA, HILL	38	0.1	0.2	171	KHEER	176	6.9	12.2
122	JACK FRUIT	88	1.9	0.1	172	SKIMMED MILK, LIQUID	29	2.5	0.1
123	LEMON	57	1	0.9	173	SKIMMED MILK POWDER	357	38	0.1
124	LEMON, SWEET	35	0.7	0.3		(COW'S MILK)			
125	LICHI	61	1.1	0.2	174	WHOLE MILK POWDER	496	25.8	26.7
126	LIME	59	1.5	1		(COW'S MILK)			
127	LIME, SWEET, MUSAMBI	43	0.8	0.3		FATS AND EDIBLE OILS			
128	MANGO, RIPE	74	0.6	0.4	175	BUTTER	729	-	81
129	MELON, MUSK	17	0.3	0.2	176	GHEE (COW)	900	-	100
130	MELON, WATER	16	0.2	0.2	177	GHEE (BUFFALO)	900	-	100
131	MALBERRY	49	1.1	0.4	178	HYDROGENATED OIL	900	-	100
132	ORANGE	48	0.7	0.2		(FORTIFIED)			
133	ORANGE JUICE	9	0.2	0.1	179	COOKING OIL (GROUNDNUT,	900	-	100
134	PAPAYA, RIPE	32	0.6	0.1		GINGELLY, MUSTARD,			
135	PEARS	52	0.6	0.2		COCONUT etc)			
136	PINE APPLE	46	0.4	0.1		MISCELLANEOUS FOOD STUFFS			
137	PUMMELO	44	0.6	0.1	180	ARROWROOT FLOUR	334	0.2	0.1
138	PEACHES	50	1.2	0.3	181	BREAD, BROWN	244	8.8	1.4
139	PERSIMMON	76	0.7	0.2	182	COCONUT, TENDER	41	0.9	1.4
140	PLUM	52	0.7	0.5	183	FISH LIVER OIL	900	-	100
141	POMEGRANATE	65	1.6	0.1	184	GROUNDNUT CAKE	386	40.9	7.4

142	SAPOTA	98	0.7	1.1	185	HONEY	319	0.3	0
143	SEETHAPHAL	104	1.6	0.4	186	MUSHROOM	43	3.1	0.8
144	STRAWBERRY	44	0.7	0.2	187	SUGAR (CANE)	398	0.1	0
145	TOMATO, RIPE	20	0.9	0.2	188	SUGAR CANE JUICE	39	0.1	0.2
146	TREE TOMATO	35	1.5	0.2					

SOURCE: Nutritive Value of Indian Foods, by C.Gopalan, B.V.Rama Sastri and S.C.Balasubramaniam; National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India, 1987

### Appendix 4

#### Basic elements of the food balance sheet

S.No	Commodities	Extraction	Wastage	Other	Seed rate	
		rate %	rate %	losses %	kg/hectare	
1	Paddy/Rice	64.87	10	1.75	55	
2	Paddy/Bran	8				
3	Wheat/Flour	96	10	1	100	
4	Wheat/Bran	3.9				
5	Maize/Flour	97	10	1	20	
6	Millet/Flour	93	10		20	
7	Barley/Flour	32	10		40	
8	Potato		15		1 000	
9	Roots & Tubers		15			
10	Sugarcane				3 500	
11	Sugarcane/Sugar	8.46				
12	Sugar/Khadasari	6.47				
13	Sugarcane/Raw sugar	9	1			
14	Oil seeds		5		10	
15	Oil	38				
16	Oil cakes	62				
17	Pulses					
17.1	Lentil		5		40	
17.2	Pigeon pea		5		40	
17.3	Black gram		5		25	
17.4	Chickpea		5		60	
17.5	Other		5		45	
18	Vegetable		10			
19	Fruit		15			
20	Egg		5			
21	Milk		5			
22	Cow milk/skimmed milk	96				
23	Buffalo milk/skimmed milk	95				
24	Cow milk ghee	4	1			
25	Buffalo milk/ghee	5	1			
26	Spices		5			
27	Coffee		5			

## Appendix 5

### Estimation of livestock feed

1. Milking cow and milking buffalo      70 kg/head =      0.07 MT/head  
(250 gm/day/head x 280 days)
2. Oxen in cattle and buffalo      24 kg/head =      0.024 MT/head  
(working animals)      (200 gm/day/head x 120 days)
3. Breeding bull (cattle) and breeding buffalo      100 kg/head =      0.1 MT/head  
(bull)      (275 gm/day/head x 365 days)  
(servicing animals)

**DATA COLLECTION, ANALYSIS AND USE  
OF AGRICULTURAL MARKETING INFORMATION IN NEPAL**

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**1. Overview of marketing information**

Recently, there has been growing realization of the importance of agricultural marketing information among commercial farmers, traders, exporters and importers, consumers and government organizations. Marketing information is an important component of a user-responsive national food and agriculture statistics service. With a more advance market economy and increasing commercial production of agricultural commodities, a strong agricultural marketing information system has become imperative. The overall purpose of such a service is to increase market transparency and provide marketing information to those who need it. This can be regarded as a public service, particularly where there are numerous small farmers and traders who are unable to pay for information. The availability of timely and accurate information is essential, whether it is provided by the government or by the private sector.

At present, the Marketing Development Division (MDD) of the Department of Agriculture of the Ministry of Agriculture is the leading organization responsible for collecting, processing and disseminating marketing information. Market information in Nepal, particularly retail price collection in the main markets of Kathmandu, was initiated during the 1960s by the then Agricultural Economics Section. Gradually this activity was extended to commercially important districts producing the main agricultural commodities, after the establishment of the then Food and Agricultural Marketing Services Department in 1972. Already then, FAO was involved in the improvement of marketing information services. Weekly, monthly and quarterly bulletins were published. A wireless broadcasting system was installed for quick flows of information. These activities were dropped when the department was restructured, but publication of a special issue of the *Agricultural marketing information bulletin* every year and of reports every four months was retained, however. MDD is also responsible for the preparation of the yearly food balance sheet.

Trained but limited manpower and four computers with printers are the main assets of the division. With limited resources, it has to carry marketing activities including information services and food statistics.

**2. Objective**

This paper intends to highlight the existing status of collection, analysis and dissemination of marketing information services provided by MDD. More specifically, the discussion will centre on the following points: items covered and frequency of data collection, methods of data collection, publication and use of the results, problems encountered and proposals for improvement.

### **3. The marketing information services of MDD**

Before explaining the practices followed by MDD in relation to marketing information services, it is useful to clarify the meaning of marketing information and market information.

Agricultural market information mainly refers to prices, market arrivals and quantities traded in the markets, whereas agricultural marketing information includes, in addition to market information, market developments, the demand and supply situation, marketing cost and margins, transport and storage cost, potential alternative market outlets and channels, etc. Rendering this information by target group in the desired form and in timely fashion is what marketing information services are about. They are “a service...which involves the collection on a regular basis of information on price and in some cases quantities of widely traded agricultural products from rural assembly markets, wholesale and retail markets, as appropriate, and dissemination of this information on a timely and regular basis through media to farmers, traders, government officials, policymakers and others including consumers.”

Through the countrywide network of District Agriculture Development Offices (DADO), the division collects wholesale, retail and border prices and to some extent farm-gate prices. The procedures are as follows.

#### **3.1. Farm-gate price**

This is the price a farmer receives from selling his produce at the gate of his farm, so to speak. It is an important indication to assess whether the farmer receives an adequate return. It also serves as a basis for calculating the market margin.

- a. **Coverage of districts and commodities.** Market-led commodities and commercially producing districts are selected for collecting the farm-gate price. This year is the initial phase. The coverage of districts and commodities is shown in Annex 1.
- b. **Frequency of data collection.** Fortnightly up to two months after harvesting.
- c. **Methods of data collection.** Two main production pockets for specific products by district are to be selected, whereby five producing farmers will be selected in the specified format.
- c. **Publication and use of the results.** At this early stage, few districts have returned the forms. When the results come in, they will be used for market margin analysis and estimated producer's share.

#### **3.2 Wholesale price**

There are two types of wholesale prices. The *primary wholesale price* is close to the farm-gate price in the sense that it is paid at the local assembly point, the market. It is the price a wholesaler pays a farmer or a commission agent for the farmer's produce.

The *terminal wholesale price* is the price a wholesaler sells produce to retailers, institutional consumers or bulk purchasers at the terminal market. The markets are selected in terms of the highest transactions within a district, with specification.

- a. **Coverage of districts.** Seventeen districts as specified in Annex 2
- b. **Coverage of commodities and frequency.** Altogether 39 commodities are specified, covering grain, pulses, livestock products, fruit and vegetables. The specific commercial produce of a district is mentioned in the format with remarks. See Annex 3 for coverage and categorization of commodities. This form is to be filled fortnightly on the first and sixteenth days of the Nepalese month.
- c. **Method of data collection.** Five respondents for each commodity are selected. Some traders do not trade all of the commodities, so data collectors have to search respondent traders purposively. If there are less than five wholesalers for a particular commodity, data collectors are asked to specify the number of respondents.
- d. **Data transmission and analysis.** The forms are filled by the district office and forwarded by post to MDD, where the data are entered into a computer. Simple average by month is made for dissemination.
- e. **Publication and use of the results.** The yearly special issue of the *Agricultural marketing information bulletin* is published and circulated among government offices, non-governmental and international organizations as well as interested individuals. The four-monthly report is not published but is available in the form of a computer printout upon request.

The wholesale price is used by both government and non-government agencies. The wholesale-price unit of the Nepal Rastra Bank has shown keen interest in the wholesale price of agricultural produce collected by MDD.

### 3.3 Retail price

This is the final price paid by consumers for commodities. It is used in the computation of consumer price indices, which are important indicators of the economy. The retail price directly reflects the consumer demand versus supply situation.

- a. **Coverage of districts.** Twenty-one districts are selected to represent the national average retail price (they are listed in Annex 4). Market information from the other 54 districts is also collected.
- b. **Coverage of commodities and frequency.** Altogether 46 commodities are identified for retail prices. The main commodities included in the data collection sheet as shown in Annex 5 are grain, pulses, livestock products, cooking oil, spices, fruit and vegetables. They are categorised to specify the prices. As for wholesale prices, collection is done on a fortnightly basis. The format is shown in Annex 6.
- c. **Method of data collection.** Similar to the wholesale price collection.
- d. **Transmission and analysis.** Similar to the transmission and analysis of the wholesale price.

- e. **Publication and use of results.** In the special issue of the *Agricultural marketing information bulletin*. The national annual average retail price of some agricultural commodities has been updated since 1965. The most recent issue is further broken down by month to show the seasonality of prices. This price is used by the ministries of finance and agriculture, the Nepal Rastra Bank, the Central Bureau of Statistics and other public, private and international agencies.

### 3.4 Indian border retail price

Because of the open border with India, it has become necessary for Nepal to monitor the prices of key commodities in the Indian border markets.

- a. **Coverage of border markets.** The markets of Naksalbadi, Jogbani, Bairganiya, Raxaul, Sunauli, Rupaidia, Palia and Banbasa are selected for the border retail price. The respective district agricultural development offices collect information in the specified form.
- b. **Coverage of commodities and frequency.** Altogether 41 commodities are included in the data collection sheet as shown in Annex 6. The commodities included are grain in edible form, pulses, cooking oil, livestock products, fruit, vegetables and spices. These data are collected fortnightly.
- c. **Method of data collection.** Similar to the retail price collection.
- d. **Data transmission and analysis.** As described in the earlier section.
- e. **Publication and use of results.** MDD compiles monthly data by main border areas and publishes the information in the special issue of the *Agricultural marketing information bulletin*. These border prices are used to prepare the minimum support price for selected crops. They are also used by organizations, including the Ministry of Supply, for price monitoring.

### 3.5 Fruit and vegetable wholesale markets

Market information for perishable produce is very sensitive to supply and demand and to factors relating to risk-return preferences. The information directly affects farmers and traders, so emphasis has been given to their collection and dissemination.

- a) **Coverage of markets.** At present, data are collected from the Kalimati fruit and vegetable wholesale market, the Birtamod and Narayanghat wholesale markets and the Kapur Kot collection centre.
- b) **Coverage of commodities and frequency.** Coverage of commodities varies by market. At the Kalimati wholesale market, volume information is collected for some 60 commodities by categorization, whereas in other markets 10 to 20 commodities are included in the data collection sheet. Given the perishable nature of the commodities, price information is collected twice a day at the Kalimati market – at 8 a.m., immediately after peak transaction, and at 1 p.m. In other markets, price information is collected daily after peak transaction.
- c) **Method of data collection.** Data are collected on a loose sheet from five respondents selected purposively. The respondents are traders.
- d) **Transmission and analysis.** The data are recorded in a standard format developed by MDD. Minimum, maximum and average prices are quoted on the basis of 100 kg. The

information is transmitted for immediate dissemination. Biratamod and Narayanghat send price information to Agro Enterprise Centre, a company which collects price information daily from eight market centres and disseminates it in the afternoon of the same day.

- e) **Publication and use of results.** Kalimati and AEC publish daily, weekly and monthly bulletins using the information. MDD has arranged for both national and regional radio broadcasting to disseminate the information to the farmers. MDD also publishes a fortnightly marketing information bulletin, which is reprinted by the leading daily newspapers – *Kantipur* and *Nepalko Samachar Patra*.

#### **4. STRENGTHS AND WEAKNESSES**

<b>Strengths</b>	<b>Weaknesses</b>
<p align="center"><b><u>Data collection and Transmission</u></b></p> <p>➤ MDD has revised the coverage of area and specified commodities by category for wholesale farm-gate and border price collection. Also revised the commodities by category for retail price collection</p>	<p>➤ Quality of data depends upon the quality of data collectors. For this, a manual with clear and specific instruction is still lacking.</p>
<p>➤ MDD is taking lead role in marketing information collection with close co-ordination of support to a New Kalimati Market Project; AEC and Nepal Rastra Bank (wholesale price unit)</p>	<p>➤ No attention has been given for training to the real data collectors in the importance of grass root level data they collected, their uses and collection procedures. Also motivation to them.</p>
<p>➤ Standardization of collection formats with specific instruction.</p>	<p>➤ Staff incentive is ignored who have to work in the early morning night for transmission of data from districts to MDD, postal service is the prime media. This causes delays and sometimes losses due to geographical.</p>
<p>➤ The frequency of collection is specified. For perishable daily and for non-perishable fortnightly basis.</p>	
<p>➤ Transmission arrangement has been improved for perishable produces. Transmission time is specified.</p>	
<p align="center"><b><u>Processing and analysis</u></b></p> <p>➤ All data collected from DADO are entered in computer.</p>	<p>➤ The provision of computer operator in MDD is lacking. The staff involved in processing can be transferred in other offices. AT that time, serious problems will be arises.</p>
<p>➤ Metric unit is used</p>	<p>➤ Marketing analyses is lacking.</p>
<p>➤ Data checking and validation is done at MDD with consultation of DADO by phone. Specially for local unit and price range</p>	<p>➤ Being MDD a lead authority for public level marketing information services, it requires competent manpower for marketing analyses.</p>
<p>➤ Price indices and trends are shown in both tabular form and /or chart In case of Kalimati Wholesale prices, price indices and comparison is also shown with interpretation</p>	

➤ Support to a New Kalimati Market Project has developed very recently a package for quick processing and analysis	
<b><u>Dissemination and Utilization</u></b>	
➤ Co-ordination with concerned agencies is going on from time to time.	➤ Lack of computer net working among MDD, AEC and Kalimati Markets for efficient dissemination. Other markets are in contact by phone and Fax.
➤ Daily bulletins for fruits and vegetables prepared by AEC and Kalimati Market are displayed at the Notice board.	➤ Reassessment for marketing information needs by target group is lacking.
➤ Daily and by weekly radio broadcasting at both National and regional level.	➤ Weak dissemination of information is still prevailed.
➤ Dissemination of current marketing information through National Daily News Papers.	➤ For continuity of coordination, specified MIS unit is lacking.

## 5. Conclusions

- Government and private-sector organizations as well as commercial farmers recognize the importance of marketing information.
- There is a need for marketing information services at the public level, especially for small farmers and traders at the markets who cannot obtain marketing information in terms of cost and linkage.
- MDD is the main authority for public-level marketing information collection, analysis and dissemination.
- MDD collects wholesale price, retail price and border price through the district agricultural development offices, analyses the data and disseminates the processed information through radio and marketing information bulletins.
- Analysis and interpretation of marketing information are not adequate; only compiled and average data are presented.
- Recently, efforts have been made to improve marketing information by targeting groups in a co-ordinated manner. Linkages are being developed with other organizations, including AEC, the Kalimati market and the Nepal Rastra Bank.
- There is a need for a regular monitoring system to assess the needs of target groups and of the collection, analysis and dissemination system; also to avoid duplication of activities.
- Information is perishable, valuable and costly, so integrated marketing information is the right strategy.

## **6 Recommendations for improvement**

### **6.1 Data collection and transmission**

- Preparation of a manual with clear and specific instructions.
- Training the data collectors on the job at a regional or sub-regional level.
- To motivate staff having to work before dawn, transport facilities in motorable areas should be provided; monetary incentives, prizes and promotions are equally important.
- The data collectors should be monitored by assistant planning officers or agricultural development officers for consistency, reliability and timely collection and transmission.
- The quick-delivery service unit of the central post office should be approached to speed up transmission to MDD.
- Concentration on the coverage of a few commodities for which marketing information is really needed.
- Reassessment of the target groups and their needs.

### **6.2 Processing and analysis**

- Provide MDD with computer operator(s), because it is the central processing unit of marketing information.
- Arrange for the training of both officers and assistants in the following areas of computer-assisted marketing analysis: demand and supply estimation techniques, elasticity estimation technique, forecasting technique, and networking and information flows.

### **6.3 Dissemination and use**

- Formation of a formal co-ordination committee comprised of delegates from the Ministry of Agriculture, the National Planning Commission, the Central Bureau of Statistics, AEC and the Kalimati market to design, implement and monitor marketing information services.
- Policy approval from the National Planning Commission to establish a marketing information service unit under MDD, as recommended in the seminar on the Marketing Information Service System held in October 1998, should be granted.
- For effective dissemination, practical links with the media should be explored – national and regional radio stations, newspapers, bulletin boards, etc.
- The monitoring of dissemination techniques and of the use of information by target groups should be continued.
- The extension workers of the district agricultural development offices should be trained in marketing extension services.

**Annex 1****Districts and commodities selected for farm-gate price collection**

(Proposed for 1999/2000)

	<b>District</b>	<b>Commodity</b>
<b>Eastern Region</b>	Jhapa	Rice
	Dhankuta	Mandarin, tomato
	Morang	Rice, wheat
<b>Central Region</b>	Dhanusha	Fish, rice
	Sarlahi	Tomato, wheat
	Makwanpur	Tomato, cauliflower
<b>Western Region</b>	Tanahu	Mandarin, tomato
	Mustang	Apple
	Rupandehi	Rice, wheat
<b>Mid-Western Region</b>	Bardiya	Rice, wheat
	Sallyan	Ginger, tomato
	Jumla	Apple
<b>Far Western Region</b>	Kailali	Rice, wheat
	Dadeldhura	Tomato

**Annex - 2****Selected 17 districts**

<b>Region</b>	<b>District</b>
<b>Eastern Region</b>	Dhankuta
	Jhapa
	Morang
<b>Central Region</b>	Kathmandu
	Nuwakota
	Rautahat
	Parsa
	Chitwan
<b>Western Region</b>	Kaski
	Rupandehi
	Kapilbastu
<b>Mid-Western Region</b>	Surkhet
	Banke
	Bardiya
<b>Far Western Region</b>	Doti
	Kailali
	Kanchanpur

**Annex - 3**

(District) (Collection Date)–	(Market)	(Wholesale)					Date Collected	Remarks
		Type :- Wholesaler	1	2	3	4		
Commodities)	Unit							
(Paddy Coarse)								
(Paddy Medium)								
(Paddy Fine)								
(Rice Coarse)								
(Rice Medium)								
(Rice Fine)								
(Wheat)								
(Wheat Flour)								
(Maize)								
(Black gram)								
(Pigeon Pea)								
(Mung Broken)								
(Lentil Broken)								
(Chick Pea Big)								
(Chick Pea Small)								
(Soybean)								
(Peas)								
(Mustard Seed)								
(Mustard Oil)								
(Soybean Oil)								
(Vegetable ghee)								
(Fresh Fish)								
(Egg)								
(Potato Red)								
(Potato White)								
(Tomato Big)								
(Tomato Small)								
(Cauliflower Terai)								
(Cauliflower Hills)								
(Green pea)								
(Mango)								
(Orange)								
(Apple)								
(Banana)								
(Raw Ginger)								
(Dry Ginger)								
(Dry Chilli)								
(Onion)								
(Dry Garlic)								

**Districts selected for national retail prices**

<b>Hills district</b>	<b>Terai district</b>
1. Achham	1. Banke
2. Bhojpur	2. Chitwan
3. Dhankuta	3. Dhanusha
4. Doti	4. Jhapa
5. Illam	5. Kailali
6. Jumla	6. Morang
7. Kaski	7. Parsa
8. Kathmandu	8. Rupandehi
9. Nuwakot	
10. Palpa	
11. Rolpa	
12. Ramechhap	
13. Surkhet	

**Annex – 5**

(District) :-	(Retail Price)					(Collection Date):-	Average	Remarks
	(Market):-	Unit	1	2	3			
(Commodities)								
(Rice Coarse)								
(Rice Medium)								
(Rice Fine)								
(Flattened Rice taichung)								
(Flattened Rice local)								
(Wheat Flour)								
(Blackgram)								
(Pigeon Pea)								
(Moong Broken)								
(Lentil Broken)								
(Soyabean)								
(Chick Pea Big)								
(Chick Pea Small)								
(Pea Big)								
(Pea Small)								
(Mustard Oil)								
(Soyabean Oil)								
(Ghee)								
(Vegetable ghee)								
(Chicken)								
(Mutton)								
(Buff)								
(Pork)								
(Fresh Fish)								
(Hen Egg)								
(Milk)								
(Sugar)								
(Red Potato)								
(White Potato)								
(Tomato Big)								
(Tomato Small)								
(Cabbage)								
(Cauliflower Terai)								
(Cauliflower Hills)								
(Green Peas)								
(Pointed Gourd)								
(Capsicum)								
(Mango)								
(Orange)								
(Apple)								
(Banana)								
(Dry Onion)								

(Commodities)	Unit	1	2	3	4	5	Average	Remarks
(Dry Garlic)								
(Fresh Raw Ginger)								
(Dry Chilli)								
(Green Chilli)								

**Annex - 6**

(Indian Border Retail Price)

(Commodities)	Unit	1	2	3	4	5	Average	Remarks
(Rice Coarse)								
(Rice Medium)								
(Rice Fine)								
(Flattened Rice local)								
(Wheat Flour)								
(Blackgram)								
(Pegeon Pea)								
(Moong Broken)								
(Lentil Broken)								
(Soyabean)								
(Chick Pea Big)								
(Chick Pea Small)								
(Mustard Oil)								
(Soyabean Oil)								
(Vegetable ghee)								
(Chicken)								
(Mutton)								
(Buff)								
(Pork)								
(Fresh Fish)								
(Hen Egg)								
(Milk)								
(Sugar)								
(Red Potato)								
(White Potato)								
(Tomato Big)								
(Tomato Small)								
(Cabbage)								
(Cauliflower)								
(Green Peas)								
(Pointed Gourd)								
(Okra)								
(Mango)								
(Orange)								
(Apple)								
(Banana)								
(Dry Onion)								
(Dry Garlic)								
(Ginger)								
(Dry Chilli)								
(Green Chilli)								

**METHODOLOGICAL REVIEW OF STATISTICAL INFORMATION ON  
AGRICULTURE AT THE MINISTRY OF AGRICULTURE**

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**1. Background**

Nepal is a predominantly agricultural country. It covers 147 181 sq km and has 2 968 000 ha under cultivation. In 1999, its population was estimated at about 22.4 million, with a growth rate of 2.4 percent.

The agriculture sector plays a key role in the Nepalese economy and contributes the largest share to the gross domestic product. Although its share has been declining in the past few years, agriculture still accounted for 40 percent of GDP in 1998/99.

The government has always given high priority to the agricultural sector and has invested in it a relatively large volume of its financial resources. Public-sector projects have long sought to augment agricultural productivity through increased emphasis on research and extension. On the whole, investments in agriculture have brought good returns, spectacular successes in some sub-sectors being offset by poor performance in some others. Over the years, the production of food grain has increased, due to an increase in crop areas, and in yields for some important crops. The Ministry of Agriculture is the main body responsible for the implementation of agricultural development programmes in the country.

For this purpose, its departments have at their disposal a countrywide network of offices at the various administrative levels. The output and productivity successes achieved so far are attributed to various development efforts besides the main agency's planned production programmes. However, a review of performance over the past four decades of agricultural development will show that agricultural growth has hardly matched population growth. Although Nepal was a food exporter until the early 1960s, it is now a food-deficit country.

**2. Statistical system**

The statistical system in Nepal is rather decentralized. Various ministries and departments are involved in the collection and treatment of data for their own needs or those of the general public. The main public-sector providers of statistics are the Central Bureau of Statistics, the Ministry of Agriculture, the departments of customs, tourism and transport and the Nepal Rastra Bank.

### **3. Agricultural statistics**

So far as agricultural statistics are concerned, both the Central Bureau of Statistics and the Ministry of Agriculture are directly involved in their collection, analysis and dissemination. The bureau conducts an agricultural census every ten years for basic agricultural data. Especially since the reorganization of the ministry in 1993, and in conformity with their respective mandates, the bureau also provides the final estimate of area production and yield for cereal and cash crops, and of livestock production, in co-operation with the Agricultural Statistics Division of the ministry. The division itself is the main agency entrusted with the handling of current agricultural statistics such as production and yield of cereal, cash and other crops, and livestock production. It verifies the district-level data through the publication of monthly crop situation reports.

Before 1993, production of agricultural statistics was the prerogative of the Department of Food and Agriculture Marketing Services, which had been created twenty years earlier to undertake economic studies for the then Ministry of Food and Agriculture. A separate division with its district-level units functioned under the department to handle the reporting of agricultural production – yield, area under cultivation, etc – for the whole country. The department's programmes providing current data on agricultural production were supported through various technical assistance projects funded by FAO and UNDP. These projects played a seminal role in introducing the methodology for producing current agricultural statistics within the crop forecasting system then adopted by the department. Along with this, the department also implemented other important programmes related to market research, market development, economic analysis and so on. Earlier, the Farm Management Survey studies conducted in the early 1960s by the Economic Analysis and Planning Division of the ministry had provided benchmark indicators for current agricultural statistics.

When the ministry was reorganized in 1993, the department was dissolved and statistical activities were transferred to the Central Bureau of Statistics. However, the Agricultural Statistics Division of the renamed Ministry of Agriculture has been entrusted with preparing advance estimates of current agricultural statistics for its own as well as other users and therefore with collecting and processing data for the publication of timely agricultural information.

### **4. Organizational structure of statistical activities at the Ministry of Agriculture**

The Ministry of Agriculture has four technical divisions to support the planning, monitoring and execution of various agricultural development projects. The divisions of Planning, Monitoring and Evaluation, and Women Farmers' Development have their own roles to play. As for the Agricultural Statistics Division, its role is to fulfil the ever-increasing information need to assess the performance of agriculture and monitor food security and the crop situation of the country.

Specifically, the Agricultural Statistics Division is the only national agency entrusted with making timely forecasts based on current agricultural statistics for such areas as production and yield of cereal, cash and other crops, and livestock population and production. The division is doing its best to support planning at the national level by providing timely expert service, more specifically in the field of current-level data input.

The division is run by six officers – a division chief (Officer Class I), three senior officers (Officers Class II) and two officers (Officers Class III) – and six technical assistants.

The Ministry of Agriculture has an administrative network covering the whole country. There are 75 district agriculture development offices, as many district livestock development offices, and each district office has its own village-level official unit called service centre and covering three to 10 village development committees. There are altogether more than 1 800 field-level official units including the agriculture and livestock service centres. The technical manpower of these units is used for the collection of field-level agricultural data. Also, there are 18 technical divisions under the Department of Agriculture and Department of Livestock Services. These are involved in agricultural statistics directly or indirectly as subject-matter specialists.

## 5. Data collection, compilation and dissemination

The previous agency resorted to the information collected by the agricultural statistics units located in fifty-seven districts of the kingdom. Most of those units operated under the administrative and financial supervision of the then District Agricultural Office, which was responsible for organizing, supervising and reporting the current agricultural statistics along the guidelines provided by the division or department of the ministry. The unit generally had a staff composition of one technical assistant and one Mukhiya (Non-officer Rank – III). During that period, the methodology consisted in random sampling to estimate the areas under the main crops within the area frame of the cultivated land. However, the area frames for conducting crop surveys were structured for only those 57 districts that had been cadastrally surveyed. The data collection in the other districts was based on the information received about the crop situation by the district agricultural offices.

“For survey purposes, cadastrally surveyed districts are divided into a number of strata, generally two to five, according to geographical proximity with due consideration to soil fertility, irrigation facilities, agricultural practices, and extension coverage. The cultivated land within each stratum is divided into a number of segments. A segment consists of 800 *ropanis* ( $\pm 15.0$  percent) for the Hills districts and 100 *bighas* ( $\pm 15.0$  percent) for the districts of the Terai. In this design, the segment is the primary unit and the parcel within the segment is the secondary sampling unit. The method for obtaining the estimates is based on random selection of fifteen-percent segments. Using total cultivated land as auxiliary variable, the ratio method is used to estimate the area under a particular crop at district level.”#

The methodology applied for a crop survey comprised both subjective and objective methods. The later required crop-cutting observation especially for paddy, maize and wheat. In a crop-cutting survey, the selection of the parcel was based on three-stage stratified random sampling. “In the first stage, 40 segments are selected out of the total selected segments for area survey. In the second stage, one parcel under a particular crop is selected from each selected segment. In the third stage, a plot is selected within the selected parcel. The size of the plot is 5 x 5 square metres for the Terai, whereas for the Hills the size of the plot is 5 x 2 square metres...The design used to estimate the

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# “Current agricultural statistics and the crop forecasting system in Nepal”, R L Shrestha and R N Shrestha.

yield in the subjective method is a two-stage stratified random sampling. The first stage involves the selection of 10 percent of the segments, out of the 15 percent segments selected for area survey. Three parcels growing the particular crops are selected from each selected segment.” \*

This mechanism provided for yield and area estimation of the principal crops of paddy, maize and wheat in a district. For those districts not cadastrally surveyed, the agricultural department relied on the information received from the district offices.

Agriculture is a broad sector, which includes cereal crops, cash crops, other crops, fruit and vegetables, livestock, fishery and forestry. At present, the agricultural data produced by the Ministry of Agriculture are based on both primary and secondary data sources.

The data are mailed to the Agricultural Statistics Division of the ministry from all districts at least twice in one crop season; once while crops are standing in the field and again after the harvest. Agricultural development officers and subject-matter specialists in their field supervision examine the crop situation under each service centre in a district and keep themselves aware of the general performance of the various crops.

In the existing system, monthly meetings are held between field supervisors and service centre representatives to discuss progress and problems in the area under their responsibility. As said earlier the crop situation at district level is to be reported every month at least to the Agricultural Statistics Division and to the Extension Division of the Department of Agriculture.

The Agricultural Statistics Division gathers the data, watching for any discrepancy and calling the district offices if need be to ensure timely monitoring of the crop situation and timely publication of monthly bulletins providing information on crops for all the 75 districts.

## **6. Types of agricultural commodities and frequency of data collection**

### **6.1 Cereal, cash and other crops**

Cereal crops include paddy, maize, wheat, millet and barley. Cash crops cover potato, sugarcane, tobacco, jute, and oil seeds. Other crops comprise pulses, spices, tea, cotton and cardamom. The Ministry of Agriculture is directly involved in data collection, compilation, processing and dissemination for cereal crops, cash crops and other crops. The data on area and production of cereal and cash crops are collected through monthly reports of the agricultural district offices. But so far as the crop situation report is concerned, the planning cell of each district office is directed to dispatch it on a weekly basis. Thus, the data collection for the main crops is done at least twice in a season.

Generally, each district conducts 100 to 250 crop cuttings depending upon the size and characteristics of agriculture in the district. The district office determines the number of crop cuttings in each agricultural service centre. The district agriculture budget has provision of Rs 60 per farmer

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\* Ibid.

to compensate losses due to crop cutting. The area for crop cutting is very much subjective: in the Mountain and Hills, it varies from 1 to 10 square metres, and from 10 to 25 square metres in the Terai. The budget for crop cutting is being expanded to meet a double objective, which is to estimate yield per hectare in production contests among farmers, and to estimate average yield of important cereal crops at the level of the service centres. Each service centre thus collects area and yield records exclusively to estimate the average production level attained in its area.

## **6.2 Fruit and vegetables**

The Fruit Development Division and the Citrus Development Programme of the Department of Agriculture are the main agencies to do cross verification of data on fruit production, area and yield, which are collected by the district offices every year for different crops. The data on area under fruit are based on the total number of fruit plants distributed in each district. In order to obtain the total area, fruit-plant mortality is adjusted. The average mortality rate of fruit plants has been established for important fruit crops such as citrus, apple and mango. The fruit area considered particularly for the purpose of production assessment is calculated by use of technical norms for the fruit-bearing age of the specific fruit type.

The Vegetable Development Division of the Department of Agriculture is another technical division that is consulted before the district-level data for area and production under vegetables are finalized every year. The information on vegetables is mainly based on the reports submitted by the district offices to the statistics division. If any discrepancy is noted during the technical consultation, the statistics division makes further enquiry with the district office or offices concerned.

## **6.3 Livestock**

Livestock includes livestock population and production. The livestock products have been grouped into the following categories:

- Milk – cow and buffalo milk
- Meat – mutton, buffalo, goat, pig
- Poultry – chicken and duck meat and eggs
- Wool
- Hides and skins

The Agricultural Statistics Department collects and compiles data on the livestock population (1 to 3) from the 75 district offices of the Department of Livestock Services. Each district office obtains the information from its livestock service centres. The estimates of total livestock products are made by using the norms developed by the department.

## **6.4 Fishery**

The data on the number of ponds, area, total water surface area, fish production, etc, are collected, compiled and produced by the Fish Development Division of the Department of Agriculture. With a view to generate timely and reliable statistics, the total fish production area has been divided into three main categories:

- Rivers
- Natural ponds
- Artificial ponds

In terms of technical management, the fishponds are categorized as intensive, developed and general. Intensive fishponds use high-level technology and management. Developed fishponds are those where only manuring is done. Ponds where the natural fish have been replaced by high-breed fish are called general ponds.

## **6.5 Data other than agricultural commodities**

The initiatives of the Agricultural Statistics Division place due emphasis on many types of data needed in planning agricultural development other than what it generates itself. It has thus established regular contact and correspondence with related organizations, such as the Agricultural Input Corporation, the National Agriculture Research Council, the Department of Co-operatives, the Nepal Rastra Bank or the Central Bureau of Statistics, for access to important information. The division puts together all those bits of borrowed information in its publication entitled *Statistical information on agricultural development*.

## **7. Data processing**

All data received by regular mail or collected otherwise by the Agricultural Statistics Division are compiled in the division's computer cell in crude form at the first stage. They are further examined against the seasonal crop status reports and against the prevailing agricultural and climatic conditions of districts. Thus, data analysis is done to look at various effects on standing crops depending on ministerial needs.

## **8. Types and frequency of publications**

Every year, the Agricultural Statistics Division forecasts agricultural crops at two levels for each crop season: summer and winter. The first level is a preliminary estimation of the area under crops grown in a season. The second level of forecast basically is estimation of the production of a crop likely to be achieved in that season. In order to arrive at the final stage, the division undergoes rigorous exercises to come to a realistic situation incorporating all possible information from the field. This process completed, the preliminary figures are submitted to a technical committee composed of representatives of the concerned agencies. This process is repeated for the following crop season. Before the division releases these estimated figures, they are reviewed by the secretary of the Ministry of Agriculture and cleared for circulation. Finally, the annual preliminary production estimates covering crops grown in both seasons are published. This is the annual publication made by the statistics division for general circulation.

Apart from this, the division also publishes monthly crop situation reports reflecting the agricultural and climatic situation as well as problems encountered during the cropping season in various parts of the country. These reports also provide information on the performance of the crops still in the field.

The main annual publications of the Ministry of Agriculture are:

- *Forecast of production and yield of crops and livestock production* (in Nepali)
- *Monthly crop situation report* (in Nepali)
- *Statistical information on Nepalese agriculture* (in English)

## **9. Use of the results**

The current agricultural statistics published by the Ministry of Agriculture are widely used by all government and concerned agencies. The main data users among the government agencies are: the Ministry of Finance for its economic survey; the National Planning Commission for its fiscal year's planning, monitoring and budgeting; the Ministry of Supply and the Ministry of Trade and Commerce to see the country's food supply position as well as surplus and deficit situation against the country's own requirements. The Central Bureau of Statistics in particular makes use of these preliminary estimates as the basic input for preparing the national accounts. Similarly, the preliminary production estimates are the core elements for the preparation of the pre-budget survey report of the Nepal Rastra Bank to be submitted to the government. International agencies such as FAO, UNDP, the World Bank, ADB, JICA and others are known to have used this publication off and on. On top of that, the Ministry of Agriculture itself is the principal data user for monitoring, evaluating and implementing its own projects and programmes. The other identified category of users is some private firms, students, news agencies and non-governmental organizations.

## **10. Current issues and problems in agricultural statistics**

Attempts are being made by the Agricultural Statistics Division to improve the present agricultural data system in consultation with the higher authorities of the Ministry of Agriculture and the National Planning Commission. The division is of the opinion that the present agricultural information system should be upgraded and developed to establish a Food Security Information System in the country.

The division strongly feels the need for increased specializing on production information of field crops and livestock as early-warning information. In order to achieve this goal, the technical capability of not only the division but also the Department of Agriculture and the district agricultural development offices has to be upgraded and the necessary logistic support provided. Although the question about the data lag arises every now and then in various other aspects of agriculture, the division must draw the attention of planners and policymakers to the need to strengthen operations through donor-assisted project support. The current need is in the direction of data gaps noted in many crops grown in the country that have commercial potential.

At present, the staff of the Agricultural Statistics Division is insufficiently trained to deliver the desired level of output. To overcome this problem, the division has raised the issue in many forums, suggesting higher-level training in the field of agricultural statistics.

## **11. Plans for an agricultural information system**

A geographic information system (GIS) is a computer-based technology with storage, retrieval, manipulation and analysis of geo-referenced data capability, which makes it a useful tool for spatial and temporal analysis. Such a system readily answers the questions related to location, conditions, trends, patterns, modelling, measurement, mapping, monitoring, etc.

The Ministry of Agriculture is aware of the need to establish a scientific agricultural geographic information system (AGIS) for data acquisition and storage and for project and programme planning, monitoring and evaluation. To this end, various agencies have suggested to use the latest GIS system as a tool for creating a database that will include both statistical and spatial data and analyse the data as required.

An AGIS unit at the Ministry of Agriculture would serve as a link between local and district-level planning requirements. The unit would seek to maintain data and information available at the district and local levels and analyse and interpret it to be used in the planning process. So far, while waiting for the software, some of the staff members of the unit have received basic knowledge on how to handle the geographic information system.

In order to establish and effectively manage an agricultural information system at the ministry, a technical co-ordination committee has been formed, with the Joint Secretary of the Agricultural Statistics Division of the Ministry of Agriculture acting as co-ordinator and with the representation of concerned governmental and non-governmental agencies. Here is the list of the members:

- |   |              |
|---|--------------|
| - Joint Secretary, ASD/MOA                    | Co-ordinator |
| - Joint Secretary, Planning Division/MOA      | Member       |
| - DDG, Planning/Department of Agriculture     | Member       |
| - DDG, Planning/Department of Livestock       | Member       |
| - Executive Director, APROSC                  | Member       |
| - Representative, Survey Department           | Member       |
| - Representative, Soil Science Division, NARC | Member       |
| - Representative, CBS                         | Member       |
| - Representative, ICIMOD/MENRIS               | Member       |



## **USE OF AGRICULTURAL STATISTICS IN SUPPORT OF FOOD SECURITY ISSUES**

**Dibakar Paudyal**  
Joint Secretary,  
Ministry of Agriculture

### **1. Introduction**

Food has always been the first concern of people, hence of politicians and policymakers. Effective food and agriculture policies contributing to higher economic growth and better standards of living are important for all. In any country, food security concerns guide overall agricultural growth, economic development and socio-political stability. They also lead the donors to back efforts to strengthen food security. A substantial amount of agricultural statistics is involved in the planning and implementation of programmes that contribute to food security. Food security and related policies thus determine the objectives of agricultural development in any country. With more than 80 percent of the population depending on agriculture, Nepal continues to give top priority to the agricultural sector, which still contributes more than 40 percent to GDP. Despite this, the country has a very high level of poverty and thus remains food insecure.

In an endeavour to alleviating poverty – the main cause of food insecurity – starting with the current Ninth Plan, Nepal is implementing a twenty-year-long Agricultural Perspective Plan. Commercializing agriculture by encouraging high-value crop production while trying to maintain food security through increased production and cropping intensity in agricultural lands under year-round irrigation is the two-pronged strategy of the long-term plan to achieve agricultural and overall economic growth. Food security issues will continue to receive high priority in future, but food production alone is not sufficient to achieve such aims, given the increasingly open nature of the economy, global liberalization and free trade perspectives. Employment, income, net farm income, market systems and other variables are extremely important in the elaboration of a food security system. Analysis and use of agricultural statistics is a most effective tool to address food security issues. What constitutes workable and reliable agricultural statistics is of course the object of this seminar.

### **2. The production system and food supply in historical perspective**

By and large, in the past the Nepalese agricultural production system was one of subsistence agriculture even after the democratic change that took place in the country half a century ago. The feudal society took it for granted that uproars due to food shortages near the capital or at their doorstep had to be avoided, but did not care if people died of hunger elsewhere. Food security was viewed as an urban concern that ensured the needs of possibly less than two or three percent of the total population. This meant that no food or agricultural policy was concerned with the food security of the whole country. No statistics whatsoever were apparently needed then either. From the 1960s

on, the state took on a wider role. Quite a large number of districts in the Hills and Mountain areas started receiving priority attention. The food policy began to encompass the whole country, not only as a matter of ensuring smooth ruling, but also of taking into account the human side of development.

In Nepal, agriculture is the backbone of the economy and the key to its growth. While it is true that the country has been giving priority to agricultural development since its fourth development plan, the growth in agriculture, by and large, remains tardy. This has resulted in slow economic growth and a steady reduction in per capita food availability. From being a net exporter of food grain until the mid-1980s, Nepal has become a net importer, as customs data show. The adoption in recent years by the government of an open economic policy has led to a different approach in maintaining food security.

As noted in the Agricultural Perspective Plan, the slow economic growth of three percent a year in the past was due in part to scattered use of resources. There is also the feeling that the policies developed and plans implemented were based on poor information, resulting in weaknesses and failures. The collection system of statistics including agricultural statistics and their frequency, scope and quality was part of the problem.

### **3. Concerns of statistics users**

Any food security strategy should consider the aspects of availability and accessibility. This depends on intra-household food distribution, nutrition or food habits, and health facilities. Designing programmes that increase availability of food calls for the use of agricultural statistics. Using relevant and reliable statistical information, measuring input and output levels for supporting food policies are essential requisites to enhance the availability of food. Creating an environment providing better access, distribution and even nutrition by using appropriate policy measures is important also. Thus any element that influences these factors becomes necessary in appraising the food security concerns and designing food security programmes.

#### **3.1 Developing plans and programmes**

Review of the periodic plans shows that there has been substantial use of agricultural statistics for planning to increase production. Yet it is widely remarked that the supply of data is not sufficient to serve development needs. Users are usually aware of the inherent weaknesses of the available statistics; yet they must use them somehow. In fact, it is not only in developing plans that agricultural statistics are used: they are also employed to prepare, monitor and evaluate agricultural programmes and projects that contribute to the food security of the people.

#### **3.2 Indicators**

Production of food grain and other agricultural produce largely depends on the availability of different types of inputs, including services. The main inputs are fertilizers, seeds, credit for production, irrigation facilities, extension services, etc. By and large, the sources of such data are administrative records. Some of this information needs to be used with caution. It may look smooth and coherent in the aggregate but erratic in some of its components, be it flow system, period, type or quantities. These ups and downs in the availability of inputs influence the production of food grain at micro or farm level and result in wide variations in food production and availability.

The degree of availability and accessibility of output is the most important of all variables to consider in agricultural statistics. For food statistics, in terms of edibles, the data are processed using established parameters on losses, seeds, milling recovery, etc, from other information sources. The parameters used over the years show that figures have remained fairly the same or moved into a certain direction for reasons that can be identified or guessed at. The gross production of grain and the net edible quantities would differ as the composition of grain in total production differs over time. Also the other parameters such as milling or recovery rate, seed, feed need, loss, etc, differ by crop, variety, location and level and type of technology used.

The availability of food in edible form, which is the main indicator of food security, is influenced by other factors as well, such as the quantities traded or the stocks carried over from the previous year. However, these statistics are to be taken from some other sources, and additional clarifications may need to be made.

Measuring accessibility, which is another indicator of food security, would be helpful to address different sets of policy issues. Data sets such as level and distribution of income, population and physical distance to the source of food would be important to consider.

In all these cases, the user of agricultural statistics often has to decide on which source of information to use.

A workshop was organised by Winrock International in late December 1990 to know users' concerns and make recommendations on how to address them. The report was published in 1994. The findings closely resemble today's conditions except perhaps for the fact that our present computation and interaction processes are much faster due to better facilities.

### **3.3 Method of study**

There exists a significant number of study reports and sets of statistics related to agriculture and food. An attempt will be made to review and answer some of the issues of how far the use of agricultural statistics is of concern to users. Using available publications, quality assessment, relevancy and other issues will be explored. Finally recommendations from a user's point of view for improving statistics to strengthen food security issues and programmes will be presented.

## 4 Food security: the main points

Food security is the first point to consider. Around the premises of food security a number of policies form the fabric. So we will focus on the most important policy areas, which primarily include production-focused policies that enhance the availability of food derived from crops and livestock. The resources enhancing their production will be discussed. Employment policies, population and trade characterization for food security will also be addressed.

### 4.1 Production

To strengthen the food-availability component, production-focused policies are in place. Production sources cover the crop, livestock and fishery sub-sectors. Policies falling within this group can also be grouped by focus area, such as production, resource, marketing, credit, investment, agribusiness, trade and so forth. The crop sub-sector policies, by and large, are associated to the following policies. Let us note that the policies discussed under the crop sub-sector also cover policy issues of other sub-sectors and areas.

### 4.2 Crop sub-sector

#### Input supply

**Fertilizer** is the main purchased input in Nepal. Administrative data on such imports are plentiful. However, very little information is available on crop-specific use of fertilizers, including type and frequency of use. Fertilizer-related response data are available but very weak. Recently, a Fertilizer Unit was established in the Ministry of Agriculture with a view to ensure that adequate supplies of quality-controlled fertilizer are available at all times. There have always been shortages of fertilizer, primarily owing to the subsidy element, which the government is always hard put to extend. Privatization of this business will, it is hoped, solve the problem of fertilizer shortage, which has been a major obstacle in the development of agriculture in Nepal. The experimentation phase of the privatization of this business is not yet over, and the effects of the shift from government hands to the private sector are still under study. So far the results seem encouraging. However, on the statistics front, it is feared that in future it may be more difficult to get the information on fertilizer required for policy analysis. Some alternative arrangements and additional efforts to collect more specific data may be needed.

**Seed** is the other important input for which statistics are frequently needed. So far, the administrative records show that a mere two to three percent of seed is distributed through institutional channels. Farmers mostly keep seeds by themselves. To some extent, depending upon the crop situation of the previous season, seeds are traded among farmers. The private sector focuses primarily on high-value vegetable seeds. Though essential from the standpoint of food security, little of the trade in food-grain seeds is handled commercially by the private sector.

#### Irrigation

Irrigation continues to receive top priority, since Nepalese agriculture remains very much dependant on the vagaries of the monsoon. The planning, development, operation and management of irrigation

systems in a sustainable way remain a challenge in the context of Nepal. Difficult topographic conditions coexist with opportunities for harnessing water resources for irrigation. The groundwater in the southern plains offers the possibility of developing large, medium-sized and small surface irrigation systems. This and the upcoming water-saving, small farmer-oriented or capital-intensive irrigation systems mainly in the Hills, in view of the apparent shortage of water there, call for different types of statistics. These statistics will encompass production and cropping intensity with and without irrigation as well as data regarding the water table and water levels at various locations during each season and under various scenarios of rainfall. Obviously any food policy issue is likely to be linked to the analysis of such statistics.

## **Research**

The most important information on research includes the introduction and reasonable spread of wheat, maize and paddy varieties at the crop front. Vegetables have remarkably progressed. In the area of livestock, similar results seem to be coming out in the form of mixed breeds. However, generally speaking, neither are detailed statistics on varieties available nor has the research policy ever been consistent enough to specify the differences in production and productivity across the agricultural board. The effectiveness of research has been minimal. This is often attributed to the allocation of nominal budgets for research opposed to what is actually required. Another factor is the bio-diversity of Nepal, which does not necessarily ensure the adaptability of a developed variety.

The establishment of gene banks and systematic record-keeping of genetic resources with the help of international institutions has been useful in providing the information needed for agricultural research and development.

## **Breeding**

Breeding programmes for annual and perennial crops and livestock involve high resource costs, and results take a long time to come out. Specific information does not exist.

## **Extension**

Extension is established as a sound institution in Nepal. Junior trainees and junior trainee assistants are supposed to be all over the place at field level. There is a common feeling, though, that they are nowhere to be seen on the ground. Access and road services are improving. Some 12 000 km of roads have been developed, and markets, movement of people and trade keep expanding internally. Information on extension, on the activities of extension agents and the quality of their performance or other statistics that lead to devising appropriate policies, however, does not exist to a satisfactory level.

## **Training**

Any technology forwarded becomes effective only if it gets support in the form of training. There was awareness of this even before the beginning of planned development efforts in Nepal. But to date the wider concern remains on the methods of imparting training, which have not been effective. Evaluation studies and proposals have been developed for strengthening manpower where

substantial statistics of an administrative nature are available. Training policies address commodities across the board, whereas the need would be to focus on those that have high-return potential. As such, it seems that, in general, policymakers are not confronted with a lack of statistics pertaining to training matters.

### **Investment and credit**

There is concern about the level of investment for agricultural development. The Agricultural Perspective Plan has estimated the level that will have to be managed by the public exchequer.

Investment can be divided into public-sector and private-sector investment. The privatization policy assumes that even for the areas of government concern so far, the private sector should take the lead. For example, the private sector is expected to share in the investment on research and development of varieties. The public sector augments its required resources from within and outside the country. Donors of a bilateral or multilateral nature share investment in the form of aid consisting of loan, aid or technical assistance. This information is documented by institutions such as UNDP, ADB or the World Bank.

Private-sector investment consists of individual savings, formal institutional lending and informal non-institutional sources. Statistical information is thus available by institution for the major part of an investment. For such institutions, the information, though delayed in most instances, is available on a regular basis. A few institutions do not bring out information on a regular basis. In any case, the volume of informal lending is not accurately known. Some institutions, mainly the Nepal Rastra Bank, publish reports addressing the dimensions of investment. These reports also provide information on the socio-economic, ethnic and cultural aspects of lending, availability and access to resources. The agricultural census report brought out every 10 years also provides this kind of information.

The investment made by ADB in the form of loans is shown each year by service or commodity and the information is available down to bank service area level. Policymakers make frequent use of it. Except for misallocations, which the bank does not report, the data are fairly reliable.

### **Marketing**

Production strategies in the past paid little attention to developing markets and the marketing system. Stagnation due to inappropriate marketing mechanisms was in the offing. It was soon realized that unless markets were developed, agricultural growth would level off or even decline. Strengthening the markets and the marketing system meant making its hardware and software components available. In order to develop policies to address these issues, quite different types of statistics are necessary. By and large, though in a bit of disarray, it seems that such information exists.

### **Agribusiness**

In recent years, due to the liberalization process, the private sector has come to the fore. In this context, it is necessary to link markets, marketing activities, industries, farmers' co-operatives or farmers' groups, and trade and information among the various partners or stakeholders in the

different market zones. This would help enhance agricultural production and growth. Clear information on these areas and sub-areas is required to devise policies on food security.

The policy issues pertinent to agribusiness call for various types of data, perhaps mostly from agricultural statistics institutions. Additionally, statistics should come from various sources, from field level up to national, regional and international levels. They may come from primary or secondary sources and include resource, output, and service-related data, including on infrastructure. Thus the agribusiness policy issues would require, in fact, a composite data system that may be seen in a whole range of agricultural and other statistics.

### **Environmental concerns**

Significant attention has been drawn to this area in recent years. The quality of food in terms of level of chemicals during production and up to the moment when it is served to the consumer is one example. The level of chemicals that crops receive, that animal feed contains, or the water in which fish grow – all this has to be assessed. The policies of integrated-pest and nutrient management that are a present-day concern require yet a different category of agricultural statistics. Attention is increasingly drawn to this, due to domestic factors and to the regional trade environment.

### **4.3 Livestock sub-sector**

Most of the policy issues mentioned in the above section are pertinent also to the livestock sub-sector. They need not be repeated. There are however some policy issues that are specifically relevant to the livestock sub-sector.

#### **4.3.1 Management**

Livestock management aspects are becoming important due to factors such as environmental concerns, agribusiness orientation toward livestock production, increasing cropping intensity and decreasing forest land for free grazing, and shift of child labour from livestock management to education out of literacy awareness. The most critical management issues lie in the area of feeding and system of grazing, which has consequences on livestock health, forage resource availability and availability of manure for agriculture. Thus quite a large mass of agricultural statistics is called for to analyse food and agriculture policy issues. Such studies take time, and in some of the reports under review, only some of the information may be available. The mass of information required does not fully exist.

Since recent management systems seem preferable to those that existed before, due to factors such as contribution to higher crop productivity and practices desirable from various angles, the question arises of how the current management systems can be made sustainable and linked to the overall food policy. Thus this area deserves some attention to generate statistics that can be employed in food policy issues.

#### **a. Breeding**

Better breeds form the basis for raised production levels. However, so far, statistics of this sort are poor. The desirability of appropriate breeds calls for statistics in this field, which is almost barren for the time being.

### **b. Feeding**

Despite high growth rates shown by the statistics, the yield levels of livestock products such as milk are low compared to the other countries of South Asia. Low yield levels have resulted in very high costs of production of livestock and livestock products. In this context, the important components that deserve attention are the fodder resources and other inputs. If the gross domestic product is to be raised, yield levels must be raised and the cost of resources lowered. By doing so, competing with external markets for a product would be easier and the level of domestic consumption could be increased. The so-called milk holiday of Nepal, a consequence of the inability to sell milk due to high price levels, would end for the producers. They could sell more milk and see their income rise. In order for this to happen, policy studies need to be commissioned on how outputs could be produced in a cost-effective manner. To initiate such efforts some agricultural statistics are available. However, much more data on inputs or resources and various factors affecting demand for products will need to be assessed. More accurate data on feed would be needed. This sort of agricultural statistics is weak so far.

### **c. Disease control**

As there are occasional outbreaks of diseases such as rinderpest, haemorrhagic septicemia, black-quarter, foot-and-mouth, foot rot, swine fever, fowl pox, coccidiosis or ascariasis, ways to minimize them are called for. Initiating studies would be helpful in supporting the objective of increasing livestock production in the country. For making an assessment of the situation and addressing policy issues, information of various kinds is required. Data collection systems for such specific issues are not well established.

## **4.3.2 Hygienic product system**

An often-felt need at present is for supplying consumers with hygienic products. Better sanitation measures will cause a rise in demand in consumer products. This will assure increased income for the farmers. So, ensuring better-quality products should be a matter of policy, given that there have been difficulties at times to persuade consumers to purchase products whose quality is perceived, rightly or wrongly, to have deteriorated. This sensitivity, while desirable from a consumer point of view, may be harmful to innocent primary producers. Agricultural statistics should include data about laboratory tests of agriculture-derived products, such as type and number of tests performed, legal provisions, number of agribusiness ventures using standard stamps such as Nepal Standards, and level of awareness of consumers and entrepreneurs.

## **4.4 Prices and taxes**

Apart from the concerns mentioned in the above section, the policy issues that influence the economy and the farm sector comprise the following, which call for sustained efforts in the area of agricultural statistics:

### **Input price**

For the last four decades, very high subsidies have been allocated to fertilizers, and to planting material including seeds. The policy analysts who have used the opportunity cost as measure of the effectiveness of a programme are convinced that such policies in themselves have ultimately constrained the very objective of increasing their use.

During the initial stages of development, when farmers were not aware of the effects of technology on their farms and their economy, the subsidy needs were pertinent. During that period, the amount of physical resources involved was small and the subsidy amount to be borne by the government was also small, thus manageable. But when consumption increased, the government was faced with a dilemma, as it could neither abandon a popular policy nor continue to bear the high subsidy amounts involved.

To address this issue, a lot of agricultural statistics are required, such as production, yield, performance by commodity in terms of comparative and competitive advantage, prices across borders mainly during harvest times, cost of production for a given commodity, agribusiness concerns involved and their strategies.

FOB, CIF, border and farm-gate prices, tariff and transport costs are also necessary. Both cross-sectional and time series data are required. There are some other new inputs or technologies that also require subsidy. In such cases, the amount appears not too high. However, when the amount of subsidy involved for all commodities is summed up, the exchequer has to seriously consider its own financial position, involvement and capacity to manage. Thus statistics on the financial position of the government and assessment of other factors also become necessary. However, such statistics are only partially available.

### **Output price**

The experience with the policy of announcing minimum prices of commodities has been that the government cannot allocate sufficiently large amounts of its budget. The minimum prices it offers hardly differ from the market prices. Even when they do, the difference is very small. The other important factor influencing this exercise is the large and powerful Indian economy. When the minimum prices announced are high, commodities begin to flow from India to Nepal through their porous common border, and large amounts of money are needed to purchase them. In a nutshell, as the Agricultural Perspective Plan states, price policies have substantial implications on food policies. So analysis of agricultural statistics in support of such food policy issues becomes pertinent, and for this the above-mentioned types of data are needed.

### **Subsidies**

Nepal has had mixed reactions to subsidies in the agricultural sector. Nepal has been told many times by donors and consultants of the theoretical disadvantages the subsidy element has for agriculture. Given the constraints on resources, a subsidy policy blocks or severely distorts the equity aspect of distribution. The price distortion, market failure and even environment distortion add up eventually to a heavy burden on scarce public resources.

Nepalese farmers cannot easily adapt to high-cost technology, at least in the initial stage. Government efforts to alleviate poverty may be nullified if subsidies are cut down. The political environment would not permit complete removal of subsidies. The heavy subsidies practised south of the border mean that our neighbour can always dump commodities in Nepal at prices lower than the prices at which Nepalese farmers can sell their own unsubsidized produce. It is a perennial problem. However, Nepal has cut down the subsidy on one very important fertilizer, urea. The subsidy is scheduled to be abandoned altogether by mid-July 2000. The move, which will certainly handicap the farmers, may yet lead to popular discontent and political opposition.

Subsidies have been lowered in shallow and deep tube-well irrigation loan schemes. The government is intent on progressively reducing the level of subsidies offered to these and various other activities. One exception appears to be the subsidies on electricity charges used for cold storage and irrigation systems. The subsidies given to fruit saplings, metal seed bins to support increased availability of quality seeds, certain horticultural and nursery-based equipment, etc, may continue. The most important subsidy that needs to be maintained is perhaps the subsidy on citrus saplings, as the latter are of benefit to both the economy and the environment. Debates and policy issues on subsidies will continue to remain important for Nepal's food policy regime.

### **Interest rates**

Just like funds and credit, interest rates have a substantial influence on the production thrust in agriculture, as the Agricultural Perspective Plan explains at length.

The high lending rates that prevail in Nepal are not due to high deposit rates, which have been negative – often quite negative – for all but a few years between 1975 and 1994. Moreover it is argued that they must be attributed to high transaction costs within the rural credit system. So policies will be needed to reduce these costs. It is also evident that various alternatives exist to remedy such problems. Clearly, a database will assume a prime role in the search for policy alternatives.

If the government borrows or if its operating budget deficit grows, this will put further pressure on interest rates, notably due to inflationary elements, and higher interest rates will be detrimental to private investment requirements.

Clearly there is a need to make an assessment of the effects of interest rates on credit, which directly affect agricultural production and food policy issues.

## **4.5 Management of natural resources**

## **Land use, land management**

So far, land use planning is limited to urban development programmes. No work or assessment of the need to address top-priority policy issues in agriculture appears to be in the offing. In theoretical terms, land use and management are quite popular. However, when it comes to operation, so far nothing has been accomplished. Land use management deserves consideration on socio-economic, technical and environmental grounds. Optimization of land use management with respect to resource optimization deserves attention. The topographical diversity and management of fragile lands in the Hills and Mountain regions call for such a policy exercise. The Terai plains, too, would need land use and management to be included in land development operations. Nepal is faced with the dilemma of initiating such action by undergoing some policy change. The Land Resources Mapping Project provides substantial database in support of this policy.

## **Ownership and tenancy**

Identifying household categories by size of landholding, type of tenancy, present system of tenancy, input use, level of investment and crop production pattern is called for so that appropriate policies conducive to production can be developed. The technology linked to these policies clearly involves investment in and use of high-yielding varieties and other inputs. The food situation of any country is very much influenced by this factor. To support land ownership and tenancy policy issues, the most important institutions providing statistics and information are the Central Bureau of Statistics, the Ministry of Land Reform and Management, Nepal Rastra Bank and private-sector institutions.

## **Water resources**

Developing water resources is a primary concern in Nepal, given that so much in agriculture depends on the vagaries of the monsoon. Droughts and excessive rainfall are cyclic in nature and tend to negate whatever gains are achieved through technological efficiency. A stable water supply system needs to be developed so that the fruits of new technologies may be harnessed. In order to accomplish this task, information of various types becomes necessary. Let us review them and see whatever is already available in the documented agricultural statistics.

## **Environment management**

The topography, population pressure, poverty, ignorance and a number of other factors adversely affect the environment in Nepal. The forest resources are getting depleted and thus the basis of perennial water resources is compromised. Each monsoon season, landslides and soil erosion are common. It is said that the production of one metric ton of food grain entails the loss of six times that volume of soil. The policy implication is clear, since these factors give rise to serious questions about the sustainability of agricultural production. Not only that: the effects are also external as they affect hundreds of millions of people living in the Gangetic plains as far away as Bangladesh, where

annually some 240 million cubic metres of fertile top soil of Nepal get deposited to no apparent advantage to the local people.

#### **4.6 Food stock and distribution**

Apart from meaning an increase in production to ensure food availability and food accessibility, a food reserve is a necessity as a precaution against times of hardship. This is an important component of food security. Leaving aside affordability, which has much to do with employment, setting up a food reserve system is a must for Nepal.

The Nepal Food Corporation, a public institution, has been entrusted with carrying out such a task. Through its 150 or so go-downs and distribution outlets, NFC provides food grain to the needy. As the road network has improved over the years, some of this role has shifted to the private sector. But so far, only 56 districts are accessible by road (and about 10 of those only in fair weather), so that the responsibility of managing food in the 38 food-deficit, inaccessible districts basically lies with NFC. In Nepal, there is no such thing as a food-balance assessment: what passes off as food balance is actually the food grain balance. In 1994/95, 55 out of the 75 districts of the country had a food deficit (Koirala et al). The role of analysis of agricultural statistics is clear here.

The government has adopted the policy of privatization of food distribution to lessen its own financial burden and try to do away with inefficiency. However, maintaining a food reserve to ensure food availability is an important part of strengthening food security. The government has set the target of 30 000 tons of grain as a buffer stock, though how much of this stock would actually be needed for a minimum food security reserve remains an open question.

Efficient methods of collection of primary- and secondary-level statistics on food, income elasticity of demand, consumption and demand behaviour of consumers are needed for realistic assessments of such a reserve. Users need this kind of information.

#### **4.7 Market and infrastructure development**

The above issue of maintaining a buffer stock is somewhat related to the market and infrastructure position of the country. While it is true that the government is taxed with the burden of accepting any responsibility arising out of food security concerns, integrated market conditions created through a better infrastructure environment are always helpful. In this respect, the agricultural statistics system should provide the basic information concerning markets and marketing infrastructure, i.e. marketing system, information system and its hardware and software components, and any information pertaining to demand and supply.

Market study also means knowing all about what is going on in neighbouring countries and the region. The advent of the World Trade Organization has greatly increased the importance of information related to trade. We need to know how producers and processors interact so that products are processed, preserved and made available at different locations whatever the season. Information on prices paid to producers, degree of remuneration to induce sustained production, and the like, also become important. Obviously these aspects have to be dealt with by the policymakers.

For this, the use of agricultural statistics, including prices, volumes transacted, and the number and location of market supporting elements and information on industries, becomes necessary.

#### **4.8 Agricultural trade**

The food policy is also very much related to the trade element in agriculture and to any trade policy. In this context the following policies are important:

##### **Import**

Nepal puts no restriction on food imports even though this has, at times, negatively affected domestic producers. Open economic policies and trade liberalization have such implications. India can produce food at lower cost primarily thanks to subsidies to its agriculture. Nepalese farmers are under heavy stress, since on good agricultural years prices would fall and on bad years the farmers may even starve. Improving efficiency is one way of solving the problem.

##### **Export**

Just like the import policy, the export policy is oriented toward non-restrictive export of food. However, extraordinary food shortages will force the government to adjust the policy on occasion. For instance, this year, quotas on food exports have been introduced. This may have a favourable impact on domestic consumers, including the farmers who sell their produce as soon as it is harvested and later buy some of it back. However, the long-term implication of such a decision may be counterproductive. Developing perfect food policies would require different, accurate and specific information.

##### **Exchange**

Nepal has a floating exchange rate with other currencies but a fixed exchange rate with the Indian currency. The higher inflation and lower growth in productivity in Nepal than in India make Nepalese exports non-competitive on the Indian market. At the same time a number of Indian food products compete with local products on the Nepalese market. Thus the exchange policy directly influences agricultural production. Information on this is obviously necessary for developing appropriate food policies at the level of the Ministry of Finance and the Nepal Rastra Bank.

#### **4.9 Population and employment**

Linked to all of the above is the population and employment policy, which has implications for the agricultural sector and food security as well. Population distribution by region, age, gender, income, consumption patterns, migration flows and many other elements are the kind of statistics required in this context.

The Central Bureau of Statistics is responsible for providing all data pertaining to population, including the employment status by gender, topographic regions or rural and urban settings.

Agriculture employs more than 80 percent of the economically active population. However, policies aiming to create opportunities to perform better in agriculture and raise productivity are yet to be developed. With a productive labour force, agriculture can significantly contribute to economic growth, which will translate into increased savings and investments and thus more employment opportunities.

Economic access to food is governed by income earned through employment. Unemployment and underemployment seriously affect economic access to food. It is estimated that in Nepal more than 200 000 people enter the labour market each year. In a 1984/85 survey conducted by the Nepal Sastra Bank, the unemployment level for the economically active population (15-60 years of age) was estimated at 3.1 percent. The estimate of the National Planning Commission for the same year was 5 percent. The commission's estimate for 1992 was 7.5 percent or about 650 000 people. The 1996 survey of living standards conducted by the commission has an overall unemployment rate of 4.9 percent (10 years old and older). The underemployment situation in the country is believed to be more serious. The 1984/85 survey by the National Planning Commission put it at 38 percent on a work time basis. These figures show that employment policies are linked to agriculture and to food policy issues that have direct implications for the accessibility to food. Unless agriculture focuses on employment, the unemployment situation in Nepal is likely to worsen in the years to come.

In addition to the above, the use of secondary or derived information to address policy issues is also worth mentioning here. Examples include the issue of overall net availability, including production, import, carryover stock, etc. Affordability or access issues, including income and patterns of employment, intra-household access and unhindered access to nutrition, are important. Consumption parameters, including patterns and sustainability, normative requirements, distribution, equity aspects and other issues, are also important when dealing with policy analysis. These data are to be collected either from agricultural statistics institutions or from specially surveyed documents.

It is also worth noting how food policy issues have to rely heavily on agricultural statistics for lack of alternative sources. In Table 1, the set of policies influencing food security issues is shown along with the type of statistics or information needed.

**Table 1. Set of policies influencing food security issues and types of agricultural statistics needed \***

Sub-sector/service	Needed statistics/information
<p><b><u>Production</u></b></p> <p><b><u>Crop sub-sector</u></b></p> <ul style="list-style-type: none"> <li>• <b>Breeding</b></li> <li>• <b>Input supply</b></li> <li>• <b>Research</b></li> <li>• <b>Extension</b></li> </ul>	<p>Area, number of animals, crop yields, animal product yields</p> <p>Number of varieties, seed/genetic resource inventory, characteristics, suitability, resistance</p> <p>Type, quantity, quality, seasonal flow</p> <p>Agronomic, pathological, entomological socio-economic preference, soil fertility, water requirements, economic profitability</p> <p>Production, post-harvest, marketing, resource use, availability of inputs, access to credit and services, farm management</p> <p>Management, plant protection, harvesting, application of inputs and</p>

Sub-sector/service	Needed statistics/information
<ul style="list-style-type: none"> <li>• <b>Training</b></li> <li>• <b>Investment</b></li> <li>• <b>Marketing</b></li> <li>• <b>Agribusiness</b></li> </ul>	<p>water, marketing, small-scale processing and preservation  Research, extension, inputs, irrigation networks, agricultural roads, rope ways, electricity, market yards, storage systems, processing</p> <p>Fresh vegetables, fruit, milk, meat, poultry, eggs, grain, industrial crops (tea, sugarcane, jute, tobacco, pulse crops, oilseeds, coffee), spice crops, fertilizer, chemicals, machinery, equipment, animal feed concentrates, seeds, saplings, packaging materials</p> <p>Industrial establishments/processors, transporters, middle-men, commodities, farm-gate prices, assembly markets, retail, wholesale, border, international level, tariffs, export points, major domestic markets, number/features of contract-farming practices, product qualities, awareness, linkages, information about technology, price environment</p> <p>Types, practices, technology, yield, feeds and composition, methods, costs, major diseases, magnitude of problem</p>
<p><b><u>Livestock sub-sector</u></b></p> <ul style="list-style-type: none"> <li>• <b>Management</b> (breeding, feeding, disease control)</li> <li>• <b>Hygienic supply system</b></li> </ul>	<p>System of production, quality tests, health status of animals, slaughterhouses, condition of processing plants, marketing systems, retailers, consumers, capacity to bear costs of high technology</p> <p>Trend, price: wholesale, retail, farm-gate, availability, production costs  Trend, price at wholesale level, retail, farm-gate, availability, cost of production, etc  Trend, lending, collection, recovery rates, interest rate, etc  Trend of tariff, octroi and local taxes, exemption and subsidies</p>
<p><b><u>Price</u></b></p> <ul style="list-style-type: none"> <li>• <b>Input</b></li> <li>• <b>Output</b></li> <li>• <b>Credit</b></li> <li>• <b>Tax</b></li> </ul>	<p>Land use system, application of fertilizer, lime, land development, agro-forestry practices</p> <p>Landholding size, tenure arrangement, use of inputs, investment</p> <p>Development, efficient use, practice, status, crop combination or pattern and technology</p>
<p><b><u>Natural resource management</u></b></p> <ul style="list-style-type: none"> <li>• <b>Land management</b></li> <li>• <b>Agrarian</b></li> <li>• <b>Water resources</b></li> <li>• <b>Environment</b></li> </ul>	<p>Soil erosion, forest cover, use of chemicals, fertilizer, pesticide use in water resources, bio-diversity concerns</p> <p>Production and distribution locations, reasons for food security and its magnitude</p> <p>Main production areas, type of market infrastructure, number of vulnerable consumers, monsoon cycle and projections, type of market, commodities, processing needs, storage system, information network, volume of movements, market linkages, import/export potential</p>

Sub-sector/service	Needed statistics/information
<p><b><u>Food security</u></b></p> <ul style="list-style-type: none"> <li>• <b>Food-reserve policy</b></li> <li>• <b>Market infrastructure development</b></li> </ul> <p><b><u>Agricultural trade</u></b></p> <ul style="list-style-type: none"> <li>• <b>Import</b></li> <li>• <b>Export</b></li> <li>• <b>Exchange</b></li> </ul> <p><b><u>Population and employment</u></b></p> <ul style="list-style-type: none"> <li>• <b>Population</b></li> <li>• <b>Employment</b></li> </ul>	<p>Trade agreements, demand, commodities, type/varieties, value, volume, purpose, target groups  Commodities, types/varieties, value, volume, purpose, target groups  Currency rates, strengths and weaknesses of exchange system prevailing</p> <p>Growth trend, gender, distribution, active, literacy, health  Extent, features, sectoral, regional, gender specific, migratory, age group, skill, education, alternatives</p>

\* Note. This is not an exhaustive list of policies and agricultural statistics

## 5 Users' assessment of agricultural statistics from a food security standpoint

The presentation in Table 1 shows the relevance of agricultural statistics and calls for an assessment of the data and information system from a user's point of view for food security issues. This begs the question of the availability of agricultural statistics in the country, their source and type, their level, frequency, adequacy and coverage, as well as reliability, quality and timeliness.

### 5.1 Current agricultural statistics

#### **Area and production data**

The former Agricultural Statistics Division of the then Department of Food and Agricultural Marketing Services was responsible in the past for the collection of agricultural data and for the presentation of final estimates for approval by the government. The sampling techniques used to estimate the area and average yields of the main crops were based on the area frame of cultivated land that was available for the cadastrally surveyed districts. For the other districts, the statistics had to be based on the information supplied by the agricultural development offices in those districts. The statistical coverage was up to the district level.

Since 1993, the Agricultural Statistics Division of the Ministry of Agriculture has been entrusted with this function up to forecast level. The presentation of the processed data is done by the Central Bureau of Statistics. The methodology followed by the division has hardly changed, but it has less manpower than was the case before 1993. This and very inadequate daily allowances have dampened the once vigorous field supervision activities, so that there are reasons to doubt the quality of the data gathered.

The Central Bureau of Statistics too seems to suffer from reduced staff at field level and also possibly from low daily allowances that discourage staff from going out for supervision. So far, there has been no major complaint about the quality of the data, but the research community can be hard put when the data for crops, livestock and fisheries are called for. Such data require an elaborate database not only for planning but also for making an assessment of what changes on income, employment, marketing and trade, environment, food security and the like are taking place.

Agricultural statistics on area and production are available on a regular basis. The districts are the basic units. Data accuracy is satisfactory from a planning point of view but unsatisfactory for monitoring purposes.

The current ADB-funded Crop and Livestock Survey has the following objectives:

- provide production estimates to monitor the progress of agriculture in each district;
- provide estimates of livestock, poultry and their products twice a year;
- prepare forecasts and provide help for the quarterly national accounts;
- provide such information for planning and policy purposes; and
- provide the general public with timely estimates of agricultural data for research, business ventures, and decision-making.

Hopefully, this project will bring about changes for the timely production of reliable agricultural statistics.

### **Livestock and poultry statistics**

Number and product statistics are available. The Agricultural Statistics Division of the agriculture ministry is the agency responsible for the collection of statistics and their treatment up to forecast level. The procedures and institutional arrangements followed are the same as mentioned in the above section. However, development workers and policymakers would like to have such statistics by breed type, i.e. improved and local, husbandry features like commercial or non-commercial, freely grazed or stall-fed, etc. Such data gaps exist. They have at times caused difficulties in terms of addressing policy issues.

The source of statistics for the case mentioned above is usually the commodity associations. However, the reliability of such statistics is in doubt. The information received is seldom consistent, regular or adequate.

### **Dairy statistics**

Livestock plays a significant role in the national economy. Dairy has been one of the effective means of alleviating poverty primarily because daily cash income can be derived from it and even small farmers have the opportunity to take up the occupation.

There are various sources from which dairy statistics (milk production) can be obtained. The Agricultural Statistics Division publishes statistics on total milk production by district, as already mentioned. However, the dairy business as such is commercially active in and around the highways, where daily milk collections are made. Dairy Development Cooperation (DDC) publishes the volume of milk handled every year. Some reports are also available from National Dairy Development Board (NDDB). However, none of the above sources publishes information on the milk handled by the private sector, which deserves attention from a policy-making standpoint.

## **5.2 Census publication**

### **National Sample Census of Agriculture**

The National Sample Census of Agriculture is a valuable source of agricultural statistics to many. It provides rare information on agrarian and land use areas and minor or very special crops for which current statistics would not be available. The type of statistics available include the following:

- size of holding, tenure, and fragmentation;
- number of holdings by type of irrigation, technology type, services including credit, crops including forest trees, fish ponds, etc; and
- number of holdings by economically active population, employment type, etc.

These statistics are useful to policymakers. Their periodicity is long, however, and additional surveys may be required in between two sets.

### **Population census and demography**

The population census is carried out every ten years. The statistics are obtained at village development council level and the information has a wide base. It is used as secondary data in a number of documents published by various institutions. The type of information on population and demography thus presented is sufficient for policymakers working on food and agriculture issues. The reliability of the information is sometimes questioned, even in government quarters. Witness the Agricultural Perspective Plan, which put the population growth rate at 2.5 percent although the figure published the same year by the Central Bureau of Statistics was 2.08 percent. CBS has now brought up this figure to 2.4 percent, which seems to indicate a measure of confusion. Nonetheless, by and large the quality of data is apparently agreeable enough not to create difficulties.

## **5.3 Irrigation**

The Department of Irrigation and the Agricultural Development Bank of Nepal, which are the main agencies developing irrigation in the country, are the main sources of data on irrigation. Besides, a groundwater database for developing irrigation systems has been created by an UNDP-sponsored project called Shallow Groundwater Investment in the Tarai, using a special groundwater computer package. The project has tested a significant number of pumps and shallow wells in Terai districts

and in two valleys. The data covers depth of water table and transmissivity. There is also groundwater data produced by the Red Cross and the United States Agency for International Development.

One serious problem with the data on irrigation command areas as reported by, say, the Department of Irrigation or the Agricultural Development Bank of Nepal is that they are grossly over-reported. They represent the sum of intended command areas of different irrigation sub-projects rather than the actual coverage. The bank also calculates the command area under a standard shallow tube well as 4 hectares while its own impact study shows that an average shallow tube well irrigates only 2.5 hectares. It is estimated that only half of the reported irrigated area receives effective supplemental monsoon irrigation and only a quarter receives year-round irrigation.

Another problem with the data on total irrigated area in Nepal is the lack of precise information on the systems developed by farmers without outside help. The farmer-irrigated area is estimated to be roughly 70 percent of the total irrigated area. Also lacking is information on the hydrology of the small rivers and rivulets, which feed water to the canals.

The Water and Energy Commission Secretariat has compiled a national-level inventory of the farmer-managed irrigation systems and agency-developed systems that command more than five hectares.

Regional hydrological studies have provided regression models for the evaluation of monthly average flows. Using the regression technique, the hydrology of small rivers in most of the districts has been studied.

There has been very little research on irrigation, including the parameters required to estimate water requirements for crops. Whatever is available is based on research conducted at the Hardinath pilot farm in Janakpur with Japanese assistance a long time ago. The National Agricultural Research Council is conducting research on optimal irrigation frequency and timing for some crops. But results are hardly significant to influence policy issues.

#### **5.4 Foreign trade statistics**

For data seekers, there are three different sources from which data on international trade can be obtained. They are the Department of Customs, the Nepal Rastra Bank and the Trade Promotion Centre. The basic sources of data for all these agencies are the various customs points in the country.

Ever since 1972, export and import statistics have been collected by the Trade Promotion Centre directly from customs points and tabulated and published annually in *Nepalese overseas trade statistics*. They are available in book form. The standard international trade classification of commodities recommended by the International Trade Centre is followed in maintaining transaction records at these customs point.

The data on imports, however, are not classified in this way. Also, they are available only in terms of value and not in terms of quantity. The commodities covered by export data include vegetable,

seeds, pulses, lentil, tea, large cardamom, Niger seed, raw jute, medicinal herbs, Linden nuts, sal seed oil, catechu, essential oil, hides and skins, wooden and bamboo goods, leather goods, Nepalese paper and paper products, and others.

Researchers who have used international trade data comment that the problem with them is that they are seldom available in one place or one institution and when collected from different sources are often significantly different. In the trade data, there are problems with basic classification due to negligence or inexperience of the person responsible for keeping records at customs points. For example, import data of commodities cannot be calculated when quantity and import value are not known (Karmacharya 1990).

The trade data obtained from the Department of Customs are on an annual basis, which restricts the study of seasonal trade patterns (Gill 1990). The department's original record can be used for monthly figures, which are available for 1980/81 onward. However, they are not complete for agricultural commodities. The high level of aggregation such as "fruit" or "vegetables" does not, at times, allow for case-specific policy studies.

## **5.5 Derived statistics in agriculture**

The Marketing Development Division of the Department of Agriculture is mandated to bring out food availability and food requirement assessments on a regular basis. The division handles data on input, output, post-harvest handling, processing, food, etc, using various coefficients, which are mostly the technical coefficients generated by the then Department of Food and Agriculture Marketing Services a quarter century ago.

Agricultural statistics on some commodities classified as minor (though they are of major importance to the rural poor) are either very poor or non-existent. Data coverage of commodities is uneven. There is a need to develop new series of coefficients to truly reflect the food scenario of the country.

## **5.6 Information**

The main institution offering such information is the Agricultural Marketing Development Division of the Department of Agriculture. The Nepal Rastra Bank also offers price data, mostly in index form. For those who want to use the actual prices, the other sources are the Federation of Nepalese Chambers of Commerce and Industry and the Ministry of Supplies. Nepal Food Corporation (NFC) provides information on prices of the food grain it handles. The Agricultural Input Corporation provides prices of fertilizer and seed upon request.

The Marketing Development Division of the Department of Agriculture is the prime government authority to collect marketing-related statistics. The division publishes documents every four months, as well as a more detailed special issue every year. These reports include prices in terms of commodities and market levels by location and by periodicity. Other pertinent data useful from a

marketing standpoint are also collected and included. The standard procedure is applied, but it is felt that there is a need to develop a standard methodology so that collected data are representative and can be of use to those who try to answer policy issues. The research activities of the division are weak. At present, studies are commissioned depending on needs.

Detailed marketing data are available also from the federation of chambers of commerce and industry. However, the absence so far of time series statistics makes it hard to use such data when analysing policy issues.

Market information is now seen to be valuable to many. With the increasing commercialization of agriculture, there are more and more requests for statistics on this sector. The main type of marketing information concerns commodity prices at different levels, i.e. wholesale, retail, primary market, border and farm-gate. The commodities covered are cereals, pulses, oilseeds, processed products such as rice, flour and broken pulse, vegetables, livestock products such as milk, ghee, eggs, as well as fish, fruit, etc. The periodicity varies depending on the commodity and its relative importance. As usual, there is no adequacy in data coverage. The data sets, which yield the national monthly and annual averages, suffer from uneven or faulty representation of the districts. Nevertheless, on the whole, they are fairly reliable, though they still lack timeliness. There is a need for faster methods of data collection and processing.

The upcoming market centres and some projects at the implementation stage also collect agricultural marketing data. Such data, however, suffer from lack of series and discontinuity in the collected information.

Infrastructure-related data such as roads, electricity facilities, storage capacities, cold storage systems and their capacity, etc, are available from various sources including the Department of Roads, Nepal Food Corporation, the Agricultural Input Corporation, the Department of Co-operatives, and others.

## **5.7 Cost-of-production data**

The Economic Analysis and Statistics Division (formerly Economic Analysis Division) of the Department of Agriculture has been collecting data on the cost of production for the past three decades. It is commonly thought that because the division does not present its methodology in detail, the information it provides is suspect. However, its publications are regular and cover important commodities. So, many would use the statistics despite serious doubts about their quality and degree of reliability.

Commodity-specific industries also collect such information for administrative purposes. In most cases, this information is not available in addressing policy issues.

## **5.8 Water resources and irrigation**

Water and Energy Commission Secretariat (WECS) collects information and statistics on various aspects of water as a resource, including for energy components, irrigation management systems, inventory of irrigation source by capacity and so on. As water resources are equally important from

an irrigation point of view, substantial information is generated on underground water resources by the Department of Irrigation. The Department of Meteorological Services collects information on climate data including rainfall, temperature and humidity.

## **5.9 Agricultural credit**

The Agricultural Development Bank of Nepal provides information required for analysis. The most important variables include loan disbursed and collected for various categories of crops by banking area. Loans by target group, i.e. small farmers, and specific-purpose loans by period of lending are also provided. Attempts by this institution to carry out purposive or impact studies are helpful as they provide more sets of data.

The Nepal Rastra Bank provides credit information of a macroeconomic nature and such information is helpful for food policy analysis.

The commercial banks involved in priority-sector lending also supply information on request. However, access to such information is rather difficult, as it is sometimes considered confidential. In some cases, even though the higher authority seems prepared to supply the information, lower-level personnel simply assume it is too risky for them to provide it. However, with a reasonable amount of effort, the amount of credit made available to farmers by these institutions can be assessed. What cannot be known is how much credit farmers receive altogether, as part of the credit comes from the informal sector.

## **5.10 Land use**

The cadastral survey is the major source of statistics for areas used for different purposes. To provide insight on policy issues pertaining to land use systems, statistics generated by the Land Resource Mapping Project, which is based on satellite imagery and aerial photographs, are widely used. The Geographic Information System is increasingly popular with government institutions, research units, universities, projects and the private sector. The system is in its initial stage and staff is being recruited and trained. The Ministry of Agriculture is about to introduce a similar system to strengthen agricultural statistics collection and analysis by purchasing hardware and software and providing training opportunities to its staff.

## **5.11 Agricultural research**

Research-related information is available in scattered form. Breeding and variety improvement investigations for different climatic regions are conducted at different locations depending on the kind of crop, livestock or fishery involved. Annual progress reports and proceedings of commodity-specific research workshops are also available. However, so far, the results are seldom relevant to farmers' needs. Obviously, in addressing food policy issues their relevance is in doubt.

## **5.12 Farm management survey**

National farm management surveys are not regularly done in Nepal. Therefore no statistics are available. The FAO-supported surveys of 1968 and 1983 provide the only base from which to draw

some conclusions. The cost-of-production studies made by the Economic Analysis and Statistics Division do not take the whole-farm approach. Obviously this area remains very weak to provide answers to food policy issues.

### **5.13 Climate data**

Climate data come from the Department of Meteorological Services. The polygons taken do not necessarily conform to the agricultural base. Data are usually supplied on a monthly basis, which does not help much to derive a plausible policy. Whether the data are reliable cannot be ascertained, since even rainfall data are given to users after they have been supplied to the centre for a so-called final check. The climate data are very important for policymakers in order to get technical advice on the position and draw the attention of those concerned. It is reasonable to assume that climate data can be used only for long-term analysis purposes. Even long-term data sets are useful from an agriculture point of view.

### **5.14 Other general surveys and reports**

#### **Multipurpose Household Budget Survey**

Policy decisions must be based on reliable data. Various surveys and reports have been of great use, in particular the Multipurpose Household Budget Survey carried out long ago by the Nepal Sastra Bank using cross-sectional data. The bank may be proud that this survey has been in great demand and it should make the effort to bring out such surveys on a regular basis.

#### **Socio-economic research**

Several institutions are doing socio-economic research. The socio-economic section of the National Agricultural Research Council, the socio-economic departments of universities and a number of other institutions collect such data. However, such efforts lack regularity, their adequacy is almost never confirmed, their quality is at times questionable and their access is limited.

#### **Compendium on environmental statistics**

Statistics on the environment, too, are relevant to food policy issues. Recently, the Central Bureau of Statistics has taken steps in this direction with an occasional series of publications, which may yet become a regular feature.

#### **Evaluation and impact studies**

Evaluation and impact studies also help to address food policy issues by indirectly supplying information either at base level or after completion of a project. Thus while the studies focus on a particular food policy issue or set of issues, they also provide information in other areas that help address other policy issues.

#### **Master plan documents**

Master plan documents not only on the agricultural sector but also on resource management are quite useful to address the policy issues of the agricultural sector. The long-term Agricultural Perspective Plan, the Forestry Master Plan, the Irrigation Master Plan, the master plan on, say, horticultural development or the upcoming fishery development plan are useful documents, because they contain information on the relevant institutions as well as on related sectors or sub-sectors.

### **Agencies/donor-based documents**

Published annual progress reports and reports commissioned specifically are frequently used for policy issues and are usually easily available. Progress reports are published by institutions such as ADB, the Agricultural Input Corporation or the Ministry of Supply. Commissioned reports include feasibility reports, reports on employment or status of target communities, etc.

The World Bank, UNDP, ADB, USAID, GTZ, DANIDA and other donors keep publishing information that is quite useful at times in the handling of policy issues. Data on development co-operation, data as indicator of position or status and comparative scenarios, etc, are available to individual countries. Whether these data are appropriate in terms of level, frequency, adequacy, coverage, reliability, quality and timeliness is not always easy to judge. However, by and large, they are dependable, except for timeliness and adequacy of the available information.

### **International Centre for Integrated Mountain Development (ICIMOD)**

International Center for Integrated Mountain Development (ICIMOD) provides statistics in the form of indicators, maps or even data sets. *Districts of Nepal – Indicators of development* is one such document. The institution is using a geographic information system, but its work is mostly based on the work done by others.

### **Winrock International**

For the agricultural sector, Winrock International compiles a significant volume of information from secondary sources and at times from primary sources. The level, frequency, adequacy and coverage are good. Reliability and quality are quite high. But whenever they have to depend on secondary sources, the limitations are obvious.

### **APROSC/Private sector (New Era, IDE, IIDS, CEAPRED, etc)**

Baseline studies, project preparation, feasibility studies, monitoring and evaluation and impact study reports mostly of the agricultural sector, and other studies of a specific nature – e.g. the MIMAP study on poverty made by APROSC – can be used as data access documents for some policy issues. By nature, most of them do not attach any specific features in terms of level, frequency, adequacy, coverage, reliability, quality, timeliness, etc. Nevertheless, policy issues can be relatively easily handled once assessment of the data contained in the documents is made.

### **Project-based documents**

Projects of high importance to the country such as the Participatory District Development Programme, the Local Governance Programme, the Rural Urban Partnership Programme and the Rural Energy Development Programme (PDDP/LGP/RUPP/REDP) supported by UNDP and His Majesty's Government plan to create databases for their respective project areas. In this context, the creation of a geographic information system and development of district-level master plans by PDDP and LGP in 40 districts and eventually in all 75 districts of the country to cover different sectors is very important. These documents will be, and in some cases already are, important sources of agricultural statistics. It should be noted, however, that their information seems to be generated with little concern for sustainability, in terms of the resources the government can allocate to the various projects. As a matter of fact, most of the work also seems to be a duplicating effort and its quality depends on what others supply.

## **6. Data gaps and ways to fill them**

### **6.1 Data requirement and availability**

The data required for strengthening food security are mostly collected by government departments and other public-sector agencies either as regular statistical activity or in the form of administrative statistics. The emergence of a fairly large number of private-sector research organizations has further eased data collection. However it has been objected that some types of data cannot be easily accessed. In this sense, there is paucity of data. Even when the data are collected, researchers often find it difficult to locate and have access to them (Koirala 1994).

Dealing with food security issues requires a very wide coverage in terms of reference data and, despite much progress in recent years, data gaps are likely to remain.

Sometimes, statistics do exist but so does confusion about how to handle them or what to use them for. For example, the 1994 economic survey published by the Ministry of Agriculture processed agricultural production data using a new series that was claimed to be better than the previous format. However, the GDP figures presented in the same report were not modified accordingly and no explanation was given. The government's *Statistical yearbook* published as late as 1997 and widely circulated makes no mention of the new series. Rather, it continues to use the "old" set of agricultural production statistics – to everyone's confusion.

At times, there are so many different sets of statistics that there is precious little examination of which data refer to which quality or condition. There could be gaps in the form of either complete unavailability of data for a required series or type or of missing data within a series. Tables 2 and 3 present the existing data gaps by subject. A quality consideration is implied.

**Table 2. Data gaps by subject**

<b>Subject</b>	<b>Issue</b>
Food grain use	Requirements of seed, feed, wastage, human consumption
Informal trade	Volume and value handled this way, as it is too high for some commodities
Institutional credit	Size of loan, transaction cost, access to credit by distance of farm household
Informal credit	Volume involved, transaction cost, collateral arrangements, defaulting cases and causes
Private sector (commodity specific)	Total information by type of commodity handled: jute, sugarcane, poultry, dairy, tea, tobacco, orange, apple, fish, silk
Marketing margins	By commodity, by season, by location, by volume handled
Pasture inventory	By location, type, carrying capacity
Customs data	By weight, grade and value

**Table 3. Coverage required (to be widened) by subject**

<b>Subject</b>	<b>Issue</b>
Area	By irrigation, variety, fertilizer application rates
Yield	By variety, irrigation condition, fertilizer rates
Number of livestock	By breed, by size of commercialization
Productivity	By breed, by size of commercialization
Land ownership /tenancy	By size of holding, area, productivity, contract arrangement
Trade flow	By agency, individual, season, destination
Resource information	Land type, underground water, irrigation, forest
Agribusiness	Size, location, kind, contract arrangements, linkages
Employment	Agricultural labour, supply, demand, seasonal, gender, wage, education, position and location
Environment	Conservation of water and forestry resources, varieties and breeds, plant protection measures, product handling
General parameters	Food requirements, price and income elasticity, recovery rates in processing, efficient use of water, fertilizer and chemicals

## **6.2 Measures for increased access to data**

It is widely perceived that resources are too limited to use only primary sources. However, duplication of efforts is also common. To minimize duplication would free resources to fill data gaps that exist due to resource constraints. To increase access to data, the following measures are important.

- A central agency produces data sets in published form (and in electronic form).
- It requests, compiles and distributes statistics collected by other agencies.
- It makes sure that sources are cited for all published statistics.
- Any study commissioned, particularly if it involves large volumes of statistics, is put on the market.

## **6.3 Other issues**

The rapid changes occurring in the development process, either countrywide or in some parts of the country, call for specific policy studies. A general study will soon lose its relevance unless specific field, commodity or regional studies are undertaken. In any study, secondary sources of data are appropriate in terms of time, cost, reliability and consistency.

Given the growing globalization of trade, it is increasingly important to pay attention to what other countries are planning and what statistics they use. This calls for updating traditional facilities with modern-day electronic gear. As institutions are, for obvious reasons, resource-minded, it will not be enough to be “computer literate”: one will have to be “Internet-time-saver literate”. The technology demands that people be given wide access to this office-within-an-office environment. Efforts must be made in this direction.

To generate efficiency in trade, having the government channels handle all information is no longer sufficient. The Commodity Association of Nepal, for example, needs to talk directly to market committees in, say, Dhaka or Calcutta over prices, volumes traded, types of commodity, etc.

## **7. Recommendations**

- Users of agricultural statistics can perform better if they get consistent, precise and systematic data presented with a mention of the technology used, including possible inherent weaknesses in it. In order to accomplish this, the following recommendations are made.
- A network of data support system should be established so that important data get collected without duplication of efforts and the system of data collection, compilation and authentication, the introduction of new series, preservation, maintenance and supply of data in various forms are clear to all.
- Accuracy and reliability are a must for correct decisions to be made in policy analysis. The most serious concern is for accurate area statistics used for various purposes, since area is the most important factor that influences all agricultural statistics. A geographic information system, an

agricultural version of it, and even the use of satellite imagery are in the offing. Though satellite imagery is costly, the necessary technical support with alternatives must be available, as Nepal still depends on the almost outdated land use data of 1979, which also form the basis for crop-specific area studies.

- The other types of statistics needed by policymakers are population, yield data, price and cost-of-production data, use of agricultural inputs – mainly seeds, fertilizers and chemicals – varieties or breeds, irrigation water and climate. For each type, the following is recommended:

**Population.** The census system will have to be continued with improvement in methodology so that errors will not be repeated. Special surveys need to be conducted every five years so that population dynamics are noted earlier.

**Yield.** Details of collection methods, precision parameters of estimates, standard errors, crop-cutting method and degree of reliability, and factors that affect the results of the crop-cutting method need to be handled carefully.

**Costs of production.** Details of collection methods, precision parameters of estimates, standard errors, crop-cutting method and degree of reliability, factors that affect the results of the cost of production, and their degree of reliability, will need to be watched. Also necessary arrangements for guidance to the users in a number of factors are called for, since a large number of types of inputs, condition or quality of land, and labour affect the data.

**Agricultural price.** Price data collection methodology needs to be revised, given the changes in market growth centres and accessibility features. The current methodology continues to rely on the quite old system of chosen districts to arrive at ecological-, regional- or national-level data from which a large number of indicators and estimates are derived, including GDP, agricultural GDP, price, employment, income and other data. Warning should be given whenever necessary about price collection, compilation and analysis.

**Climate data.** The system of climate data collection so far is linked to strategic considerations, e.g. airports, hydrological measure points of the main river systems or of important border or dam areas, etc. Climate data seldom reflect the needs of the agricultural sector. The main agricultural production pockets are overlooked. So, necessary steps should be taken to get data in the way it is needed by the agricultural sector.

**Use of agricultural inputs.** The statistics for these components are basically lacking. Administrative data obtained do not necessarily reflect the true position of application of fertilizer, even though it has long been accepted that they do. Fertilizer use by crop, season and region are not available in detail, so that one has to resort to guesses, which as often as not will turn out not be valid. The same is true of seeds and chemicals. With the implementation of the privatization policy, these statistics will be further confusing in future. Corrective measures are needed.

**Varieties or breeds.** The Agricultural Perspective Plan calls for the commercialization of agriculture. In order to plan, implement and monitor the outcome, it is high time to make specific arrangements. The ongoing ADB-supported project of the Central Bureau of Statistics on Crop and Livestock

Statistics is a step in this direction. It is recommended that the government and the Central Bureau of Statistics in particular explore the possibility of carrying on along the same lines in a sustainable manner.

***Irrigation water.*** Given the importance for agriculture of irrigation and water resources, it is recommended that very clear institutional arrangements be made for the provision of information and the development of a new methodology. Any effort to precisely define and strengthen the relevance of high-quality information and of the database should be supported.

***Trade.*** The collection and publication methods of trade statistics need to be refined. Volume and value both should be precisely reported. A system should be established for data grading commodities and indicative of development. As trade data is highly manipulated, the authorities should take the necessary initiatives to make data matters transparent. As very significant volumes of valuable commodities pass unofficially through official routes as well as through unofficial ones, it is recommended that specific study of such matters be commissioned.

***Income and consumption data.*** With the globalization of trade, both income and consumption scales are changing. Patterns of consumption are also changing. However, very little information on these aspects is available. These matters need to be looked into, as such changes have a multiplier effect on agriculture, food and development. It is recommended that special studies of these factors be commissioned. Data should be available along established norms for well-defined geographic areas and planning units. Some data sets may have planning units at village level, but in most cases *ilaka* or constituency level is good enough. Data sets should be transparent, mention data collection methods and explain the limitations of the data. Free distribution of any document published by the government should be encouraged so that anyone can have access to data. Libraries should be maintained and the original volumes should be permanently archived and supplied to users against some service charge, including for electronic media.

## **7.1 Overall recommendation**

Based on the review of other people's experience and on day-to-day dealings with food policy issues, it is felt that there is a need to improve the agricultural statistics system. Creation of a high-powered body to institute a dynamic information, collection and dissemination centre for Nepalese statistics is proposed. In any case, the specific recommendations made above should be acted upon, so that problems of quality, precision and accessibility in the handling of statistics in this country may be, if not solved, at least minimized.

## LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ADB/N	Agricultural Development Bank of Nepal
AEC	Agro Enterprise Centre
AGIS	Agricultural Geographic Information System
AIC	Agricultural Input Corporation
AIS	Agricultural Information System
APCAS	Asia and the Pacific Commission on Agricultural Statistics
APP	Agricultural Perspective Plan
ASD	Agricultural Statistics Division
CLS	Crop and Livestock Survey
CBS	Central Bureau of Statistics
DADO	District Agriculture Development Office
DDC	Dairy Development Coopertation
DFAMS	Department of Food and Agricultural Marketing Services
DLDO	District Livestock Development Office
FAO	Food and Agriculture Organization
FBS	Food Balance Sheet
FIVIMS	Food Insecurity and Vulnerability Management System
GDP	Gross Domestic Product
GIS	Geographic Information System
GTZ	German Agency for Technical Cooperation
HMG/N	His Majesty's Government of Nepal
ICIMOD	International Center for Integrated Mountain Development
JT	Junior Technician
JTA	Junior Technician Assistant
MDD	Marketing Development Division
MOA	Ministry of Agriculture
MOS	Ministry of Supply
NARC	National Agricultural Research Council
NDDB	National Dairy Development Board
NFC	Nepal Food Corporation

NLSS	Nepal Living Standard Survey 1994/95
NPC	National Planning Commission
NPCS	National Planning Commission Secretariat
NRB	Nepal Rastra Bank
NSCA-91	National Sample Census of Agriculture 1991/92
VAM	Vulnerability Assessment Method
VDC	Village Development Council
WECS	Water and Energy Commission Secretariat
WFP	World Food Programme
WTO	World Trade Organization