

CHAPTER I

AGRICULTURE AND ALLIED ACTIVITIES

Coverage

1.1. The economic activities included in this sector are (i) growing of field crops, fruits, nuts, seeds and vegetables, (ii) management of tea, coffee, and rubber plantations, (iii) growing of trees on farm lands and village common lands, (iv) agricultural and horticultural services on a fee or on contract basis such as harvesting, baling and threshing, husking and shelling, preparation of tobacco for marketing, pest destroying and spraying, pruning, picking, packing and operating irrigation systems (including those operated by government) and (v) ancillary activities of the cultivators such as transportation operations¹ and activities yielding rental income from farm buildings and farm machinery and interest on agricultural loans. In India, agriculture and livestock production generally go together and it is not possible to separate the various inputs like livestock feed, repairs and maintenance costs, consumption of fixed capital etc., into those used for agricultural products and livestock production. As such breeding and rearing of animals and poultry including private veterinary services, production of milk and milk products, slaughtering, preparation and dressing of meat, production of raw hides and skins, eggs, dung, raw wool, honey and silk worm cocoons, hunting and trapping are included in the sector. Irrigation services are also included under this activity.

Methodology and Source Material

Estimates at current prices

1.2. The contribution to domestic product from agriculture, livestock and allied activities except government irrigation system is estimated by using the production approach which involves estimation of the gross value of products and by-products and ancillary activities and deduction of the value of inputs of raw materials, services and consumption of fixed capital in the process of production to obtain the net value added. For irrigation, an income approach is used and the total factor incomes generated as a result of providing the irrigation services is measured. Separate estimates of gross value of output for agricultural crops and livestock production are prepared while gross/net value

added (gva/nva) estimates are worked out for the activity as a whole.

Output from agriculture

1.3. For purposes of evaluation 68 agricultural crops including by-products are considered. These can be divided into 4 broad categories, viz., (i) 35 items of principal crops²; (ii) 10 items of minor crops³; (iii) 11 items of miscellaneous and unspecified crop groups⁴ and (iv) 12 other products and by-products⁵.

1.4. Estimates of area and outturn for principal crops are mostly based on the results of crop estimation surveys conducted annually by the State Government agencies. These are compiled and published annually by Directorate of Economics and Statistics, Ministry of Agriculture and Irrigation (DESAg) in the *Estimates of Area and Production of Principal Crops in India*. The sources of data for individual crops is at Appendix 1.1. These figures at the state level are used for the estimation of the gross value of output. In the case of sugarcane, output excluding the quantity converted into gur by the cane growers themselves through indigenous methods is taken and gur is evaluated separately. The outturn of raw cotton (kapas) is obtained by adding together statewide estimates of cotton lint and cotton seed. Since analysis of relevant data reveal that as much as 95 p. c. of kapas is ginned by factories, the value added by this processing is included in the manufacturing sector.

1.5. Ad-hoc estimates of area and outturn of minor crops (except mangoes, citrus fruits and grapes) are also published annually in the *Estimates of Area and Production of Principal Crops in India* (DESAg) with a time lag of one year. In their absence, the estimates for the current year are obtained by projecting the previous year's estimates on the basis of past trend and are revised subsequently when the data become available. In the case of tea, the estimates of output relate to production of processed tea instead of raw tea leaf. Since processing is the activity outside the scope of agriculture, and the output of raw tea leaf has

¹ To the extent the producers themselves carry their farm products to primary markets.

² Rice, wheat, jowar, bajra, barley, maize, ragi, small millets, gram, tur, urad, moong, masoor, other pulses, lined sesamum, groundnut, rapeseed and mustard, castor, coconut, sugarcane, cotton (unginned, i. e. kapas), jute, mesta, sannhemp, tobacco, dry chillies, dry ginger, black pepper, turmeric, arcanut, cardamom, potato, banana and tapioca.

³ Indigo, opium, sweet potato, cashewnut, tea, coffee, rubber, citrus fruits, grapes and mangoes.

⁴ Other cereals, other oilseeds, other sugars, other fibres, other dyes and tanning materials, other drugs and narcotics, other condiments and spices, other fruits and vegetables, fodder, miscellaneous food crops and miscellaneous non-food crops.

⁵ Gur (indigenous production only), bagasse, cotton sticks, sesamum sticks, jute sticks, arhar sticks, rice bran, rice husk, cane trash, grass, stalks and straw and farmyard wood.

Assuming that the consumption of grass per urban cattle equivalent is half of that for rural, total consumption in urban areas is estimated. The allocation of total grass consumption among the states is done in proportion to combined area under (i) permanent pastures and other grazing lands; (ii) miscellaneous tree crops and groves; (iii) culturable waste; (iv) fallow lands, and (v) net area sown, weights used for combining being 4:1:2:2:1 respectively. The annual estimates are obtained by taking into consideration the changes in the combined area figures.

1.10. The information on utilisation of cane for seeding, chewing, juice making etc., is gathered from the unpublished DMI Report on the Marketing of Gur, 1961-62 (DMI, 1962). The information on the quantity of sugarcane crushed by the factories during each year is taken from the monthly publication *Agricultural Situation in India* (DESAG). Out of the total outturn of sugarcane, the quantity of sugarcane leftover after allowing for the above uses is assumed to be converted into gur. The conversion ratios from cane to gur are taken from the periodic estimates of sugarcane released by the DESAG.

1.11. Farm yard wood comprises industrial wood and fuel wood collected by the primary producers from trees outside regular forests, e.g. trees in village commons, field ridges and fruit gardens not yielding any fruits. The estimates of production of industrial wood and fuel wood from such trees are available at the all-India level for the year 1957-58 in the *Timber Trends and Prospects in India, 1960-1975* (Ministry of Agriculture, 1962). The allocation among the States is undertaken in proportion to the total area under (i) miscellaneous tree crops and groves not included in the net area sown and (ii) fruits other than banana and grapes. The estimates for the later years are prepared by moving the bench mark year estimates by changes in the total area under these categories at the state level.

1.12. *Value of agricultural output.*—For evaluating crop outputs at the state level, crop-wise average wholesale prices prevailing in the primary markets during the peak marketing periods⁹ are used. The wholesale prices are collected by the State Agricultural and Marketing Departments and are published in the statistical supplements to the State Gazettes or in the weekly bulletins of wholesale prices [Appendix 1.2]. When not available, prices of crops collected by SSBs through their district statistical offices and by DESAG under the market intelligence scheme are utilised.

1.13. For averaging the weekly wholesale prices in the selected primary markets to obtain the State average prices, the following procedure is adopted :

- (a) arithmetic average of the prices at the various centres within a district to get the weekly district prices.
- (b) average price for a district is worked out as the arithmetic average over the peak marketing period of weekly prices obtained at (a) above.
- (c) State average price is then obtained as a weighted average of the districtwise prices derived at (b) above, weights being the districtwise outturn figures.

1.14. For all such agricultural crops for which both price and production figures are available the average prices so arrived are used along with outturn for obtaining the value of output. However, for a particular year, if the price given for a crop for any of the states is not available, the trends in prices of the crop in adjoining states is used to estimate the price in the current year. In such cases, where the State level prices are not available the estimates are prepared at the all-India level using the trend in the prices as available from the Economic Adviser's (EA's) index of wholesale prices of agricultural commodities.

1.15. For most of the minor crops and by-products the elaborate method of arriving at the state average prices cannot be followed. The source material and the method followed is different for different crops. These are as follows :

- (i) For small millets the average price at the all-India level is taken to be 75 p. c. of the weighted average price of jowar, bajra, barley, maize and ragi. This relationship between the prices of small millets and other principal crops has been obtained from the details available in the NSS Report No. 32, *Some Aspects of Cost of Cultivation* (Parts I to III), 5th to 7th Rounds : 1951-52 and 1952-53 (NSSO, 1960). The quantity of small millets is evaluated at the all-India level (except for Andhra Pradesh (A.P.) and Madhya Pradesh (M. P.) using this price. In the case of A.P. and M.P. the detailed data on production and prices are available from the respective SSBs.
- (ii) In the case of other pulses, a similar method is followed for working out the average price. It is taken as 85 p. c. of weighted average price of arhar, urad, moong and masoor. For the States of A.P., Bihar, M.P., Karnataka and Rajasthan independent data on production and prices however are available.
- (iii) For crops like banana, mango, citrus fruits and grapes since no production data at the district level are available a simple average of the district prices is taken as the State average price.

⁹ Peak marketing period is defined as the period 3 to 4 weeks post-harvest where bulk of the produce is expected to be brought to market for sale.

- (iv) In the case of arecanut, wholesale prices obtained from the Directorate of Arecanut & Spices Development are deflated by 20 p.c. to obtain the producer's prices of raw arecanut.
- (v) For opium, prices paid to the growers are obtained from the Narcotics Commissioner.
- (vi) For raw rubber, the price of sheet rubber prevailing in Kottayam market of Kerala is used after deflating by 28 p.c. on the basis of information contained in the *Plantation Enquiry Commission Report on Rubber* (Ministry of Commerce, 1956) to allow for processing, etc.

1.16. The value of unspecified crops/crop groups the outturn of which is not generally available is estimated by applying an appropriate average value of yield-per hectare to the total estimated area under each of these crop groups. The estimates of value of yield per hectare for different unspecified crops/crop groups are obtained as follows :

- (i) According to the NSS Report No. 32, *Some Aspects of Cost of Cultivation* (Parts I to III) 5th to 7th Rounds : 1951-52 and 1952-53 (NSSO 1960), the average value of yield per hectare of other cereals (other than small millets) for 1952-53 works out at 110 p.c. of the weighted average value of yield per hectare of jowar, bajra, barley, maize and ragi and of 'other oilseeds' at about 85 p.c. of the weighted average value of yield per hectare of linseed, sesamum and castor. These ratios are made use of for estimating the value of output of 'other cereals' and 'other oilseeds' in each state.
- (ii) In the case of 'other sugars', 'other fibres', 'other drugs and narcotics', 'other dyes and tanning material', and 'other condiments and spices', the average value of yield per hectare is assumed to be 90 p.c. of the value of yield per hectare of sugarcane (including gur), sannhemp (including mesta), opium, indigo and the weighted average of cardamom, dry chillies, black pepper and dry ginger respectively. For other condiments and spices, the value of yield per hectare is estimated for each state and for the states of A. P., Bihar, M. P., Orissa, T. N. and Pondicherry, the value estimates of some of the constituent items for which data are available are prepared independently and added to the

- (iii) For 'other fruits and vegetables' the average value of yield per hectare is taken to be same as the weighted average value of yield per hectre of all the specified fruits and vegetables (viz. mango, banana, citrus fruits, cashewnut, potato, sweet potato and tapioca) on the basis of details¹⁰ available. For Gujarat, separate estimates of value of yield per hectare are used for 'other fruits' and 'other vegetables' on the basis of a survey conducted by the SSB in 1967-68.
- (iv) In the case of fodder crops, the all India estimates of consumption and price per unit for the year 1955-56 as available from the NSS Report No. 65, *Tables with Notes on Animal Husbandry*, 11th Round : 1956-57 (NSSO, 1962) are used to estimate value of output in the base year. These estimates are adjusted to other years taking into consideration the year to year changes in the area under fodder and price per unit of straw.
- (v) In the case of miscellaneous food crops and miscellaneous non-food crops, the estimates of value per hectare are received from some of State Governments. For example for 1970-71, the information on value per hectare is available in respect of A. P., Assam, H. P., Punjab and U. P. for miscellaneous food crops and for A. P., Assam, Haryana, H. P., Kerala, Punjab, T. N. & U. P. for miscellaneous non-food crops. For the rest of the States all-India estimate of value of yield per hectare of miscellaneous food crops and miscellaneous non-food crops estimated at Rs. 40 per acre in 1948-49 on the basis of available reports¹¹ is projected to later years with the help of wholesale price index of agricultural commodities.
- (vi) Ex-farm prices of straw are obtained from different SSBs. For the States for which prices are not available, average prices given in NSS Report No. 32, *Some Aspects of Cost of Cultivation* (Parts I to III), 5th to 7th Rounds: 1951-52 & 1952-53 (NSSO, 1960) for the period 1951-54 are projected to later years using the price changes observed from the available data.
- (vii) For arhar and sesamum sticks and rice husk, an average price of Rs. 13.40 per tonne is assumed and in the case of cotton sticks, an average of Rs. 20.00 per tonne is adopted for all states for the year 1960-61 on the basis of information

¹⁰ Based on data obtained from various SSBs, State Agriculture Departments and a number of Agricultural Research Institutions.

¹¹ Some of the more important sources are W. Roberts : *Text Book of Punjab Agriculture*, 1947, Board of Economic Enquiry, Punjab; *Family Budgets, 1948-49 of Eighteen Cultivators in the Punjab*, 1950; Board of Economic Enquiry, East Punjab; *Farm Accounts in the East Punjab—1945-46 to 1947-48*, 1949; G. D. Agarwal : *Agricultural Credit Problem in India* (Agra University 1949); C. P. Shastri : *An Enquiry into the Costs and returns of Government Farms, Private Farms and Cultivators Holdings in the District of Meerut* (Agra University, 1950); D. S. Chauhan : *Rural Economy of India* (Agra University, 1947).

supplied by the State Agriculture Departments of Punjab and T. N. These are projected to later years on the basis of all-India index of firewood prices specially prepared by the CSO.

- (viii) State-wise prices of jute sticks obtained from the Indian Central Jute Committee for the year 1960-61 are projected to later years on the basis of changes observed in the index of fire-wood prices.
- (ix) For bagasse, the average State-wise ex-factory price for the year 1966-67, available from ASI Report (1966) is adjusted to later years on the basis of movement in the index of fire-wood prices.
- (x) For rice bran monthly prices collected from DESAg and SSBs are used.
- (xi) For cane trash, the price of fodder is adopted.
- (xii) For grass, the prices received from the SSBs of Haryana, Kerala, M. P., Punjab, Rajasthan, Delhi and Manipur are used. For other States, weighted average of prices in the available States is used, the weights being corresponding production.
- (xiii) Farmyard wood is evaluated at prices estimated independently for evaluation of forest products.

1.17. From the total gross value of output necessary deductions are made for (i) difference in price of foodgrains procured (i.e. difference in procurement and free market prices) and (ii) value added by rice milling industry. As regards adjustment for value of procured foodgrains annual data on quantities of foodgrains procured by central and state governments and the corresponding procurement prices are published annually in the *Bulletin of Food Statistics* (DESAg). The value of quantity procured is estimated using differences between the procurement price and the wholesale price during the peak marketing period and the quantities procured and the necessary adjustment made. Since the value of rice corresponds to the total production of clean rice including the quantity milled by the organised and unorganised rice mills necessary adjustment needs to be made to avoid double counting between agriculture and rice milling industry in registered and un-registered manufacturing sectors. The report on *Price Spread of Rice Studies in Costs and Margins, 1959-60* (DMI, 1961) gives statewise estimates of various components of milling charges per unit of paddy milled and proportions of paddy

milled by industry and by hand pounding are available in the *Report of Rice Milling Committee*, (Ministry of Food & Agriculture, 1955). From these data, the estimates of relevant rice milling charges for the manufacturing sector are worked out. These are adjusted for later years on the basis of all India index number of wages of rural skilled workers specially prepared by CSO.

Output from Livestock

1.18. For purposes of estimation of gross value of output, 36 livestock products¹² are divided into eight broad groups. viz. (i) milk and milk products; (ii) meat and meat products; (iii) hides and skins; (iv) eggs and poultry meat; (v) wool and hair; (vi) dung; (vii) increment in livestock and (viii) other products. In the absence of current direct information on output of various livestock products, annual production is estimated by carrying forward the benchmark estimates by changes in the number of livestock of the relevant categories. The main source of information on livestock numbers is the quinquennial Indian Livestock Censuses (ILC). The estimates for inter-censal and post-census years are arrived at on the basis of compound growth rate observed for each category between two consecutive censuses. The details of sources of data on yield rates etc. are given in Appendix 1.1.

1.19. *Milk and milk products.*—In estimating the production of bovine milk, use is made of the estimates of (i) annual number of milch animals; (ii) proportion of milch animals in milk and (iii) yield rates per animal in milk. The estimates are prepared¹³ at the state level. Statewise average yield rate of milk per animal in milk and percentage of animals in milk to total milch animals are based on latest survey results obtained from the reports of National Sample Survey Organisation (NSSO), Indian Agricultural Statistics Research Institute (IASRI formerly IARS) and Animal Husbandry Departments of States.¹⁴ As regards Jammu & Kashmir (J.&K.) and H. P., rates applicable to Punjab Hills as obtained from IASRI Survey of 1966-67 are used. For the rest of the states/union territories, for which no survey results are available, the rates finalised by the Animal Husbandry Commissioner in consultation with the State Governments are adopted.

1.20. For the estimation of goat milk, a slightly different relationship (suggested by DMI) is used¹⁵. Unpublished information on

¹² Unprocessed milk, ghee, butter, lassi, beef, buffalo meat, goat meat, mutton, pork, glands, and edible offals, heads and legs, fats, other meat products, cattle hides, buffalo hides, goat skins, sheep skins, eggs (hen and duck), other eggs, adult-fowls, adult ducks, chickens and ducklings, other poultry, wool, goat hair, camel hair, pig bristles, dung fuel, (dry) cakes, other dung, increment in stock, bones, horns and hoofs, silk worm cocoons and honey.

¹³ Annual production of milk equals number of milch animals multiplied by average annual percentage animals in milk multiplied by average daily yield of milk per animal in milk multiplied by 365.

¹⁴ A. P. (1966-67, 1975-76), Assam (1970-71, 1971-72), (1975-76), Bihar (1966-67, 1975-76), Gujarat (1963-64, 1970-71, 1973-74, 1974-75, and 1975-76), Haryana (1966-67, 1972-73, 1975-76), Karnataka (1965-66, 1975-76), Kerala (1964-65, 1975-76), M. P. (1966-67, 1971-72, 1975-76), Maharashtra (1964-65, 1970-71, 1975-76), Manipur (1975-76), Orissa (1975-76), Punjab (1966-67, 1970-71, 1975-76 and 1976-77), Rajasthan (1962-65, 1970-73, 1975-76), T.N. (1965-66, 1975-76), Tripura (1975-76), U. P. (1962-63, 1968-69, 1972-73, 1974-75, 1975-76 and 1976-77), W. B. (1975-76) and Delhi (1953-55).

¹⁵ Average annual production of goat milk equals number of milch goats multiplied by ratio of average lactational period to average calving interval multiplied by average daily yield of milk per goat in milk multiplied by 365.

the above factors is made available by the DMI for most of the states. In the case of A. P. use is made of the information on the average annual yield of milk per goat milked and the average percentage of milking goats to total female goats (over one year) from the *Ninth Quinquennial Livestock Census, 1961* (SSB, Andhra Pradesh). These figures are also adopted for Karnataka, T. N. and Pondicherry. In case of West Bengal (W. B.) the estimates of average yield of goat milk are obtained from the results of the 1961 sample survey conducted by the SSB.

1.21. The total milk produced is generally utilised by dairy farmers either in fluid form or after being converted into desi ghee¹⁶ or desi butter. The conversion of milk into curd, khoa, cream, paneer (channa) etc., is undertaken generally by non-dairy farmers though a small proportion of the activity may be undertaken by dairy farmers also. However, due to lack of available information, such activities by dairy farmers have not been separated and included in this sector. The total quantity of milk is, therefore, allocated among the three uses on the basis of the statewise (except A. P.) utilisation rates obtained from DMI in 1968 (unpublished) and estimates of ghee and butter obtained using the conversion rates of milk into ghee and butter obtained from the same source. In case of A. P. the utilisation rates collected during the ILC, 1961 are adopted.

1.22. Lassi is a by-product of ghee and butter. Its production is estimated as the difference between the total quantity of milk apportioned for conversion into ghee and butter and the quantity of ghee and butter produced. No allowance is made for evaporation of milk while estimating the quantity of lassi because sizeable quantity of water is added to it in the process of churning.

1.23. *Meat and meat products.*—The annual estimates of output of meat and meat products at the state level are prepared using data on the number of animals slaughtered and the average yield of meat for different categories of animals. The average meat yield rates by types in respect of all the states (with the exception of Haryana, T. N., U. P. and Bihar) relating to 1967-68 have been obtained from DMI in 1972. In respect of T. N. and Haryana, the source in the result of the pilot sample survey (unpublished) conducted by IASRI to estimate the production and average yield rate of meat during the year 1966-67 and 1968-69 respectively, for U. P. the sample survey conducted for estimation of production

of meat, hides and skins in 1970-71 by Animal Husbandry Department and for meat products DMI results. In the case of Bihar, the information on yield rates of meat and fats in furnished by the SSB (on the basis of a survey of recognised slaughter houses in the year 1970-71) and for other meat products the data are from DMI. In the absence of current annual data, the statewise proportions of slaughtered animals to total animal population by categories for the year 1967-68 (obtained on the basis of data supplied by DMI except for Maharashtra and Delhi for which SSBs are the sources) are assumed to remain unchanged over the years. The basic data relating to production of fats and other by-products (viz. guts, oesophagus, tail stumps, useless meat and blood) are culled from the relevant MR (DMI, 1961), and are projected to other years with the help of the estimated population of the relevant categories of livestock.

1.24. *Hides and skins.*—Hides and skins are obtained from (i) animals slaughtered for production of meat (as estimated above) and (ii) animals fallen due to natural death. Estimates of the number of animals fallen as given in the relevant MR (DMI, 1961) are projected to later years on the basis of the movement in the estimated population of animals by various categories.

1.25. *Eggs and poultry meat.*—IASRI and some of the State Animal Husbandry Departments have conducted poultry surveys in a number of States.¹⁷ Data on number of layers and yield of eggs collected in the IASRI surveys have been analysed in the article *Poultry Egg Production and its Per Capita Availability in India*¹⁸, *Indian Journal of Animal Production*, December (ICAR, 1972) with a view to preparing estimates of egg production in India at the state level. The yield rates based on these results are adopted and used for other years on the basis of number of layers extrapolated from the ILC results. These sources also give information on collection of eggs (after making allowance for wastage) and proportions of eggs available for consumption and hatching of which the details are used to estimate the number of eggs for consumption and hatching purposes. Production of poultry meat is obtained¹⁹ from the number of adult fowls and chickens slaughtered.

1.26. *Wool and hair.*—IASRI and some of the State Animal Husbandry Departments have conducted surveys²⁰ to estimate the production

¹⁶ The term "Desi" stands for ghee or butter produced out of milk within the households only.

¹⁷ IASRI Surveys relate to A.P., Haryana, Punjab and Bihar (1966-67), Gujarat (1963-64), H.P., M.P. (1968-69), Kerala, Maharashtra (1964-65), Karnataka, Rajasthan and T. N. (1965-66), U. P. (1967-68) and W. B. (1962-63). Survey conducted by State Governments relate to Assam (1971-72), Gujarat (1971-72), M.P. (1972-72), Maharashtra (1971-72) and U. P. (1971-72).

¹⁸ Murthy, V. V.R., Goel, B. B. P.S., and Rao, D. V. S. *Poultry Egg Production and its Per Capita Availability in India* (*Indian Journal of Animal Production*, December, 1972).

¹⁹ Poultry meat production equals 50 p. c. of the total adult fowls plus chickens killed. The latter is worked out as estimated number of chickens during the year plus chickens survived during the year plus 50 p. c. of adult fowls minus estimated number of total fowls of the following year.

²⁰ A. P. (1963-64), Gujarat (1964-65, 1972-73), H. P. (1962-63), Karnataka (1961-62), M. P. (1969-70), Maharashtra (1972-73), Rajasthan (1960-61) and U. P. (1969-70, 1973-74).

of wool (clipped). In these surveys information is collected on (i) the average yield rate of wool per clipping by types of sheep and (ii) the average number of clippings per type per year. These yield rates of wool (published/unpublished) and the estimated population of sheep in various years (based on ILC) are utilised to estimate the production of wool in those states where survey results are available. For the remaining states, the average yield rate of wool prevailing in the adjoining states is utilised. To this are added estimates of pulled wool prepared on the basis of data on yield rates per sheep obtained from the relevant MR (DMI, 1964). The estimates of goat hair and pig bristles are prepared on the basis of information given in the relevant MRs (DMI 1961 and 1962 respectively). As regards camel hair, similar unpublished information has been made available by the DMI for 1958-59.

1.27. *Dung*.—The estimates of dung are prepared on the basis of information (published/unpublished) on evacuation rates collected by IASRI and State Animal Husbandry Departments during their surveys on milk production.²¹ For the states, for which no survey results are available, the rates pertaining to adjoining states are adopted. The statewide production of dung thus estimated is classified into (i) dung used as manure and cleaning, etc., and (ii) dung used as fuel, the proportions of utilisation rates having been supplied by IASRI in 1972. The quantity of dry dung cake is taken as 40 p. c. of green dung.

1.28. *Increment in stock*.—The annual net increase in the population in each state is estimated separately for each category of livestock on the basis of the projected population (based on ILC).

1.29. *Other products*.—The other products of animal husbandry are bones, horns, hoofs, silk worm cocoons and honey. The yield rates of bones per animal of each type and of horns and hoofs are taken from the relevant marketing reports (DMI, 1957) and (DMI, 1961) respectively. The outturn estimates are worked out for each category of animals by applying the statewide average yield rates on the estimated annual number of slaughtered and fallen animals. The annual outturn estimates (unpublished) of silk worm cocoons by type (viz. mulberry, tasar, ericut and muga) and honey are obtained from the Central Silk Board, Bombay and Khadi and Village Industries Commission, Bombay respectively.

1.30. *Value of livestock output*.—The prices of livestock products are obtained from the same sources as those for agricultural commodities [Appendix 1.2]. Wherever possible, special returns are obtained from SSBs to ensure a reasonable coverage of statewide prices of

important livestock/livestock products. The statewide prices are worked out as the simple arithmetic average of all available price observations. As in the case of agriculture, in case in any year price of a product is not available for a given state, the price trend/actual price prevailing in an adjoining state is adopted. Since these wholesale prices relate mostly to urban centres, these are adjusted to conform to the rural prices using the urban/rural price differentials worked out from the data on retail prices in urban and rural areas for milk, mutton, goat flesh and eggs collected during 5th Round: 1952-53, 6th Round: 1953 and 7th Round: 1953-54 of the NSS.

1.31. The wholesale prices thus estimated are further adjusted for gross trade margins to obtain the producers' prices. For trade margins, use is made of the relevant MRs on various livestock products released from time to time, and of the trade margins presented in an unpublished paper, 'A Note on Urban Distributive Margins', (Indian Statistical Institute). The price differentials and the trade margins used for adjusting are given in Appendix 1.3. No adjustment has, however, been made on this score in the prices of milk and meat except for Maharashtra as these commodities are generally sold by the producers themselves. Further, the services of the petty collectors²² of milk are considered as an ancillary activity in this sector.

1.32. *Value of output from hunting and trapping*.—The estimates of value of output from hunting and trapping are prepared on the basis of partial (unpublished) data available in respect of (i) the number of animals killed or caught by important species and (ii) approximate prices of different kinds of animals and furs, obtained from DESAg and Forest Research Institute and Colleges, Dehra Dun respectively.

Inputs

1.33. To arrive at the gross value added (gva) from agriculture, livestock, hunting and trapping, necessary deductions are made from the value of output for the current cost of inputs in the shape of (i) seed; (ii) manure (chemical fertilisers and organic manure); (iii) current repairs and maintenance of fixed assets and operational costs; (iv) livestock feed; (v) irrigation charges (payable to government); (vi) market charges; (vii) electricity; (viii) pesticides and insecticides; and (ix) diesel oil. Detailed sources for information on quantity & prices for each item of input are at Appendices 1.1 and 1.2 respectively.

1.34. *Cost of seed*.—The quantity of seed used as input is estimated on the basis of seed rates as available from the NSS Report No. 32. Some Aspects of Cost of Cultivation (Parts I to III), 5th to 7th Rounds: 1951-52 to 1952-53 (NSSO, 1960), MRs, various studies on cost of

²¹ A. P. (1966-67), Assam (1970-71, 1971-72), Bihar (1966-67), Gujarat (1963-64, 1970-71), Haryana (1966-67), Kerala (1964-65), M. P. (1965-66), Maharashtra (1964-65, 1970-71), Karnataka (1965-66), Punjab (1966-67), Rajasthan (1962-65), T. N. (1965-66), U. P. (1962-63, 1968-69, 1972-73) and H. P. (1968-69).

²² Some quantity of milk is purchased by the milk collectors from the producers in small quantities and sold to consumers in rural and urban areas.

cultivation by DESAg and information supplied by State Governments.²³ To the extent information on per acre quantity of seed used is not available from state governments/MRs, NSS data (available at zonal level only) are used on the assumption that the zonal rates hold true for each individual state within a zone. For most of the principal crops and some minor crops, the MRs contain data on the quantity of seed required per acre which are directly used for such purposes.

1.35. *Cost of manure.*—Input of both inorganic manure (e.g. ammonium sulphate, superphosphate and urea) and organic manure (e.g. compost, farm-yard manure, dung manure) are considered. Statewise data on the actual off-take (in physical terms) and prices of various types of chemical fertilisers as published annually in *Fertiliser Statistics* (Fertiliser Association of India) are used to estimate the value of consumption. The estimates of organic manure are based on data given in reports of Farm Management Studies released by DESAg from time to time. Wherever necessary, information is supplemented by data given in the NSS Report No. 140, *Tables with Notes on Some Aspects of Agriculture in India (Rural)*, 11th Round: 1956-57 (NSSO, 1969). The base year estimates in such cases are projected to later years on the basis of changes in gross area sown in each state.

1.36. *Cost of livestock feed.*—Cost of feed of animals used in agricultural activities is estimated as a proportion of the total feed cost of the entire population. For distributing the total cost between agricultural and non-agricultural sectors, the respective number of animals under each of these categories are converted into cattle equivalents and the proportions worked out. The total urban working population of cattle and buffaloes and the entire population of horses, ponies, donkeys, mules and camels are treated as non-agricultural for the purpose.

1.37. Items of feed considered are roughages (green and dry), concentrates (grains, cotton seed and oilcakes) and salt, medicines and miscellaneous feed. The entire value of fodder, cane trash and grass and 95 p.c. of the value of stalks and straw are assumed to go towards the feed of livestock population. The information on percentage of each of the cereals fed to cattle²⁴ is obtained from the *Population and Food Planning in India* (Baljit Singh, 1947). In the case of gram, its consumption for cattle feed is worked out at all-India level on the basis of data given in the NSS Report No. 65, *Tables with Notes on Animal Husbandry* 11th Round: 1956-57 (NSSO 1962). The entire value of rice bran is taken to be consumed as livestock feed. The cost of oil-cakes feed to cattle is estimated on the basis of information given in the *Oilseeds in India, 1954-55*, (DESAg 1955) and in the case of cotton seed at all India level about 85 p. c.²⁵ of total production is taken to be consumed as cattle feed. The expenditure on salt, medicines and miscellaneous feed is estimated at Rs. 1.62 per cattle equivalent for 1955-56 on the basis of data given in the NSS Report No. 65, *Tables with Notes on Animal Husbandry* 11th Round : 1956-57 (NSSO, 1962), and moved to later years on the basis of index number of wholesale price of salt (EA).

1.38. *Irrigation charges.*—Annual data on irrigation charges payable to government in lieu of water supplied to producers from government owned canals and other means of irrigation are culled out from state budgets.

1.39. *Market charges.*—The estimates of marketing charges are prepared separately for agriculture and livestock production. Data on marketing charges of agricultural products covering transport charges for marketing, sale commissions, storage and other marketing costs available from *All-India Rural Credit Survey, 1951-52* (RBI, 1954) are utilised to estimate total market charges for the year 1951-52. The

²³ The crops covered by the studies on cost of cultivation are; paddy (A. P., Assam, Bihar, Karnataka, M. P., Orissa, T. N., U. P. and W. B.); wheat (Haryana, M. P., H. P., Punjab, Rajasthan and U. P.); jowar (Karnataka, Maharashtra, M. P.); bajra (Haryana, Rajasthan, Gujarat); maize (H. P., Rajasthan); gram (Haryana); groundnut (Gujarat, T. N., Karnataka and Orissa); sugarcane (Punjab, T. N., Bihar and U. P.); and cotton (Gujarat, Haryana, Punjab, Karnataka and T. N.). The cropwise data supplied by some of the State Government have also been used. The States/crops covered are : A. P. (jowar, bajra & maize); Assam (maize, arhar, urid, moong and rapeseed and mustard); Bihar (wheat, jowar, bajra, maize, gram, arhar, moong, linseed, sesamum, groundnut, rapeseed and mustard, castor, potato and cotton); Gujarat (paddy, wheat and jowar), Haryana (moong and potato); Karnataka (wheat, bajra, maize, ragi, gram, arhar, urid, moong, sugarcane and potato); Kerala (paddy, arhar, urid, moong, sesamum and groundnut); M. P. (wheat, bajra, maize, barley, ragi, arhar, urid, moong, linseed, sesamum, groundnut, rapeseed, and mustard, castor and potato); Maharashtra (paddy, wheat, bajra, maize, ragi, gram, arhar, moong, linseed and sesamum); Manipur (paddy, wheat, maize, rapeseed and mustard, castor and potato); Orissa (wheat, jowar, bajra, maize, ragi, gram, arhar, urid, moong, linseed, sesamum, rapeseed and mustard, castor and potato); Punjab (jowar, bajra, maize, barley, gram, groundnut, rapeseed and mustard); Rajasthan (jowar, barley, gram, linseed, sesamum, groundnut, rapeseed & mustard and cotton); T. N. (jowar, bajra, maize, ragi, gram, urid, sesamum and castor); U. P. (bajra, maize, gram, urid, sesamum, groundnut, rapeseed and mustard, castor and potato); W. B. (wheat, maize, barley, gram, urid, moong, sesamum, rapeseed and mustard); Delhi (paddy); Goa, Daman & Diu (paddy).

DMI data contained in the respective marketing report of the crop viz., rice, wheat, barley, maize, gram, arhar, urid, moong, linseed, sesamum, groundnut, rapeseed and mustard, castor, potato and sugarcane have also been used for some of the States.

²⁴ (a) rice and wheat (1 p.c.), (b) jowar, bajra, barley, maize, ragi and other cereals (2 p.c.) and (c) small millets (5 p.c.).

²⁵ Total production of cotton seed is adjusted for the quantity used in organised manufacturing industries to obtain the proportion of 85% in the year 1961.

ratio of market charges to the gross value of output for the year 1951-52 is assumed to remain constant over years and annual expenditure on market charges estimated. Market charges for sale of ghee, butter and meat are estimated for bench mark years using the information available in the *MR on Milk and Butter* (DMI, 1957) and the *MR on Meat* (DMI, 1955). Charges for marketing of meat are available in terms of per animal slaughtered. Total market charges are estimated using this information and the number of animals slaughtered in the slaughter houses. As in case of agricultural products, the percentage of such expenses to the value of output is assumed to remain unchanged to obtain the estimates for the subsequent years.

1.40. *Cost of electricity*.—Data on quantity consumed and price per unit of electricity utilised for agricultural purposes are obtained from the Central Electricity Authority (CEA) to estimate the total expenditure on this item.

1.41. *Cost of pesticides and insecticides*.—Annual data on value of consumption of pesticides and insecticides for agriculture at the all-India level are available from the Pesticides Association of India. Statewise allocation is made using the proportions of consumption in 1972-73 for which year statewise data were specially collected by the Association.

1.42. *Cost of diesel oil*.—Annual statewise consumption of diesel oil is estimated separately for tractors and diesel engines on the basis of information on consumption per unit and the number of units, obtained from the State governments. Consumption of diesel oil per unit per annum is worked out from the information on average consumption of diesel oil per hour per unit, average number of working hours per day, and average working days per annum. The number of tractors registered with the state transport authorities available for most of the states and the annual number of diesel engines estimated from ILC data alongwith retail prices of diesel oil supplied by the Indian Oil Corporation are used to estimate the total cost.

1.43. *Operational cost of livestock products*.—The operational costs cover current expenditure on production of ghee and butter, milk, hides and skins, eggs and poultry, wool and hair, honey and silk worm cocoons. Based on the limited data available on such expenditures, operational costs of production of ghee and butter are taken to be Rs. 267.92 per tonne and that of other products, namely, milk, hides and skins, eggs and poultry, wool and hair, honey and silk worm cocoons at 0.25 p.c. of the value of output.

1.44. *Current expenditure on repairs & maintenance and consumption of fixed capital*.—Fixed assets employed in the sector for production are classified into (i) agricultural implements, machinery and transport equipment, (ii) farm houses, barns (grain golas) and cattle sheds, (iii) orchards and plantations, (iv) bunding and other land improvements, (v) wells, (vi) other

irrigation resources, (vii) other assets not elsewhere classified, and (viii) meant stalls.

1.45. The estimates of expenditures on current repairs and maintenance and consumption of fixed capital are prepared for all the above categories of assets (except meat stalls) using the corresponding data for 1971-72, available from the RBI Reports *All India Debt and Investment Survey* (AIDIS, 1971-72)—*Statistical Tables Relating to Capital Expenditure and Capital Formation of Rural Households During the Year Ended 30th June, 1972, and Assets and Liabilities of Rural Households as on 30th June, 1971* (RBI, 1977), annual independent estimates of net capital formation for other years and indices of annual price change. The estimate for agricultural implements, machinery and transport equipment obtained from AIDIS cover rural areas only and data for urban areas are still to be released. These estimates have therefore been adjusted to account for expenditure on such implements etc., in urban areas. The adjustment has been made on the basis of the proportion of these assets in rural and urban areas (urban 3.1 p.c. of rural) as available from the results of ILC, 1972 which give break up of agricultural implements between rural and urban areas. The reports of AIDIS give figures of capital stock, capital expenditure, repairs and replacements and major alterations and additions during 1971-72 under different categories of assets. These figures are first converted to 1970-71 prices using relevant price indices for each of the categories of fixed assets. The estimates of capital stock for other years at 1970-71 prices are then prepared using the perpetual inventory method, i.e. addition of annual figures of net capital formation at 1970-71 prices to the previous year-end figures of capital stock to obtain the corresponding estimates at the end of the year.

1.46. Based on the rough proportions supplied by RBI for AIRDIS, 1961-62 results, repairs and maintenance in the base year 1971-72 is assumed to be one-third of the total expenditure on 'repairs and replacements' as available from AIDIS. The proportion of expenditure on current repairs and maintenance thus obtained to the value of capital stock in 1971-72 is then worked out. This proportion in the base year is assumed to remain unchanged over time and the costs of repairs and maintenance for agricultural machinery and implements, farm houses, grain golas, cattle sheds, etc., are first estimated at 1970-71 prices using the proportions and then adjusted for price changes to obtain the corresponding estimates at current prices.

1.47. In the case of machinery and equipment, consumption of fixed capital is estimated at 11 p.c. of the value of stock of such assets. In case of farm houses, grain golas etc., the rate of consumption of fixed capital is taken to be 2 p.c. of the value of capital stock. These proportions are based on the age structure of the assets, the details of which have been obtained from a few SSBs.

1.48. In the case of all other construction works also the point estimates of repairs and maintenance and consumption of fixed capital are based on the results of AIDIS and expenditure on repairs and maintenance is taken to be one-third of the total expenditure on repairs and replacement of such assets (available from AIDIS). Consumption of fixed capital is, however, estimated as the sum of expenditure on replacements of such assets, i.e. two-thirds of total 'repairs and replacement' available in AIDIS, and expenditure on major alterations in case of bunding and other land improvements, wells and other irrigation resources. In the absence of data on capital stock for these categories of assets in AIDIS, expenditures on repairs and maintenance and consumption of fixed capital for other years are estimated by moving the point estimates by using relevant indicators. In the case of repairs and maintenance, the point estimate is moved with the help of constant price value added in unorganised sectors, (i.e., agriculture, unregistered manufacturing, unorganised transport and other services). In the case of consumption of fixed capital, 10 p.c. of annual net capital formation in other construction works in agriculture is added to the previous year's estimate (beginning with the 1971-72 estimates) to obtain the corresponding annual estimates for other years. This approach is on the assumption that, on an average, the life of other construction works is 10 years.

1.49. For adjustment of the values of capital stock, to obtain the corresponding estimates for 1971-72 at 1970-71 prices as well as for obtaining the estimates at current prices in different years, different price indices according to the type of capital assets have been used. These are as follows :—

- (i) agricultural implements and machinery; EA's index of wholesale price of non-electrical machinery.
- (ii) farm houses, grain golas etc.; cost of construction of rural building.
- (iii) other construction works; a specially prepared composite index of cost of construction work.

1.50. In the case of repairs and maintenance of agricultural implements and machinery the price adjustment is made using the wage index of rural skilled workers.

1.51. The consumption of fixed capital for meat stalls is estimated arbitrarily as 20 p.c. of the rental value of meat stalls available from MR on Meat (DMI, 1955). This is moved to other years on the basis of data on the number of slaughtered animals and an index number of wages of rural skilled workers.

1.52. In respect of the activity of hunting and trapping of animals, the consumption of fixed capital is arbitrarily assumed to be Rs. 1 lakh per annum.

1.53. The total estimates of consumption of fixed capital for the entire sector are obtained as

the sum of the estimates for the above categories and the consumption of fixed capital in respect of government irrigation system.

Gross value added

1.54. The estimate of gross value added is arrived at by deducting from the value of output of the sector (agriculture, livestock, hunting and trapping) the estimated total value of inputs used in production. Since the operation of government irrigation system is also an activity to be accounted for in the agriculture sector, the gross value added from such services is added to obtain the corresponding total for the sector. The gva from the operation of government irrigation system is obtained by the income method as the sum of compensation of employees, interest payments, operating surplus and maintenance provisions, the details of which are available from the central and state government budgets. The estimate of gross value added is then netted for consumption of fixed capital to obtain the corresponding net value added.

Estimates at constant prices

1.55. For estimation of value added at constant prices, the double deflation method is used and both the value of output of each crop, their by-products and livestock products, and the cost of inputs are evaluated at 1970-71 prices. In a given year the state average price, value of yield per hectare and value per unit of yield per livestock products, in the base year (1970-71) are used and a method similar to that at current prices is followed to obtain the value of output at constant prices. In the case of hunting and trapping, due to non-availability of any data on physical outturn, the current price estimates are adopted for constant prices also.

1.56. The estimates of cost of each item of input are prepared using base year's prices. However, in the case of pesticides and insecticides for which only value estimates are available, the estimates at 1970-71 prices are arrived at by deflating the current price estimates using the EA's index number of wholesale prices of pesticides. For irrigation charges, no adjustment for price changes is made.

1.57. In the case of government irrigation system, the wages and salaries of the staff are adjusted on the basis of changes in the area under irrigation for government canals to obtain the corresponding constant price estimates. For interest, surplus and depreciation provision, current price estimates are adopted without adjustment.

1.58. The method followed for estimation of consumption of fixed capital at 1970-71 prices has already been dealt with while discussing preparation of the estimates at current prices. For agricultural implements, machinery, etc., and farm buildings the estimates are prepared by taking the constant price estimates of capital stock and using the same percentage of consumption of fixed capital. For other construction works, the AIDIS estimates of 1971-72 are adjusted to

1970-71 price using a specially prepared index of cost of other construction works and the estimates for the base year are moved to subsequent years by adding 10 p.c. of the estimates of net capital formation at 1970-71 prices during the year to the estimates of consumption of fixed capital of previous year. For meat stalls, the estimates of consumption of fixed capital in 1970-71 are moved to the other years on the basis of the number of animals slaughtered.

1.59. To arrive at the estimates of net value added, the estimates of consumption of fixed capital at 1970-71 prices are subtracted from the estimates of gross value added.

Reliability, Objectivity and Current Status of Data

Agriculture

1.60. For building up the estimates of value of output in this sector the principal sources of information on production are (i) land utilisation statistics, (ii) periodic estimates of area and production of principal crops, (iii) marketing reports on various farm products, and (iv) data on prices.

1.61. The statistics of land utilisation flows as a by-product of administrative activity of state revenue departments. A regular reporting agency maintaining records of area statistics on a complete enumeration basis exists for about 76.5 p.c. of total geographical area. About 5 p.c. of the total area is covered by sample surveys. Statistics based on conventional methods are available for about 12 p.c. of the total area while the statistics for the remaining 6.5 p.c. of the area are not available. DESAg releases the land use statistics in their annual publication *Indian Agricultural Statistics* based upon data collected from state governments. The time lag for this publication is about 5-6 years. Pending its publication DESAg released estimates of area in mimeographed form in 'Area under crops', 'Classification of area and irrigated area', and 'Area irrigated-sourcewise and cropwise'. However, there is a time lag of about 3 years in the availability of these data.

1.62. Periodic estimates of outturn of 35 principal crops based on the average yield rates obtained through random crop cutting surveys are issued by the DESAg in the form of 'Forecast Reports' which contain data on final forecast and fully revised estimates. The estimates of final forecast become available normally 4-6 months after the close of the agricultural year. The fully revised estimates become available after about 1-1½ years for most of the States. However, in respect of some of the States like Gujarat and Karnataka the time lag is much larger (about 2-4 years). Prior to the release of final forecast reports, DESAg also publishes first and second forecast reports which provide rough information on the area sown under these crops at different points of time. The estimates of yield rates of all principal crops are based on crop cutting experiments. The scope of such experiments has increased considerably over

time. Appendix 1.4 presents the position regarding area and outturn covered by such experiments for different crops for the years 1960-61, 1970-71 and 1976-77.

1.63. In the case of minor crops like indigo, opium and cashewnut etc., the yield estimates are based on traditional methods and are therefore questionable. No forecast is issued in respect of these crops. For some of the minor crops viz., mango, citrus fruits and grapes even such estimates are not available. In view of importance of these crops in individual states, use of scientific methods for estimation of their annual outputs is essential.

1.64. For the unspecified crops only the area figures are available on an annual basis. The value of output of these crops/crop groups is, therefore, estimated on the basis of area and output of related major crops/crop groups. The estimate for these crops/crop groups are therefore comparatively much less reliable.

1.65. DMI conducts ad hoc trade enquiries to collect data on area, outturn, quantity marketed, etc., and publishes these data in the form of marketing reports on various farm and livestock products. The collection of these data is generally not in a very planned and objective manner. Since the data are collected through trade enquiries, the estimates based on these results are not considered sufficiently reliable and as such only restricted use of these data is made. In the absence of any other data on production estimates of mango, citrus fruits and grapes, the yield rates for most of the states given in the DMI reports are used to frame the production estimates.

1.66. The production estimates of plantation crops like tea, coffee and rubber are obtained by DESAg from the respective boards and are considered to be not very reliable as these are prepared on the basis of returns received from growers. In respect of tea, however, the data relate to processed tea. The output of raw tea leaf is taken to be equivalent to input of raw tea in the manufacturing industries and might, therefore, suffer from incomplete coverage.

1.67. Data on both wholesale and retail prices of agricultural commodities are collected by DESAg, State agriculture departments, Indian Labour Bureau (ILB) and NSSO. The weekly wholesale price data collected by DESAg/State governments under Market Intelligence Scheme cover all important mandis in rural and urban areas. The prices collected by DESAg become available with the time lag of about 1-2 months only while prices collected by the State governments become available with a time lag of about 1-3 years. These prices cover about 90 p.c. of the output of important crops and are of reasonable quality. Farm harvest prices are also collected by DESAg in respect of 23 crops for most of the States covering about 80 p.c. of the output of important crops.

1.68. The farm output should conceptually be evaluated at the price which accrues to the

producer at the first point of transaction. In practice, however, this is not possible as the producer disposes the produce at different stages. The more important of these are (i) sales at village farm site, (ii) sales at nearby and distant markets at different time points, and (iii) retentions for consumption and other uses like seed, feed, etc., in the producer households. The ideal way would be to evaluate transactions at each stage of disposal, at the corresponding price but little information is available to make this possible. Studies, however, show that the disposal of produce by producer households is largely in the primary markets. Statewise data on weekly prices covering large number of crops as well as markets are generally available with a reasonable time lag. Evaluation of output at State average prices worked out as a weighted average of district level prices during peak marketing period is therefore considered to be most satisfactory under the present circumstances.

Livestock and livestock products

1.69. The main sources of information used for building up estimates of output of livestock and livestock products are (i) quinquennial livestock censuses, (ii) ad hoc surveys conducted by IASRI and State Governments, DMI marketing reports and (iii) published and unpublished data on prices.

1.70. Quinquennial livestock census (ILS) is the main source of data on livestock. This provides age-wise and sex-wise data at the district level on a number of different categories of animals separately for urban and rural areas.

1.71. Surveys conducted by IASRI and state governments and the trade enquiries of the DMI form the main source of data on yield rates of the livestock products. Statewise estimates of yield rates of milk, wool and egg are available from ad hoc surveys conducted by IASRI and also by the state governments. These surveys are conducted in an objective manner and provide sufficiently reliable estimates of yield rates, though these refer to different time periods in different studies. Estimates of yield rates of some of the livestock products like meat, hides and skins, etc., are generally obtained from DMI. Although DMI enquiries lack comprehensiveness and objectivity their estimates are used in the absence of better alternatives. The main limitation of data on livestock products is the non-availability of information on either population or yield rates on an annual basis to enable realistic measurement of annual changes in output.

Inputs

1.72. Main sources of data used are (i) NSS and DMI reports and surveys, (ii) Data collected by DESAg under Farm Management studies and Cost of Cultivation Studies, (iii) data collected by other agencies, like State agricultural departments, and (iv) Reserve Bank of India.

1.73. The NSS Report No. 32, *Some Aspects of Cost of Cultivation* (Parts I to III) 5th to 7th Rounds: 1951-52 & 1952-53 (NSSO, 1960), the NSS Report No. 65, *Tables with Notes on Animal Husbandry*. 11th Round: 1956-57, (NSSO, 1962) and the NSS Report No. 140, *Some Aspects of Agriculture*, 11th Round: 1956-57 (NSSO, 1969), coupled with the results of ad hoc enquiries of DMI and State Governments form the main source of data in this respect. Whereas the NSS reports refer to distant past years and provide data at best at zonal levels, the results of DMI are not based on scientific enquiries. The data collected under the studies conducted by some of the State Governments and Programme Evaluation Organisation provide information on specific local problems only.

1.74. The use of farm management studies of DESAg which are conducted in all the States except J. & K. and Nagaland from time to time is very restricted because of their coverage and since the data on inputs are available in current value terms with differing reference periods. In 1968, a comprehensive scheme for the study of cost of cultivation of principal crops in India, was launched by DESAg. The scheme envisaged among other things collection of data on inputs and outputs of principal crops. The scheme is under operation in most of the States and it is expected that satisfactory upto-date statewise and cropwise data on inputs would eventually become available on a regular basis.

1.75. The data on consumption of inorganic manure are not available, and the information on distribution of inorganic manure as available annually from the *Fertiliser Statistics* (Fertiliser Association of India) is used. For satisfactory measurement it is necessary that the actual data on consumption become available.

1.76. RBI surveys on Debt and Investment of Households form the main source of information for preparing estimates of repair and maintenance, consumption of fixed capital and marketing charges. These surveys are, however, conducted once every ten years and the preparation of the annual estimates is naturally handicapped due to the non-availability of satisfactory annual indicators.

APPENDIX 1.1 : AGRICULTURE AND ALLIED ACTIVITIES : SOURCE FOR DATA ON PRODUCTION AND INPUTS

item	source
1. principal crops ² and indigo, opium, sweet potato, cashew nut, tea, coffee and rubber	<i>Estimates of Area and Production of Principal Crops in India (DESAg).</i>
2. cashewnut	Directorate of Cashewnut, Cochin.
3. tea	ASI, <i>Tea Statistics</i> (Tea Board).
4. mango, citrus fruits and grapes	Marketing Reports (DMI), <i>Indian Agricultural Statistics (DESAg).</i>
5. miscellaneous unspecified crops ⁴	<i>Indian Agricultural Statistics (DESAg).</i>
6. stalks and straw	NSS Report No. 32, <i>Some Aspects of Cost of Cultivation of different Crops, 5th to 7th Rounds: 1951-52 and 1952-53</i> (NSSO, 1960) (Part I to III), NSS Report No. 65, <i>Tables with Note on Animal Husbandry, 11th Round: 1956-57</i> (NSSO, 1962), SSBs.
7. sticks (arhar, sesamum and cotton).	State Agriculture Departments.
8. jute sticks	Indian Central Jute Committee.
9. bran and husk	<i>Report on the Marketing of Rice in India, 1955</i> (DMI).
10. sugarcane (crushed)	<i>Agricultural Situation in India (DESAg).</i>
11. sugarcane (for seeding, chewing, juice making etc.)	Marketing of Gur, 1961-62 unpublished (DMI, 1962).
12. cane trash	<i>Fertiliser Statistics</i> (Fertiliser Association of India).
13. grass	NSS Report No. 65, <i>Tables with Notes on Animal Husbandry, 11th Round: 1956-57</i> (NSSO, 1962).
14. Industrial and fuel wood	<i>Timber Trends and Prospects in India, 1960-75 (Ministry of Agriculture, 1962).</i>
15. lemon grass oil	SSB, Kerala.
16. food grains procured by govts.	<i>Bulletin of Food Statistics (DESAg).</i>
17. proportion of paddy milled.	<i>Report of Rice Milling Committee</i> (Ministry of Food and Agriculture, 1955).
18. livestock (numbers)	<i>Quinquennial Livestock Censuses.</i>
19. yield of milk	Institute of Agricultural Research Statistics (IARS); Animal Husbandry Depts. of States; <i>Ninth Quinquennial Livestock Census, 1961</i> (SSB, A.P.); Sample Survey by SSB (W.B).
20. Utilisation rates (milk)	DMI ; SSBs; ILC (1961).
21. yield rate (meat)	DMI ; IASRI; Animal Husbandry Deptt. (U.P.); SSB (Bihar).
22. slaughtered animals	DMI (1967-68); SSB (Maharashtra, Delhi).
23. hides and skins	DMI.
24. eggs and poultry meat.	IASRI; Poultry Egg Production and its per capita availability in <i>Indian Journal of Animal Production, Dec. (ICAR, 1972)</i> ; ILC, Animal Husbandry Departments of some States.
25. wool and hair	IARS; Animal Husbandry Deptts. of some States; ILC; DMI (1961-62, 64); DMI (1958-59 unpublished).
26. dung	IASRI; Animal Husbandry Deptts. of some States.
27. increment in livestock	ILC.
28. other livestock products	DMI (1957, 61).
29. silk worm cocoons and honey.	Central Silk Board; Khadi and Village Industries Commission.
30. hunting and trapping	DESAg; Forest Research Institute and Colleges, Dehra Dun.
31. seed rates	NSS Report No. 32; Marketing Reports (DMI); Studies on Cost of Cultivation (DESAg) State Govt.
32. manure	<i>Fertiliser Statistics; Farm Management Studies (DESAg)</i> ; NSS Report No. 140, <i>Tables with Notes on Some Aspects of Agriculture in India (rural), 11th Round: 1956-57</i> (NSSO 1969).

APPENDIX 1.1 : Contd.

item	source
33. diesel oil	ILC, SSBs.
34. Electricity	Central Electricity Authority.
35. irrigation charges	Budget documents.
36. repairs & maintenance	<i>All India Debt and Investment Survey- 1971-72</i> (RBI) AIDIS, 1971-72, NSS Report No. 136, <i>Tables with Notes on Capital Formation</i> (Urban) 17th Round, 1961-62, (NSSO, 1968).
37. consumption of fixed capital	AIDIS, 1971-72; SSBs, ILC, NSS Report No. 136, <i>Tables with Notes on Capital Formation</i> (urban), 17th Round: 1961-62 (NSSO, 1968).
38. pesticides	Fertiliser Association of India.
39. cost of livestock feed	<i>Population and Food Planning in India</i> (Baljit Singh, 1947) (for percentage of each cereal fed to cattle), NSS Report No. 65, <i>Tables with Notes on Animal Husbandry</i> , 11th Round: 1956-57 (NSSO, 1962); DMI; <i>Oilseeds in India</i> , 1954-55, (DESAg, 1955); ILC.

NOTE : For footnotes see corresponding footnotes on page 3.

APPENDIX 1.2 : AGRICULTURE AND ALLIED ACTIVITIES: SOURCES OF DATA ON PRICES OF OUTPUTS AND INPUTS

item	source
1. individual crops (for output and input as seed).	Weekly bulletins of wholesale prices (statistical supplements to State gazettes); DESAg; SSBs.
2. small millets, pulses etc. (individual prices not available).	Same as (1) above and NSS Report No. 32.
3. arecanut	Indian Central Arecanut Committee.
4. rubber	Market prices (Kerala); Plantation Enquiry Commission Report on Rubber.
5. lemon grass oil	SSB, Kerala.
6. Fodder crops	NSS Report No. 32, <i>Some Aspects of Costs of Cultivation</i> (Parts I to III), 5th to 7th Round: 1951-52 & 1952-53 (NSSO, 1960).
7. Straw	SSBs.
8. cotton sticks	State Agriculture Deptt. (Punjab and TN).
9. jute sticks	Indian Central Jute Committee.
10. bagasse	ASI (1966).
11. rice bran	DESAg ; SSBs.
12. grass	SSBs (Haryana, Kerala, M.P., Punjab, Rajsthan, Delhi & Manipur) .
13. livestock products	Same as (1) above and <i>A Note on Urban Distribution on Margins</i> (Indian Statistical Institute, unpublished); DMI (1961); Central Silk Board; Khadi and Village Industries Commission.
14. procurement price	<i>Bulletin of Food Statistics</i> .
15. hunting and trapping	DESAg; Forest Research Institute and Colleges, Dehra Dun.
16. rice milling charges	<i>Price Spread of Rice Studies in Costs and Margins</i> , 1959-60 (DMI, 1961)
17. manure	<i>Fertiliser Statistics</i> ; Farm Management Studies by DESAg; NSS Report No. 140; SSBs.
18. cost of repairs and maintenance.	<i>All India Debt and Investment Survey</i> , 1971-72 (RBI, AIDIS); NSS Report No. 136 <i>Tables with Notes on Capital Formation</i> (urban) 17th Round: 1961-62 (NSSO, 1968)
19. cost of livestock feed	<i>Population and Food Planning in India</i> (Baljit Singh, 1947) (for percentage of each cereal fed to cattle); NSS Report No. 65, <i>Tables with Notes on Animal Husbandry</i> , 11th round: 1956-57 (NSSO, 1962); DMI; <i>Oilseeds in India</i> , 1954-55 (DESAg, 1955) ILC.
20. market charges	<i>Rural credit Survey</i> , 1951-52 (RBI, 1954) <i>Marketing Report on Meat</i> (DMI, 1955) ; <i>Marketing Report on Milk and Butter</i> (DMI, 1957).
21. electricity charges	Central Electricity Authority.
22. cost of pesticides and insecticides.	Pesticides Association of India.
23. cost of diesel oil	State govts; ILC; Indian oil Corporation.
24. consumption of fixed capital.	AIDIS, 1971-72; SSBs; ILC; NSS Report No. 136, <i>Tables with Notes on Capital Formation</i> (Urban), 17th Round : 1961-62 (NSSO, 1968).

APPENDIX I.3

A—STATEWISE PRICE DIFFERENTIALS AND TRADE MARGINS FOR MILK AND GHEE/BUTTER

State	rural price as percent of urban price of milk	percentage share of producer in wholesale price of ghee/butter
(1)	(2)	(3)
1. Andhra Pradesh	79	94
2. Assam	86	91
3. Bihar	67	91
4. Gujarat	83	94
5. Jammu and Kashmir	82	91
6. Karnataka	79	86
7. Kerala	79	90
8. Madhya Pradesh	77	94
9. Tamil Nadu	79	90
10. Maharashtra	83	94
11. Orissa	69	94
12. Punjab	85	96
13. Rajasthan	80	94
14. Uttar Pradesh	83	94
15. West Bengal	69	91
16. Delhi	84	94
17. Himachal Pradesh	84	91
18. Manipur	63	83
19. Tripura	69	83
20. A. & N. Islands	69	90

B—PRICE DIFFERENTIALS AND TRADE MARGINS FOR LIVESTOCK PRODUCTS OTHER THAN MILK AND GHEE/BUTTER: ALL INDIA

item	rural price as percent of urban price	percentage share of producer in wholesale price
(1)	(2)	(3)
1. meat	84	100*
2. other meat products	—	90
3. eggs	85	90
4. hides and skins	—	90
5. poultry	—	95
6. wool	—	95

* In case of Maharashtra and W.B. the share of producer in the wholesale price has been taken as 90 percent.
 Source : NSS/MRS/unpublished paper of A. Sanyal and N. Chattopadhyaya.

APPENDIX 1.4 : PERCENTAGE OF AREA AND PRODUCTION COVERED BY CROP-CUTTING EXPERIMENTS

crop	percentage of total area			percentage to total production		
	1960-61	1970-71	1976-77	1960-61	1970-71	1976-77
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. rice	97.6	96.0	97.1	97.9	95.0	96.2
2. wheat	98.4	98.5	98.4	98.9	98.8	98.8
3. jowar	99.9	99.6	99.6	99.9	99.6	99.7
4. bajra	99.6	99.7	99.6	99.4	99.7	99.6
5. barley	97.9	97.2	98.8	98.7	97.9	99.2
6. maize	91.4	95.0	91.5	92.8	94.5	88.1
7. ragi	75.2	83.1	86.7	82.4	86.5	91.2
8. small millets	25.4	30.7	31.6	14.4	21.2	15.8
9. gram	98.5	98.4	98.2	99.3	99.1	98.8
10. arhar (tur)	74.0	81.2	84.3	83.6	87.6	87.8
11. other pulses	18.6	18.5	22.0	34.6	31.7	30.2
12. sugarcane	73.4	94.1	92.9	71.2	95.3	94.3
13. mesta	—	31.1	48.9	—	45.1	70.9
14. cotton	69.3	91.7	87.9	67.8	73.8	71.5
15. jute	99.0	92.1	98.4	99.0	91.6	98.5
16. tobacco	21.6	70.6	68.6	18.2	69.9	72.9
17. potato	24.3	45.3	53.9	28.3	45.6	53.8
18. linseed	45.0	44.3	50.8	42.9	41.8	42.6
19. sesamum	48.5	56.0	46.9	35.8	53.3	42.9
20. groundnut	83.3	96.2	95.5	75.2	95.6	94.2
21. rape & mustard	23.6	33.8	36.7	20.1	33.7	31.0
22. castor	—	88.0	89.9	—	79.7	87.3
23. dry chillies	—	5.4	13.3	—	2.7	9.5
24. tapioca	—	83.1	92.9	—	88.5	93.7

Source : Estimates of Area and Production of Principal Crops in India (DESAg).