

Cereals Prospects in India to 2020: Implications for Policy

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Achieving food security has been the overriding goal of agricultural policy in India. The introduction and rapid spread of high-yielding rice and wheat varieties in the late 1960s and early 1970s resulted in steady output growth for foodgrains. Public investment in irrigation and other rural infrastructure and research and extension, together with improved crop production practices, has significantly helped to expand production and stocks of foodgrains. Foodgrain production, which was 72 million metric tons in 1965/66, rose to 185 million tons in 1994/95. (In this brief, all tons are metric tons.) Imports, which averaged 6 million tons per year from the mid-1960s to the mid-1970s, have been negligible in recent years, and grain stocks, which were just 2.2 million tons in 1965/66, rose to 31 million tons in 1995.

However, concern is increasing that the rapid growth from the Green Revolution is waning. Public investments in agriculture are declining, and the annual increment to gross capital formation in agriculture is now lower than in the early 1980s. This decline seems to be happening in all states in India, not just the poorer ones. At the same time, increasing shares of total public expenditure on agriculture are allocated to input subsidies (on fertilizers, electricity, irrigation, and credit, for example), rather than to productivity-enhancing investments such as research. The share of input subsidies in public expenditure increased from 44 percent in the early 1980s to 83 percent by 1990. Private investment in agriculture has increased modestly in recent years, but not by enough to fill the gap left by the decrease in public spending.

In the years to come, higher economic growth as well as sizable population growth will increase the demand for food. The structure of demand is also changing, as diets are diversifying from the basic cereal staples to fruits, vegetables, and other higher-valued foods. These evolving scenarios will change the supply and demand prospects for food in the next century. What then are the prospects for India's trade in grains? Will India become either a big importer or exporter?

Collaborative research between the Indian Agricultural Research Institute (IARI) of the Indian Council for Agricultural Research and the International Food Policy Research Institute (IFPRI) has explored how these possibly conflicting trends in supply and demand will affect net trade in grains in India, and it suggests policies for meeting the growing demand.

Recent Trends in Supply and Demand for Cereals

Indian agriculture has undergone technological change at different rates across regions and among different crops. Rapid growth in wheat and rice production has resulted in substantial increases in the marketable surplus of wheat and rice. These have contributed to food security mainly by inducing sharp declines in real prices of rice (down 2.2 percent annually) and wheat (down 3.3 percent annually). While new technologies have increased the use of modern inputs, the increase

in crop yields has been much higher than the increase in real input costs. Hence, the cost per unit of output has declined dramatically for rice (down 1.1 percent in eastern India, 2.1 percent in northern India, and 3.9 percent in the southern states annually) and wheat (declines ranging from 2.0 to 2.8 percent across states).

Many of the benefits of higher efficiency in the use of inputs and lower unit costs of production that technological change has generated have been passed on from farmers to consumers in the form of lower prices. The fall in rice and wheat prices has benefited the urban and rural poor more than the upper income groups, because the former spend a much larger proportion of their income on cereals than the latter. Production growth for coarse grains has not been as high: since technological change has been limited for these crops, yields have grown relatively slowly and land has been diverted to more profitable crops like rice and wheat. Of more concern, total factor productivity growth (TFP, or the growth in the amount of output generated by a unit of input), declined in the 1980s compared with the 1970s due to the declining real investments in agriculture already noted. For rice, growth in TFP declined from 1.3 percent annually in the 1970s to 1.0 percent in the 1980s. For wheat, productivity growth dropped from 1.4 percent annually to 1.1, and for coarse grains, the decline was from 1.1 percent to 0.9.

Demand for Cereals

Cereals dominate food expenditures in India; rice ranks first followed by wheat and coarse grains. Annual per capita consumption of cereals was 176 kilograms in the rural areas in 1987/88 and 136 kilograms in the urban areas, accounting for 73 percent of the total calorie intake in rural areas and 62 percent in urban areas. The food basket is more diversified in urban areas, with significantly higher per capita expenditures on milk and milk products, fruits, vegetables, and other high-value foods and lower per capita expenditures on cereals, compared with rural areas. Increasing urbanization and widening rural-urban disparities will reduce the per capita demand for foodgrains and rapidly increase the demand for fruits and milk. The consumption of cereals per capita has declined in rural areas but shows no significant trend in urban areas, despite rising incomes and declining relative cereal prices in cities. The declining trend in cereal consumption in rural areas can largely be attributed to a shift in tastes and preferences resulting from the increasing availability of a greater variety of food items other than foodgrains as well as a wide range of nonfood goods and services.

Supply and Demand Projections

To assess prospects for Indian cereal supply, demand, and trade, an integrated supply and demand model was used for India. This model, developed at IFPRI and IARI, estimates key parameters econometrically. On the supply side, production of each cereal crop is determined by crop and input prices and TFP growth, which in turn is driven by investment in research, extension, irrigation, and infrastructure. Two alternative scenarios are explored: (1) continued decline in productivity due to further slowing in public investment, and (2) sustained growth in productivity at the levels prevailing in the 1980s, through a recovery in public investment in agriculture.

Demand projections in the model are driven by growth in population, urbanization, income, and changes in income distribution. The projections presented here assume income growth of 5 percent per year; gradual decline in population growth, with an average annual growth between 1995 and 2000 of just over 1.8 percent; rates of urbanization consistent with the recent historical trend; and inequality in distribution of expenditures across income groups the same as in 1987/88.

Continued deceleration in productivity from declining support to agriculture is cause for concern. Under this scenario, the demand for cereals will exceed domestic production by 23 million tons by 2020--double the highest historical levels of imports (Table 1). Nearly two-thirds of these imports will be in coarse grains, because of relatively slow growth in their production and strong growth in the demand for livestock feed.

If, instead, recent historical growth in productivity is maintained, India will be in a much stronger trade position. As shown in the table, exports of wheat and rice would more than offset the deficit in coarse grains, generating net cereal exports of nearly 16 million tons. These results emphasize the need for strengthening efforts to increase production by maintaining or increasing productivity through public investment in irrigation, infrastructure development, research, and efficient use of water and plant nutrients.

Policy Implications

Resource productivity can be further enhanced by creating infrastructure in less developed areas, by managing infrastructure better, and by introducing new technologies. The most disquieting feature in Indian agriculture today is the decline in real investment in irrigation, which can be traced to a paucity of financial resources caused largely by the rise in subsidies.

It is essential to explore the options for cost-effective expansion of irrigated area. Scaling down the input subsidies provided for water, electricity, and fertilizer would augment the resources available for investment in irrigation, rural roads, and prevention of land degradation. It would also promote more efficient allocation of resources and provide incentives for development of cost-reducing innovations.

Recent fertilizer policy has increased the use of nitrogen fertilizers over other nutrients. Phosphorus deficiency is now the most widespread soil fertility problem in both irrigated and unirrigated plots in the country. Correcting the distortion in relative prices of primary fertilizers by removing the remaining subsidies could help correct the imbalances in the use of the primary plant nutrients--nitrogen, phosphorus, and potash.

The challenge to sustain food security will be difficult for any country that has a large proportion of rainfed areas and an unfavorable food-growing environment. Rainfed areas, which account for about 70 percent of India's cultivated land, play a key role in meeting future food needs, in generating employment, and in promoting national economic growth. Resource-poor farmers in the rainfed ecosystems practice less-intensive agriculture, and since their incomes depend on local agriculture, they benefit little from increased food production in irrigated areas. To help them, efforts must be increased to disseminate available dryland technologies and to generate new ones.

The scope for influencing long-run productivity growth through manipulation of crop prices is limited. Reforms of trade and macroeconomic policies are needed to encourage long-term investment and technological change in the agriculture sector. The increasing complexity of production environments demands efficient information dissemination and training in the use of modern technologies. For this, an appropriate extension service needs to be created to stimulate and encourage both top-down and bottom-up flows of information between farmers, extension workers, and research scientists to promote generation, adoption, and evaluation of location-specific farm technologies.

Table 1--Projected cereal supply, demand, and net trade, India, 1995 and 2020

Year/Cereal	Declining Productivity Growth			Sustained Productivity Growth		
	Supply	Demand	Net Exports (million metric tons)	Supply	Demand	Net Exports
1995						
Rice	79.5	77.5	2.0	79.8	77.5	2.3
Wheat	59.7	63.5	-3.8	60.0	63.5	-3.5
Coarse grains	32.7	39.7	3.0	32.9	29.7	3.2
Total cereals	171.9	170.7	1.2	172.7	170.7	2.0
2020						
Rice	120.5	124.5	-4.0	134.0	124.5	9.5
Wheat	107.6	111.0	-3.4	127.3	111.0	16.3
Coarse grains	42.3	57.9	-15.6	48.0	57.9	-9.9
Total cereals	270.4	293.4	-23.0	309.3	293.4	15.9

Source:IFPRI-IARI projections.

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"A 2020 Vision for Food, Agriculture, and the Environment" is an initiative of the International Food Policy Research Institute (IFPRI) to develop a shared vision and consensus for action on how to meet future world food needs while reducing poverty and protecting the environment. Through the 2020 Vision initiative, IFPRI is bringing together divergent schools of thought on these issues, generating research, and identifying recommendations. The *2020 Briefs* present information on various aspects of the issues.