

Poultry Feed Supply and Demand

Feed is the single largest cost item in poultry production, accounting for 55-64 percent of variable costs in India, depending on the region (table 6). According to industry sources, domestically produced corn (energy) and soybean meal (protein) are the dominant feed ingredients in broiler rations. Nearly all of India's feed demand is met from indigenously produced feeds. The continued growth of poultry production, however, could eventually outstrip gains in feed production, particularly if poultry output continues to expand at its current rapid rate.

Statistics on feed use, either in general or by the poultry industry in particular, are not available from government sources. The Compound Livestock Feed Manufacturers Association (CLFMA) provides some data on compound feed production, but these member-supplied data cover only a portion of total feed production and use. As a result, estimates of feed use must be pieced together based on the judgment of industry sources. USDA provides the most up-to-date, long-term series of estimates of feed use in India, based on government and industry information and expert judgment.¹³ USDA, however, does not provide estimates of feed use by animal type.

Feed Composition

Corn and soybean meal are the major feeds used in the broiler industry, but feed composition varies somewhat by region and season. A ration of corn and soybean meal is recognized as technically superior for raising broilers, but other ingredients are sometimes substituted based on availability and price (table 5).¹⁴

Regional feeding practices follow:

- ◆ *South.* The larger southern integrators report using a broiler ration that, on average, contains 60-65 percent corn, 28-30 percent soybean meal, and 2-3 percent oil. Most integrators report productivity losses when ingredients are substituted for corn or soybean meal. Although the ration can contain up to 20 per-

cent wheat, depending on relative prices, this substitution necessitates the addition of energy in the form of oil. Other substitutes for corn may be rice bran, sorghum, millet, or broken rice. When the price of soy rises, limited substitutions for soy meal include peanut meal, sunflower meal (decorticated), and fish meal; but substitution of rapeseed meal is limited to no more than 3-5 percent. The preferred oil is corn oil, but sunflower and soybean oils are also used. Palm oil is also a substitute but is not as digestible as the other oils.

- ◆ *West.* The integrated operators in this region are more likely to use strictly a corn and soybean meal ration. One source indicated that rice polish is sometimes substituted into the ration, but this substitution had the impact of raising the FCR.
- ◆ *East.* The large integrator in this region generally does not substitute for soybean meal in the protein portion of the ration. While this integrator's ration typically included 55-60 percent corn, rice polish, sorghum, or feed grade wheat (5-10 percent) may be substituted for corn depending on the least-cost combination.
- ◆ *North.* In the Haryana-Punjab region, the typical feed composition includes 50-60 percent corn, 25 percent soybean meal, and 5 percent fish or meat meal. Reportedly, feed millers and producers substitute other ingredients into the ration, including wheat, rice polish, broken rice, and millet, based on shifts in relative prices. In this region, where producers are not integrated operations, it is common for feed millers to sell a concentrate feed consisting of protein (soybean meal, meat meal, fishmeal, etc.) and minerals, with the individual poultry producers then adding the energy component in the form of corn or other cereal.

Based on the field survey, the integrators, who receive direct benefits from higher levels of feed efficiency among their growers, are most likely to adhere to a corn and soybean meal ration, unless there is a significant swing in relative prices in favor of a substitute ingredient. In contrast, feed millers, who sell their product to independent growers, are more likely to substitute for corn or soybean meal in response to price changes so that they can either maintain a constant selling price for their feed products or reduce feed prices when final product prices fall.

¹³ FAO also reports data on feed use in India, but the FAOSTAT database reports average corn feed use of only 197,000 tons for 1998-2000, compared with more than 4.5 million tons in the USDA PS&D database. The FAO data appear too low to be credible.

¹⁴ By way of comparison, U.S. broiler feed rations generally contain 68 percent corn and 26 percent soybean meal, according to an ERS model for poultry costs and returns.

Current feeding practices suggest that the role of corn and soybean meal in broiler rations will increase with the further spread of integrated poultry operations. Substitute energy feeds that could become more important in the event of shortages of corn include wheat, rice (broken and polish), sorghum, and millet. Other proteins that could become more important if shortages of soybean meal emerge are rapeseed meal, sunflower meal, fishmeal, and meat meal. But, although India is a large producer of rapeseed and peanut meals, only small amounts of the former can be used in broiler rations, and use of the latter is limited due to concerns with aflatoxin, which can be prevalent in Indian peanut meal.

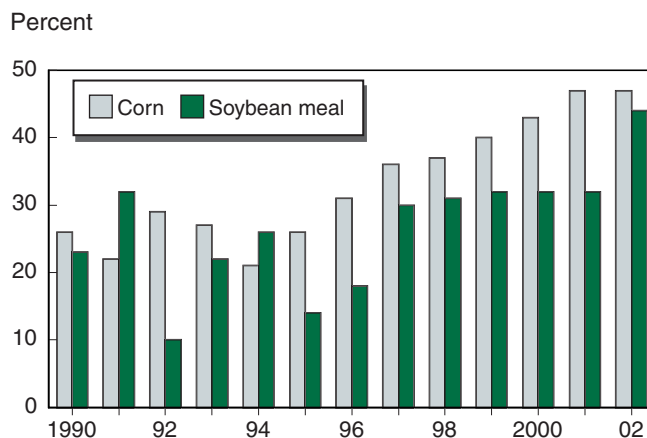
Feed Production and Consumption Trends

In the absence of data on feed use in India from GOI or other sources, trends in supply and demand for the key broiler feeds, corn and soy meal, are based on USDA data. The USDA data series employs GOI crop production estimates, with the data on other variables, including trade, human consumption, and feed use, based on industry estimates and judgment. Because data on feed use by various animal product enterprises, including poultry production, are not available, the assessment is based on overall supply and feed use trends. According to these data, recent trends in corn and soybean production and feed use indicate that feed use accounts for a growing share of production (fig. 11).

Production and feed use of corn. Growth in Indian corn production, although somewhat slower in the 1990s than in the 1980s, has accelerated since the mid-1990s (table 10 and fig. 12). Recent production gains have resulted from growth in both area and yields, although yields remain quite low by world standards. Corn production also varies significantly year-to-year because most production is on rainfed land without assured supplies of moisture. The consumption data show a similar pattern, with relatively strong growth in total corn use since the mid-1990s. According to USDA estimates, corn feed use has grown much faster than nonfeed uses (including food and industrial uses), with the nonfeed total actually showing a decline for most of the period since the early 1970s. Growth in feed use of about 14 percent annually during the last half of the 1990s is comparable to industry estimates of the expansion in broiler output, and much greater than recent growth in corn production. With the rapid growth in estimated feed use, feed now accounts for

Figure 11

Feed-use share of domestic production in India



Source: USDA PS&D database, January 2003.

more than 42 percent of total corn use in India, and, if recent trends continue, this share will increase.

The effect of rising feed demand on domestic corn prices and potential import levels will be determined by production trends, as well as trends in food and industrial use of corn. Until now, rising feed use has been accommodated by gains in production and static or declining food and industrial use. Estimates by P. Kumar indicate that coarse grains as an aggregate are an inferior good for food use with an expenditure elasticity of food demand in the range of -0.10 to -0.20 . While these estimates suggest that per capita food use of coarse grains will continue to decline, it is unclear to what extent they apply to corn food use. According to some industry sources, in certain areas of India, particularly in Rajasthan, corn is the preferred staple grain and food use is likely to remain at current levels.

In general, industry sources, including those in the South, West, and East, express more concern about the availability and price of corn than about any other feed ingredient. Corn trade has, historically, been quite low, although both concessional and commercial imports increased slightly in the late 1990s. These increases in imports, however small, led to a growth rate in corn consumption that, for the first time since at least 1960, exceeded that of total production.

In the longer term, domestic corn production in India may expand significantly. India has a large area devoted to corn production, and average yields of about 1.8 tons per hectare are well below those in many other countries, including the United States (8.0 tons/ha.), China (4.4 tons/ha.), and Thailand (3.2

Table 10—Trends in corn supply and use in India

Year	Area 1,000 ha.	Yield Tons/ha.	Production 1,000 tons	Imports 1,000 tons	Consumption			
					Total 1,000 tons	Nonfeed	Feed	Feed share Percent
1969-71	5,794	1.05	6,087	18	6,405	6,246	158	2.5
1979-81	5,887	1.10	6,486	9	6,521	5,921	600	9.2
1989-91	5,893	1.51	8,891	0	8,956	6,839	2,117	23.6
1994-96	6,121	1.58	9,675	0	9,553	6,987	2,567	26.9
1999-2001	6,461	1.81	11,679	133	11,717	6,783	4,933	42.1
<i>Growth rates (percent)</i>								
1970-80	0.2	0.5	0.6	-6.9	0.2	-0.5	14.3	--
1980-90	0.0	3.2	3.2	-100.0	3.2	1.5	13.4	--
1990-2000	0.9	1.8	2.8	--	2.7	-0.1	8.8	--
1995-2000	1.1	2.7	3.8	--	4.2	-0.6	14.0	--

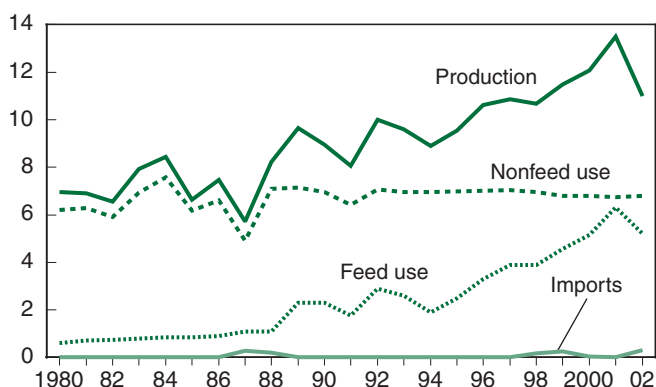
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Source: Computed from USDA PS&D database.

Figure 12

Supply and use of corn in India

Mil. tons



Source: USDA PS&D database; January 2003.

tons/ha.). Most corn is produced on unirrigated land using traditional varieties, with only about 30 percent of area sown to high-yielding varieties. The low level of technology employed is, at least in part, likely due to the traditionally low level of effective demand for corn, which has resulted in weak prices for corn relative to other crops. Reportedly, improved technology is available for use in India, including improved traditional and hybrid varieties and plant protection measures that could significantly boost corn yields. In addition to promoting new technology, the GOI may also opt to establish a more supportive price policy for corn producers. With the GOI now struggling with large surpluses and high price supports for wheat and rice, it may begin to shift more price and nonprice support to other crops, including corn and other feed grains.

Production and feed use of soybeans and meal.

Soybean production expanded rapidly following its introduction to central India in the late 1960s and early 1970s, with growth driven primarily by gains in area planted (table 11 and fig. 13). Although chronically low yields have grown somewhat, growth in both area and production have slowed steadily since the 1970s. Future gains in soybean production will likely be increasingly dependent on improvements in yields, which may be difficult to achieve in the major rainfed production zones of Madhya Pradesh and Maharashtra to the west.

With no trade in soybeans, and most soybeans crushed for meal and oil, the pattern of growth in soybean meal production has closely matched that of soybeans. But while output of soybeans and meal has slowed since the early 1970s, growth in estimated consumption of soybean meal, and particularly feed use, has increased. According to USDA estimates, annual growth in feed use of soybean meal was about 12 percent during the 1990s, rising to more than 20 percent in the late 1990s.

With feed use of domestic soybean meal now growing significantly faster than production, India's traditionally large exportable surplus of soybean meal is under pressure from domestic demand. After expanding more than 25 percent annually during the 1980s, growth in Indian exports stalled at about 2.2 million tons in the late 1990s. This surplus should serve domestic feed requirements for the foreseeable future. In the longer term, however, growth in feed demand could create pressure for imports of soybeans and/or soybean meal, particularly if the recent slowdown in soybean production continues.

Table 11—Trends in soybean and soybean meal supply and use in India

Year	Soybeans			Soybean meal				
	Area	Yield	Production	Production	Exports	Consumption		
	1,000 ha.	Tons/ha.				Total	Food	Feed
1969-71	29	0.56	16	6	0	6	0	6
1979-81	541	0.79	420	291	122	169	8	161
1989-91	2,667	0.87	2,300	1,653	1,183	470	33	437
1994-96	4,614	0.85	3,937	2,773	2,210	563	47	517
1999-2001	5,748	0.93	5,350	3,572	2,220	1,375	70	1,305
<i>Growth rates (percent)</i>								
1970-80	34.1	3.5	38.4	46.6	--	38.9	--	38.2
1980-90	17.3	1.0	18.5	19.0	25.5	10.8	15.8	10.5
1990-2000	8.0	0.7	8.8	8.0	6.5	11.3	7.8	11.6
1995-2000	4.5	1.8	6.3	5.2	0.1	19.5	8.6	20.4

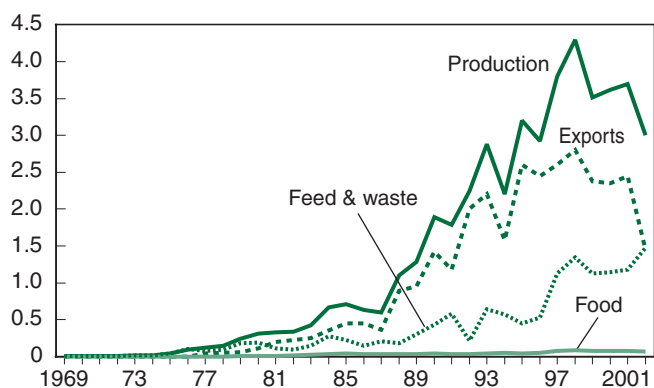
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Source: Computed from USDA PS&D database.

Figure 13

Supply and use of soybean meal in India

Mil. tons



Source: USDA PS&D database; January 2003.

Feed Price Trends

Limited data are available for corn prices, consisting of annual average wholesale prices for markets in three key producing states: Bihar (East), Karnataka (South and West), and Uttar Pradesh (North). These data indicate significant variability in the average corn price in these three regional markets, as well as significant variability in the ratio between corn and poultry prices (fig. 14). Industry sources also report considerable regional and seasonal variation in corn prices in the various producing areas. Unlike soybean meal, corn has not been traded heavily and corn prices in India can deviate significantly both above and below world prices (see subsection on feed trade policy). Again, poultry producers most distant from local production centers in Bihar, Uttar Pradesh, Madhya Pradesh, and Karnataka, including producers in

Coimbatore in southern India, are most likely to face higher corn prices.

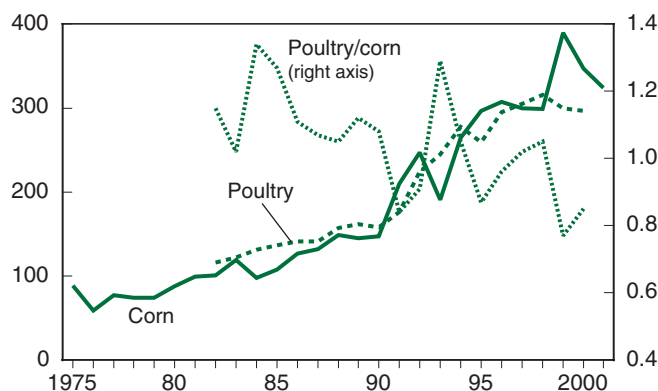
For soybean meal, with no impediments to exports and exports still accounting for more than 60 percent of annual production, domestic prices near production and export centers are closely aligned with world prices. However, poultry producers located a significant distance from production centers in Madhya Pradesh and Maharashtra in central India, such as those in Coimbatore in southern India, face somewhat higher prices due to transport and handling costs. As long as exports remain unrestricted and comprise a significant share of production, it is likely that domestic soybean meal prices will remain aligned with world prices.

Figure 14

Trends in poultry and corn prices in India

1981/82=100

Ratio



Source: *Agricultural Prices in India*, Ministry of Agriculture, GOI, various issues.

Feed Trade Policy

With the removal of quantitative restrictions on most imports as a result of the Uruguay Round Agreement on Agriculture, imports of most feeds and ingredients are unrestricted and subject only to import duties (table 12). Imports of corn for feed use are now administered by a TRQ regime that was introduced in June 2000. Under the TRQ, the first 400,000 tons of imports enter at a duty of 15 percent, with above-quota imports subject to a 50-percent duty. By agreement, the TRQ was raised 50,000 tons annually, to a maximum of 500,000 tons in 2003. Importers of corn under the TRQ are to be given quota allotments by the Exim Facilitation Committee within the Office of the Director General Foreign Trade (DGFT) in the Ministry of Commerce. Imports of sorghum can be conducted by an agency appointed by the government, subject to a duty of 50 percent.

The current TRQ regime for corn replaced a policy under which corn was imported at a zero tariff but was subject to ad hoc government decisions on whether corn could be imported for feed or industrial (starch) use. Although some significant quantities of corn were imported under the previous policy, virtually no corn has been commercially imported since the TRQ was implemented. For most of the period since 2002,

Table 12—Import policy for feed ingredients in India

HTS code	Commodity	Trade policy ¹	Tariff ²
100590	Corn, for feed	Free;TRQ ³	15.00/50.00
100700	Sorghum	Canalized	50.00
2306	Oilmeals	Free	40.40
230120	Fish meal	Free	35.00
230990 02	Concentrates for compound feeds	Free	40.40

HTS = harmonized tariff schedule.

¹Canalized and TRQ items require import license.

²Inclusive of special and additional tariffs, as applicable.

³TRQ is 400,000 tons with in-quota tariff rate of 15 percent and above-quota tariff of 50 percent.

Source: *India Poultry and Products Annual 2001*, Gain Report No. IN1045, Foreign Agricultural Service, USDA.

imports have not been viable because domestic prices have been below world prices, inclusive of the tariff and transport costs (table 13). TRQ administration, which has made it difficult for importers to obtain quotas at opportune periods of the marketing year, has also impeded corn imports.

Oil meal and feed concentrates can be imported without quantitative restriction, subject to tariffs of 35-40 percent. Imports of oil meals and concentrates remain negligible because India has a large exportable surplus of oil meals, and internal prices are generally near or below world prices.

Table 13—Domestic and import parity prices of corn in India

Item	Unit	1996/97	1997/98	1998/99	1999/2000	2000/01
Domestic price:						
Wholesale price ¹	Rs/ton	4,572	4,042	5,699	5,463	4,627
	\$/ton	127	101	133	124	99
Import parity:						
U.S., fob ²	\$/ton	118	107	94	88	90
Freight & handling	\$/ton	23	17	16	23	22
Import duty ³	\$/ton	0	0	0	0	13
Import price, cif + duty	\$/ton	141	124	109	110	125
Freight & handling to mill	Rs/ton	5,074	4,978	4,680	4,865	5,866
Import price, cif mill	Rs/ton	800	800	800	800	800
	\$/ton	5,874	5,778	5,480	5,665	6,666
	\$/ton	164	144	128	128	142
Domestic-import parity	Rs/ton	-1,302	-1,737	219	-203	-2,039
	\$/ton	-36	-43	5	-5	-44
Memo items:						
Exchange rate	Rs/\$	35.86	40.04	42.80	44.15	46.85
Corn imports	1,000 tons	0	1	175	250	50

fob = free on board. cif = cost, insurance, freight.

¹Average wholesale price in Karnataka, Bihar, and Uttar Pradesh.

²U.S. No. 2, Yellow, fob U.S. Gulf ports.

³Zero duty until June 2000, 15 percent in-quota tariff thereafter.

Sources: *Agricultural Prices in India*, Ministry of Agriculture, GOI; *International Financial Statistics*, International Monetary Fund; USDA.