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The U.S. and Mexican Dry Bean Sectors

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Abstract

Liberalization of U.S.-Mexico dry bean trade, as part of the North American Free Trade Agreement (NAFTA), has enabled U.S. dry bean producers to provide a steadier and larger portion of Mexican supply. Long-term prospects for the newly integrated market are shaped by various factors. On the supply side, the future structure of Mexico's dry bean sector will be comprised of a smaller number of producers who work larger plots of land for higher yields. U.S. dry bean production is already characterized by large-scale farms, and recent yields exhibit a modest upward trend. On the demand side, per capita disappearance of dry beans in Mexico is declining over the long term as consumers shift away from traditional staple foods. U.S. per capita consumption is relatively stable but only at about a fourth of Mexico's average level, even though dry beans are a low-fat source of important nutrients.

Keywords: Dry beans, Mexico, United States, NAFTA, North American Free Trade Agreement

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Introduction

Participants in U.S.-Mexico dry bean trade are steadily gaining experience with how the North American market operates under conditions of regional free trade. The last transitional tariff-rate quotas (TRQs)[1] on U.S.-Mexico (and Canada-Mexico) dry bean trade were removed at the start of 2008, in accordance with the North American Free Trade Agreement (NAFTA). As a result, the outlook for the U.S. and Mexican dry bean sectors is now shaped by more fundamental forces of supply and demand, rather than anticipated reductions in regional trade barriers.

In this report, the authors examine the significance of dry bean trade to the NAFTA countries; provide a detailed understanding of supply, demand, and policy in the U.S. and Mexican dry bean sectors; and consider the outlook for these industries. Special attention is given to the changing importance of dry beans within Mexican society. Dry beans continue to be an important source of protein, carbohydrates, and other nutrients in many Mexican households, particularly those of modest means. Nevertheless, consumption has declined over the past two decades in both aggregate and per capita terms, and this trend is likely to continue. Moreover, while producers working less than 5 hectares of land account for roughly half of Mexico's dry bean farmers, the sector is gradually becoming more consolidated, smaller in terms of area planted, and more efficient in terms of yields.

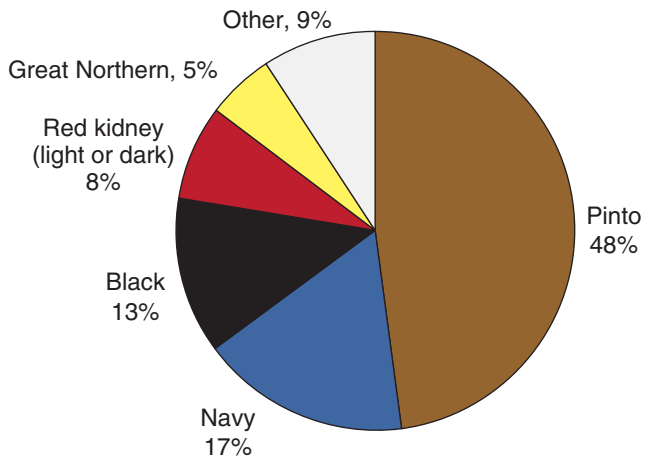
[1]A TRQ is a quota for a volume of imports at favorable tariff rate. After the quantitative limit is reached, a higher tariff is applied to additional imports. In many TRQs, the in-quota tariff rate equals zero, and the over-quota tariff rate is prohibitively high.

Bean Classes and Varieties Covered by NAFTA's Last Set of Import Restrictions

Mexico and the United States produce a diversity of dry bean varieties, not all of which were covered by the transitional import restrictions that expired in 2008 as part of NAFTA. The production statistics collected by USDA's National Agricultural Statistics Service (NASS) cover the following commercial classes of dry beans: large lima, baby lima, navy, Great Northern, small white, pinto, light red kidney, dark red kidney, pink, small red, cranberry, black, blackeye, small chickpeas, and large chickpeas. Each class includes multiple varieties; for instance, the United States cultivates over 15 varieties of black beans. NAFTA's TRQs for U.S. and Canadian dry bean exports to Mexico for the period 1994-2007 (tariff line 0713.33.02 in Mexico's NAFTA tariff schedule) covered beans belonging to the species *Phaseolus* vulgaris, or "common" beans. The dry bean classes covered by these TRQs—pinto, navy, red kidney, black, Great Northern, small red (excluding Adzuki), pink, cranberry, and small white—account for about 90 percent of U.S. production. Within this framework, the leading classes of dry common beans produced in the United States are pinto (48 percent), navy (17 percent), black (13 percent), and red kidney (8 percent) (fig. 1).

Given the focus of NAFTA's restrictions and longstanding interest in U.S.-Mexico trade in dry common beans, the authors primarily examined dry common beans, and the statistics presented in this report for U.S. dry bean exports, imports, and production cover only common classes and varieties of dry beans. Appendix table 1 identifies the tariff lines considered as dry common beans for the purposes of this report.[2]

Figure 1
U.S. dry bean production, by variety, 2007-09



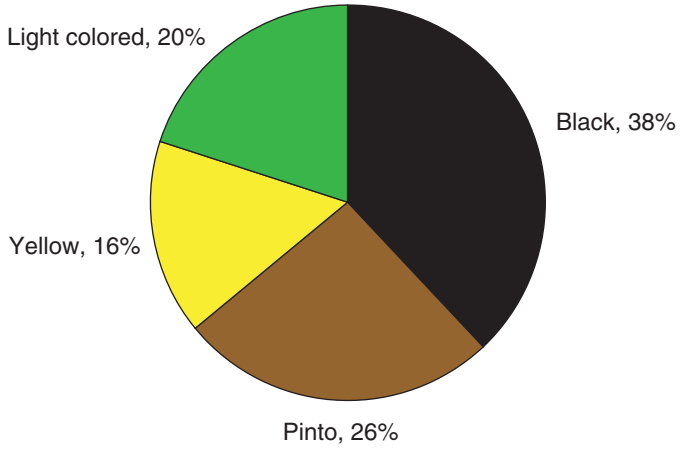
Source: USDA, National Agricultural Statistics Service, *Crop Production*, January 2009.

[2] Matching tariff lines to dry bean varieties is not a precise science. For instance, the tariff line for small red beans (0713.32.2000) includes varieties that belong to the species *Phaseolus* vulgaris as well as Adzuki beans, which belong to the species *Vigna* angularis. Moreover, it is not certain that the tariff classifications have been consistently and correctly applied to the different varieties of dry beans over the years.

Mexico produces about 50 different varieties of dry beans, and these may be divided into four major groups (fig. 2). Black (*negros*) is the group with the largest share of total consumption (38 percent), followed by pintos (26 percent), pink (*rosas*, also referred to as *claros* or light-colored beans, 20 percent), and yellow (*amarillos*, also referred to as *azufrados* or sulfur-colored, 16 percent). The most commonly produced varieties of pink beans in Mexico are *Flor de Mayo* and *Flor de Junio*. Mexico's dry bean exports to the United States include some varieties that once were rarely produced in the United States, such as the yellow variety known as *peruano* or *mayocoba* (Wingett, 2006). U.S. and Mexican trade statistics are not sufficiently detailed to specify the actual volumes of this trade, however.[3]

Some producers in Mexico are adopting different varieties of dry beans. In the State of Durango, for instance, the Government and the dry bean sector are encouraging producers with a medium to high level of potential productivity to plant certified varieties better suited for precipitation conditions in Durango (Guzmán, 2010). Production in the State of Zacatecas has shifted toward pinto beans and away from the traditional light-colored varieties of Flor de Mayo and Flor de Junio. Pintos are projected to account for 23 percent of Zacatecas's dry bean production in 2010, compared with 3 percent in 2002 (Vallejo Díaz, 2010). Since 2004, the Idaho Bean Commission has worked with Mexican producers to test varieties suited for specific Mexican growing regions—first in the State of Sinaloa and later in the States of Chihuahua and Zacatecas—with the intent of increasing sales of certified seed to Mexico (Idaho State Department of Agriculture, 2006; Stewart-Williams, 2009; and Wilkins, 2009).

Figure 2
Distribution of Mexican dry bean consumption, by variety, 2008



Source: Author calculations based on data from Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP).

[3] Interest in the market opportunities for yellow beans in Mexico and the United States has motivated the Idaho Bean Commission to partner with researchers at Idaho State University and Oregon State University to develop virus-resistant yellow beans. This research was funded by a Specialty Crop Block Grant awarded to the Idaho Bean Commission by the Idaho Department of Agriculture and USDA (*Ag Weekly Online*, 2009). Some producers in Michigan are also growing mayocoba beans.

The Importance of Dry Bean Trade to NAFTA Countries

Dry bean trade is a key component of sales for U.S. and Canadian producers and an important source of supply for Mexican consumers (table 1). Mexico is the destination for about 35 percent of U.S. dry bean exports and 10 percent of U.S. dry bean production, while Canada receives about 10 percent of U.S. dry bean exports and 3 percent of U.S. production. For Mexico, imports from the United States account for about 10 percent of national dry bean supply (calculated as imports plus domestic production), stabilizing consumption when downturns in production occur. For Canada, exports to the United States and Mexico combined to account for about 14 percent of dry bean production.[4]

According to Mexican trade statistics, the United States is Mexico's principal foreign supplier of dry beans, with a 95-percent share of Mexico's total dry bean imports. U.S. trade data contain detailed information about the classes and varieties of dry beans exported to Mexico, although there is some question as to whether these details have been consistently and correctly identified over time. According to available data, black beans were the leading dry bean class exported to Mexico during U.S. marketing years[5] 2006/07 to 2008/09, accounting for 52 percent of U.S. dry bean exports to Mexico (fig. 3). Pinto beans accounted for 32 percent.

The architects of NAFTA recognized the possible sensitivity of Mexico's dry bean producers to import competition and provided for the liberalization of Mexican dry common bean imports from the United States and Canada over a period of 14 years (1994-2007), the longest transitional period specified by the agreement for agricultural products. Other varieties of U.S. and Canadian dry beans, such as garbanzo, lima, blackeye, and Adzuki, have enjoyed duty-free access to the Mexican market since 1994, when NAFTA initially took effect.[6]

[4] Mexico's 2007 Agricultural Census (INEGI, 2009b, 2009c) suggests that the country's dry bean production is roughly 15 percent larger than the production statistics presented in table 1. According to that census, Mexico produced 1.1 million tons of dry beans during the 2007 agricultural year, compared with 994,000 tons as stated by the annual production statistics. If the census figures are more indicative of the sector's true size, then imports from the United States play a somewhat smaller role in the Mexican dry bean market. For Mexico's 2010/11 marketing year (January to December 2010), USDA's Foreign Agricultural Service (see Juárez and Ford, 2010) forecasts Mexican dry bean production of 1.1 million tons.

[5] The U.S. marketing year for dry beans runs from September to August. Thus, the 2008/09 marketing year ran from September 1, 2008, to August 31, 2009.

[6] Appendix table 2 lists the quotas and over-quota tariffs associated with NAFTA's TRQs for dry beans, along with the actual trade volumes governed by the TRQs. In-quota volumes under these TRQs received duty-free treatment.

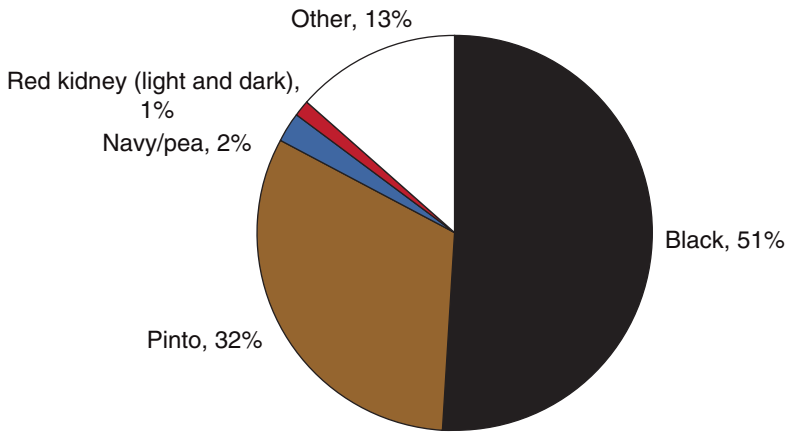
Table 1
Overview of North American dry bean production and trade: Annual averages, U.S. marketing years 2006/07 to 2008/09

Reporting country	Production		Exports to:					Imports from:				
			World	Canada	Mexico	U.S.	ROW	World	Canada	Mexico	U.S.	ROW
			Metric tons (thousands)									
United States	1,164	*	330	33	116	--	181	72	34	7	--	31
Mexico	1,027	**	20	***	--	17	3	116	9	--	107	***
Canada	305	*	216	--	7	37	172	34	--	***	29	5
Total, North America	2,496		566	33	123	54	356	222	43	7	136	36

ROW = Rest of world.
-- = Data not applicable.
* = Annual average for 2006-08.
** = Annual average for Mexico's 2006-08 agricultural years.
*** = Less than 500 metric tons.

Source: Author calculations based on data from Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP, 2010a) (Mexican production); Secretaría de Economia, as cited by Global Trade Information Services, Inc. (2010) (Mexican trade data); Statistics Canada, as cited by Agriculture and Agri-food Canada (2009) (Canadian production); Statistics Canada, as cited by Global Trade Information Services (2010) (Canadian trade data); USDA, National Agricultural Statistics Service, *Crop Production*, January issues (2009-10) (U.S. production); U.S. Department of Commerce, Census Bureau, *Foreign Trade Statistics*, as cited by USDA, Foreign Agricultural Service (2010) (U.S. trade data).

Figure 3
U.S. dry bean exports to Mexico, by class, marketing years 2006/07-2008/09



Source: Author calculations based on data from U.S. Department of Commerce, Census Bureau, *Foreign Trade Statistics*, as cited by USDA, Foreign Agricultural Service (2010).

NAFTA has facilitated an important change in the U.S.-Mexico trading relationship for dry beans. Before NAFTA, the Mexican Government tightly regulated dry bean imports from the United States through a system of import licenses. As a result, imports fluctuated widely from year to year, with little to no trade when Mexican production was ample and large volumes of trade when Mexican production was limited (fig. 4). Since NAFTA's implementation, U.S. dry bean exports to Mexico have become far more consistent, averaging 116,000 metric tons (mt) per year during 2006/07 to 2008/09. Nevertheless, trade continues to fluctuate in response to weather conditions in either country.

Trade liberalization also has facilitated the participation of Mexican and Canadian producers in the U.S. market, although current U.S. most-favored-nation (MFN)[7] import tariffs on dry beans are quite small, with *ad valorem* values of 2 percent or less. Imports from Mexico averaged about 7,000 mt per year during 2006/07-2008/09, compared with less than 1,000 mt per year during the 3 marketing years immediately prior to NAFTA (1990/91-1992/93). Imports from Canada also have increased, averaging 34,000 mt per year during 2006/07-2008/09. Prior to the implementation of the Canada-U.S. Free Trade Agreement (CUSTA)[8] in 1989, these imports had never exceeded 15,000 mt per year.

Exports to countries outside NAFTA—the rest of the world (ROW) in table 1—are a significant outlet for U.S. and Canadian dry beans, but not for Mexican dry beans. During 2006/07-2008/09, such exports accounted for 16 percent of U.S. production and 56 percent of Canadian production. In markets outside the NAFTA region, U.S. producers have faced heightened competition from China, Burma, and Canada, each of which increased its annual dry bean exports by 100,000 mt or more between 1991-93 and 2005-07 (appendix table 3).[9] In this context, U.S. dry bean exports to the ROW declined from 256,000 mt in 1998/99 to 132,000 mt in 2004/05,

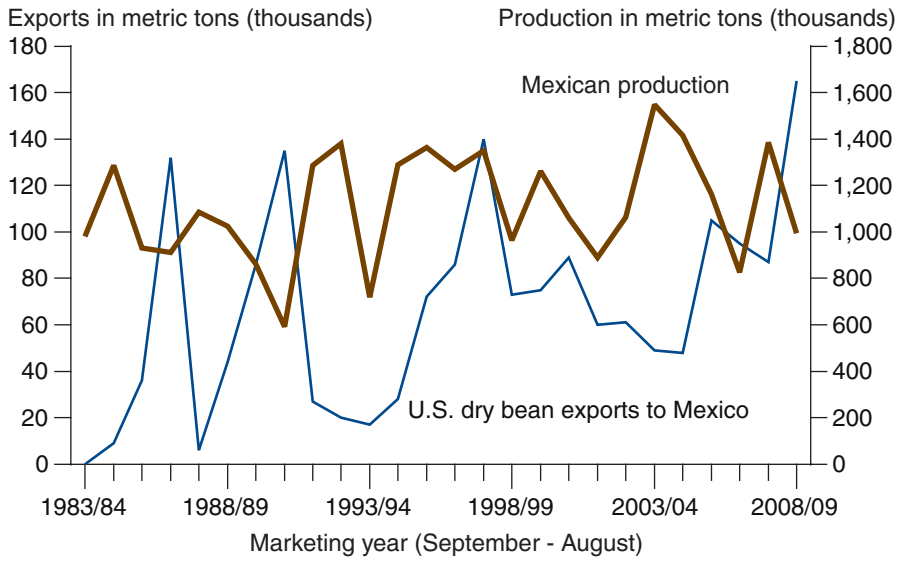
[7] As members of the World Trade Organization (WTO), each NAFTA country generally is required to apply its MFN tariffs to all other WTO members. Important exceptions to the MFN obligation include preferential trade agreements, such as NAFTA, and special access for developing countries.

[8] CUSTA liberalized almost all aspects of U.S.-Canada agricultural trade over the 9-year period that ended on January 1, 1998. CUSTA was subsumed by NAFTA in 1994.

[9] Appendix tables 3 and 4 summarize changes in dry bean exports and imports, respectively, for the leading exporting and importing countries between 1991-93 and 2005-07, while appendix table 5 describes changes in dry bean production among the leading producing countries between 1991-93 and 2006-08.

Figure 4

U.S. dry bean exports to Mexico and Mexican production of dry beans, 1983/84 to 2008/09



Notes: The production statistics in this figure correspond to Mexico's agricultural years. Mexico's agricultural year is divided into two production cycles: fall/winter and spring/summer. To compare U.S. exports with Mexican production, we matched U.S. marketing years and Mexican agricultural years so that the starting year of the marketing year is the same number that denotes the agricultural year. For instance, the U.S. marketing year 2008/09 is matched with Mexico's 2008 agricultural year. This allows us to compare the quantities of U.S. and Mexican dry beans that are on the market at roughly the same time.

Source: Author calculations based on data from USDA, Foreign Agricultural Service (2010); Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP, 2010a).

a decrease that corresponded with about 9 percent of U.S. production in 1998. Much of this decrease is linked to declining exports of navy beans to the European Union (EU). Canada, in particular, has become much more competitive on a cost and a volume basis, vying with U.S. products in both the EU and the United States. A strengthening of the real value of the U.S. dollar vis-à-vis its Canadian counterpart during 2002/03 to 2006/07 boosted the competitiveness of Canadian products. Over the past 4 years, however, the area planted with dry beans in Canada has experienced successive annual declines, driven partly by reductions in white and navy bean area (Lucier, Dettman, and Da Pra, 2009: p. 19) and a strengthening of the Canadian dollar in 2007/08 and 2008/09. These developments have facilitated a modest rebound in U.S. dry bean exports to the ROW. These exports reached 233,000 mt in 2008/09, their highest level in 8 years.

Price Data Reveal Similar Movements in Two Markets

A close relationship between the prices of a specific good in two geographically distinct locations is viewed by many economists as a defining characteristic of integrated markets (Vollrath, 2003). While a formal analysis of price integration is beyond the scope of this report, the available data suggest some similarities in U.S. and Mexican dry bean price movements during U.S. marketing year 2008/09 (table 2). Practically all of the consumer, producer, and wholesale prices for dry beans listed in table 2 increased between 2007/08 and 2008/09, reflecting the broader phenomenon of higher prices for many agricultural commodities during that period. In both countries, the price paid by urban consumers for dry beans increased at a much faster rate than the overall consumer price index (CPI) in 2008/09. For Mexican consumers, however, the increase in the dry bean CPI was proportionately larger than for U.S. consumers; 39.5 percent in Mexico, compared with 19.2 percent in the United States.

For the two leading classes exported to Mexico (pinto and black), U.S. bids to growers and dealer prices increased for black beans but decreased for pinto beans between 2007/08 and 2008/09.[10] In Mexican wholesale markets, as exemplified by the Central de Abasto in the Iztapalapa delegation of Mexico City, the prices of domestically grown pinto and black beans increased at a faster rate in 2008/09 than corresponding prices of imported product. At the same time, the increases in the wholesale prices of imported products (30.7 percent for pinto beans and 25.2 percent for black beans) were substantially less than the 39.5-percent increase in the Mexican CPI for dry beans. Thus, the availability of U.S. dry beans in the Mexican market may have tempered the impact of higher prices of domestically produced dry beans on Mexican consumers.[11]

[10] The U.S. price series data collected by USDA's Agricultural Marketing Service (AMS) for dry beans may be divided into two main groups: bids to growers and dealer prices. For each major commercial class, there are usually price series data that correspond to the States that are the leading producers and marketers of that class, such as North Dakota and Minnesota for pinto beans and Michigan for black beans.

[11] Mexico's large wholesale markets (*centrales de abasto*) are the marketing channel for roughly 40 percent of the country's dry bean production. Both wholesale and retail activities take place at these markets, as many Mexican consumers buy produce directly from distributors at these locations.

Table 2
Selected price data for the U.S. and Mexican dry bean sectors

	U.S. dry bean marketing year				
	2005/06	2006/07	2007/08	2008/09	Change, 2008/09 versus 2007/08
Consumer price indices:	*Indices*				*Percent*
United States, overall (1982-84 = 100)	200	205	214	214	0.2
United States, dry beans (1997 = 100)	119	127	147	175	19.2
Mexico, overall	117	121	127	134	5.9
Mexico, dry beans (2Q 2002 = 100)	99	102	111	155	39.5
Exchange rate:	*Pesos per dollar*				*Percent*
Nominal	10.84	10.93	10.64	13.25	24.5
Real (2005)	10.87	10.78	10.48	12.33	17.7
Pinto beans:	*Dollars per mt*				
Bids to growers	307	466	617	593	-3.8
Dealer prices	517	651	852	901	5.6
Unit value, exports to Mexico	560	670	785	880	12.2
	Pesos per mt				
Unit value, exports to Mexico	6,070	7,327	8,326	11,640	39.8
Wholesale price, imports, Mexico City	10,243	9,574	11,723	15,321	30.7
Wholesale price, domestic product, Mexico City	9,365	8,191	10,150	14,556	43.4
Black beans:	*Dollars per mt*				
Bids to growers, Michigan	461	528	685	741	8.1
Dealer prices, Michigan	651	682	958	1,029	7.4
Unit value, imports from U.S.	583	656	858	987	15.1
	Pesos per mt				
Unit value, imports from U.S.	6,329	7,169	9,116	13,098	43.7
Wholesale price, imports, Mexico City	11,289	11,396	12,995	16,274	25.2
Wholesale price, domestic product (Veracruz), Mexico City	8,758	8,438	8,490	14,018	65.1

mt = Metric ton.
Note: Mexico City prices are for the Central de Abasto, Iztapalapa.

Source: Author calculations based on data from Banco de Mexico (2010) (Mexico CPI); Secretaría de Economía (2010) (Mexico wholesale prices); USDA, Foreign Agricultural Service (2010) (unit values); USDA, Agricultural Marketing Service (2005-09) (bids to growers and dealer prices); USDA, Economic Research Service (2010b, c) (exchange rates); and U.S. Department of Labor, Bureau of Labor Statistics (2009) (U.S. CPI).

Geography and Farm Size Differentiate U.S. and Mexican Dry Bean Sectors

Mexico and the United States are similar dry bean producers in terms of total output. Mexico ranks sixth among the world's leading dry bean producers, with average annual output of 1.05 million metric tons (mmt) during agricultural years 2007-09;[12] the United States ranks fifth, with average annual output of 1.16 mmt during 2007-09.[13] At the same time, dry beans account for a small portion of the total value of crop production in the two countries: about 3 percent in Mexico and 0.5 percent in the United States (SAGARPA/SIAP, 2010a; and USDA/NASS, 2010a). But the geographic and socioeconomic conditions under which dry beans are cultivated in the two countries are quite different in many respects, and these differences are reflected in the production statistics.

Climate's Impact on Yields

Figure 5 indicates the location of U.S. and Mexican dry bean production, using U.S. county-level data from the 2007 Agricultural Census and Mexican municipal-level data for agricultural years 2006-08 (see box, "Where Are Dry Beans Grown?"). U.S. production takes place either in regions with a humid continental climate—marked by cold winters and warm summers—or in semiarid places where irrigation is available. In contrast, Mexican production tends to take place either in a semiarid climate—often without the benefit of irrigation—or in a tropical savannah climate featuring a dry season and a wet season and the possibility of severe weather in either season. Some Mexican producers use irrigation to compensate for the dry climate, but most lack access to large amounts of irrigated water. Rainfed lands accounted for 86 percent of Mexico's area harvested with dry beans and 69 percent of Mexican dry bean production during agricultural years 2007-09. As a result of these cross-country differences in climate and availability of irrigation, U.S. dry bean yields are substantially higher than Mexico's. U.S. yields averaged 1.98 mt per hectare during 2007-09, while Mexican yields averaged 0.76 mt per hectare during agricultural years 2007-09 (fig. 6).

Lower yields are important to the Mexican dry bean sector for several reasons. First, they contribute to the persistent fragmentation of the sector by reducing the economic gains from consolidating smaller plots and spreading the fixed costs of production across a larger quantity of output. Second, they represent an agronomic challenge that is not easily surmounted. Irrigated lands generate roughly 30 percent of Mexico's dry bean production, and the costs of this irrigation are often borne by persons outside the dry bean sector. The electricity used by farmers to pump irrigation water is subsidized, and the charges for water often do not reflect its true economic value.[14] In the absence of irrigation, the prospect for higher yields lies squarely in the development of technological innovations suited for rainfed lands, such as improved seed varieties.

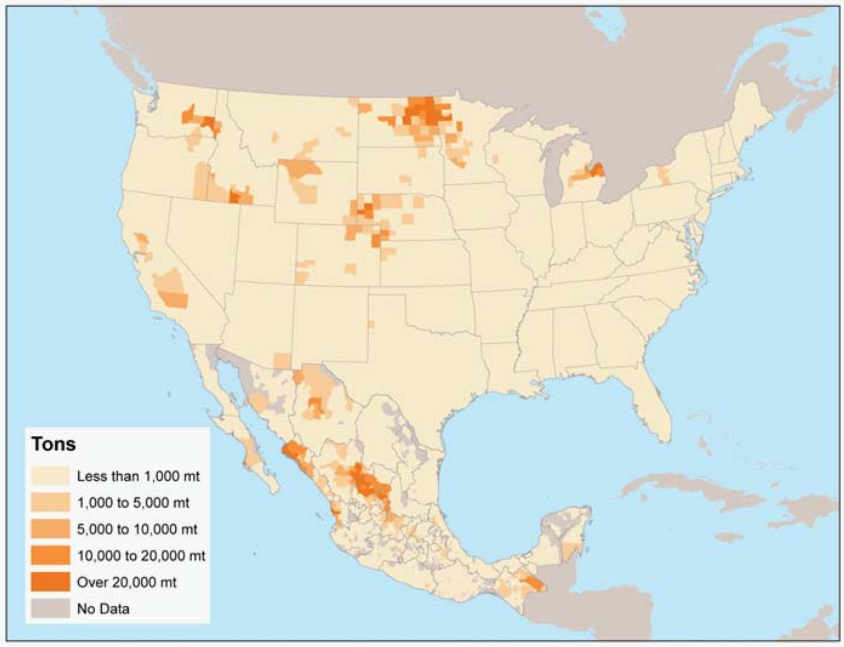
[12] The Mexican production statistics in this report correspond to Mexico's agricultural years, while the U.S. production statistics correspond to calendar years. Mexico's agricultural year is divided into two production cycles: fall/winter and spring/summer. For dry beans, planting in fall/winter begins in October and ends in March, while the harvest begins in January and ends as late as September. Planting in spring/summer begins in April and ends in September, while the harvest begins in June and ends as late as March. Thus, Mexico's 2008 agricultural year covers dry beans planted from October 2007 to March 2008 (fall/winter 2007/08) or from April to September 2008 (spring/summer 2008).

[13] Appendix table 5 lists the world's leading dry bean producers, using information from the FAOSTAT database of the Food and Agriculture Organization of the United Nations (FAO, 2009a). Note that FAOSTAT's definition of dry beans differs somewhat from the definition used in the production statistics of the U.S., Canadian, and Mexican governments.

[14] For an assessment of the economic value of irrigation to the Mexican dry bean sector, see pp. 45-7 of World Bank, Agriculture and Rural Development Team, Sustainable Agriculture Department, Latin America and the Caribbean Region, and Instituto Mexicano para la Competividad (2007).

Figure 5

Locations of dry bean production in the United States and Mexico



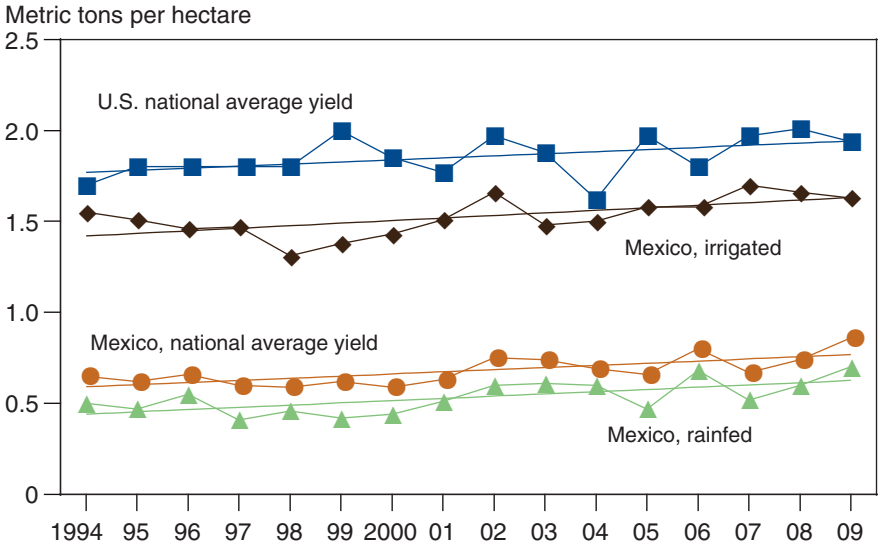
mt=Metric ton.

Note: The Mexican production statistics in this report correspond to Mexico's agricultural years, while the U.S. production statistics correspond to calendar years. Mexico's agricultural year is divided into two production cycles: fall/winter and spring/summer. U.S. county-level data are for 2007; Mexican municipal data are annual averages from agricultural years 2006-08.

Source: Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP, 2010a); USDA, National Agricultural Statistics Service, 2007 Census of Agriculture.

Figure 6

U.S. and Mexican dry bean yields have trended upward during the NAFTA period



Notes: The straight lines represent the linear trend lines for each data series. The Mexican production statistics in this report correspond to Mexico's agricultural years, while the U.S. production statistics correspond to calendar years. Mexico's agricultural year is divided into two production cycles: fall/winter and spring/summer.

Source: Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP, 2010a); USDA, National Agricultural Statistics Service, *Crop Production*, January issues (1997-2010).

Where Are Dry Beans Grown?

Dry bean production in Mexico and the United States is concentrated in certain regions. In Mexico, three regions are responsible for about 80 percent of the country's dry bean production: (1) North-Central Mexico (the States of Zacatecas, Durango, Chihuahua, San Luis Potosí, and Guanajuato); (2) the Northern Pacific Coast (the States of Sinaloa and Nayarit); and (3) the State of Chiapas. North-Central Mexico accounted for 52 percent of Mexico's dry bean production during 2007-09. Much of this region's production takes place under semi-arid conditions, although in some parts of the region, dry bean production takes place in a variety of climates (Vallejo Díaz, 2010). For instance, in Zacatecas, dry bean production occurs in arid, semi-arid, and subtropical areas. Roughly 6 percent of North-Central Mexico's bean area is irrigated, and nearly all (99 percent) of the region's bean production occurs during the spring-summer agricultural cycle.

The Northern Pacific Coast region accounted for 21 percent of Mexico's dry bean production during 2007-09. This region's climate ranges from desert and semi-arid in Sinaloa to tropical savannahs in Nayarit. Production in the Northern Pacific Coast region takes place almost entirely during the fall-winter agricultural cycle, and about two-thirds of the region's bean area is irrigated. Chiapas, located primarily in a tropical savannah climate, accounted for 7 percent of Mexican production during 2007-09. Roughly 62 percent of Chiapas's production occurs during the spring-summer cycle, and very little of its production is irrigated.

Similarly, three regions account for about three-fourths of U.S. dry bean production: (1) the Northern Great Plains (North Dakota and Minnesota); (2) the States along the Platte River (Nebraska, Colorado, and Wyoming), and (3) Michigan. The Northern Great Plains region accounted for 53 percent of U.S. production during 2007-09. North Dakota, the top producing State, grows several classes of dry beans—including pinto, navy, and black—while navy and dark red kidney beans are the main classes produced in Minnesota. According to the 2007 Agricultural Census, only 2 percent of North Dakota's area harvested with dry beans is irrigated, compared with 18 percent in Minnesota (USDA/NASS, 2010b).

Production in Nebraska, Colorado, and Wyoming takes place primarily along the western portion of the Platte River, including both the North and the South Platte Rivers. This region, which accounted for 17 percent of U.S. dry bean production during 2007-09, primarily produces pinto and Great Northern beans. In contrast to other dry bean producing regions in the United States, Platte River States account for a relatively high proportion of irrigated production—90 percent of area harvested.

The third region, Michigan, accounted for 14 percent of U.S. dry bean production during 2007-09. Michigan is second in U.S. navy bean production and the Nation's leading producer of black beans. Producing about 57 percent of U.S. black beans, Michigan is also the leading U.S. supplier of black beans to Mexico. Very little of Michigan's dry bean production (4 percent of area harvested) is irrigated.

U.S. dry bean yields differ substantially by commercial class. During 2007-09, the average yield ranged from 1.72 mt per hectare for cranberry beans to 2.68 mt per hectare for small white beans (appendix table 6). This wide range in yields is due to the influence of irrigation and region of production on yields. Black beans are generally produced on nonirrigated lands in some States, such as Michigan and North Dakota, while irrigated lands in Idaho and Oregon account for a large portion of U.S. production of small white beans. Classes that are commonly irrigated (primarily because of where they are grown) include Great Northern, small white, pink, and small red beans.

Units of Production

Another key difference between Mexico and the United States is the scale of a typical dry bean operation. A typical U.S. dry bean producer works about five times as much land as a typical Mexican producer who is focused primarily on the commercial market—about 100 hectares in the United States, compared with roughly 20 hectares in Mexico.[15] Moreover, Mexico has a large number of dry bean farmers who operate on an even smaller scale and thus have limited marketable surpluses. According to Mexico's 2007 Agricultural Census (Instituto Nacional de Estadística y Geografía (INEGI), 2009b,c), about 622,000 farms grow dry beans in Mexico, with an average area planted of 3.1 hectares and an average area harvested of 2.8 hectares.

[15] Since many dry bean producers also raise crops other than dry beans, production statistics indicate the average dry bean area per farm, rather than the average size of a farm that grows dry beans.

Over the past two decades, dry bean production in the United States and Mexico has become concentrated on a smaller number of farms. In the United States, the number of farms producing dry beans dropped from about 15,900 to 6,200 between 1987 and 2007, while the area of dry beans harvested per farm climbed from 42 hectares to 94 hectares (table 3). In Mexico, the decrease in the number of farms growing dry beans has coincided with a decrease in the area planted of this crop. The average size of a dry bean parcel in Mexico's spring-summer agricultural cycle increased 9.4 percent between 1991 and 2007, while the average parcel size in the fall-winter cycle decreased 7.6 percent (table 4).

An analysis of these production trends at the State level reveals that a consolidation of the Mexican dry bean sector has taken place in two of the leading producing States. In Zacatecas, the average size of a parcel cultivated with dry beans increased from 7.7 to 9.5 hectares between 1991 and 2007, while in Sinaloa parcels increased from 8.9 to 12.2 hectares. At the same time, the State of Chiapas continues to be one of Mexico's larger dry bean producers, even though its average dry bean parcel size remains around 1 hectare, well below the national average.

Data from Mexico's main direct-payment program suggest that roughly half of Mexico's dry bean producers devote 5 hectares of land or less to dry beans. Producers of this scale tend to focus on local markets, including the subsistence of their own households, and consolidating their supply with other producers. About 20 percent of Mexico's dry bean production is used for home or local consumption, while 70 percent enters regional and national commercial circuits (fig. 7). Among the latter groups, the main destinations are wholesale markets and packing houses. While many of Mexico's smaller dry bean producers focus on local markets, the producing regions for a particular variety are often quite distant from the destination markets for

Table 3

U.S. dry bean sector: Number of farms and area harvested, 1987-2007

Census year	Number of farms	Area harvested	Average dry bean area per farm
		Hectares	
2007	6,236	589,040	94
2002	8,647	684,637	79
1997	11,348	700,874	62
1992	13,201	626,763	47
1987	15,914	675,864	42

Source: USDA, National Agricultural Statistics Service (2009a, 2004, 1999, 1994).

Table 4

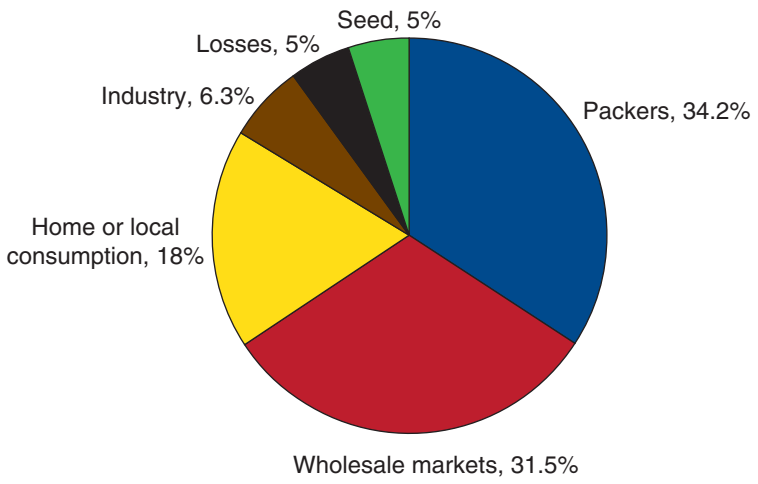
Mexican dry bean sector: Number of farms and area planted, 1991 and 2007

Agricultural cycle	Units of production	Area planted with dry beans	Average parcel size
	Number	*Hectares*	
Fall-winter 1991	155,856	433,669	2.78
Spring-summer 1991	814,095	2,384,856	2.93
Fall-winter 2007	95,854	246,366	2.57
Spring-summer 2007	526,410	1,686,680	3.20
2007 compared with 1991:		*Percentage change*	
Fall-winter	-38.5	-43.2	-7.6
Spring-summer	-35.3	-29.3	9.4

Source: Author calculations based on data from Instituto Nacional de Estadística y Geografía (INEGI), *VII Censo Agrícola, Ganadero y Forestal*, 1991, and *VIII Censo Agrícola, Ganadero y Forestal*, 2007.

Figure 7

Destinations for Mexican dry bean production, 2008

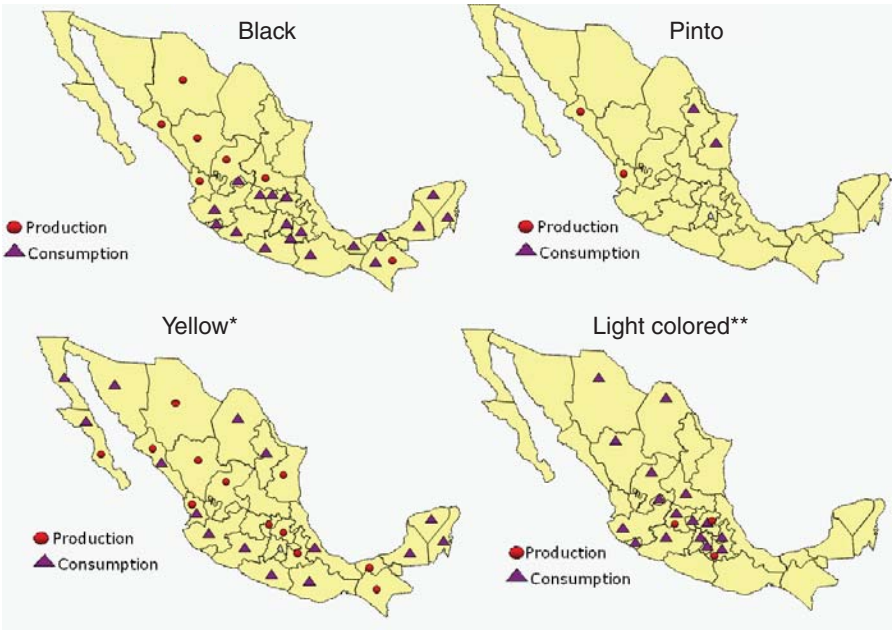


Source: Author calculations based on data from *Plan Rector Sistema Producto Frijol 2008*.

that variety (fig. 8); a feature that some observers view as a marketing and competitiveness problem (at least for some producers) due to high transportation and storage costs (World Bank, Agriculture and Rural Development Team, Sustainable Agriculture Department, Latin America and the Caribbean Region; Instituto Mexicano para la Competividad, 2007: pp. 38, 56-9).

The extent to which small-scale production continues in Mexico's dry bean sector will have a marked impact on the sector's future. In 2007, the average age of a Mexican farmer (for all crops) was 51 years, compared with 57 years in the United States, and the retirement of older, small-scale farmers without their full replacement by a younger generation will necessarily result in a more consolidated dry bean sector where producers that are more closely oriented to the commercial market play a larger role. At the same time, Mexico's traditional diet based on white corn and dry beans was linked closely to small-scale agricultural production, so the retirement of small-scale dry bean producers could also accompany further reductions in per capita dry bean consumption in Mexico.

Figure 8
Production and consumption of dry beans, by variety and region



*=Includes principally the varieties known as azufrado, garbancillo zarco, mayocoba, and peruano.
**=Includes principally the varieties known as Flor de Mayo and Flor de Junio.
Note: The circles identify the major States where a particular variety is produced, while the triangles identify States where a particular variety tends to be consumed.

Source: Author presentation of data from Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Apoyos y Servicios a la Comercialización Agropecuaria (SAGARPA/ASERCA), General Coordinator of Commercialization.

Smaller, More Productive Dry Bean Sectors Have Emerged in Both Countries

Dry bean production varies considerably from year to year as a result of changes in area planted, area harvested, and yields. Nevertheless, several long-term trends are visible in Mexican and U.S. dry bean production, broadly characterized by less area devoted to the crop and higher yields. In Mexico, area planted with dry beans has trended downward, from 2.2 million hectares in 2002 to 1.7 million hectares in 2009 (fig. 10), as farmers reallocated some land to alternative crops and/or livestock production—sometimes in response to market price signals and sometimes with governmental support. Area harvested also has trended downward, from 2.1 million hectares in 2002 to 1.2 million hectares in 2009. Rainfed lands account for about 80 percent of these decreases.

Programs that encourage dry bean farmers working marginal lands to shift toward other agricultural activities may have reduced the loss rate (the percentage difference between area harvested and area planted)[16] in Mexico's dry bean sector, although the lower loss rate may also be the result of favorable weather conditions. The median loss rate was 10 percent during 2000-09, compared with 13 percent during 1990-99. Dry beans are extremely sensitive to excessive humidity, frost, and drought, and this vulnerability leads to very high loss rates in certain years. For example, the loss rate reached 28 percent in 2005 and 2009, years in which droughts negatively affected dry bean production in some parts of Mexico.

Mexico's dry bean yields on irrigated lands have experienced a fairly steady, upward trend since 1980, while yields on rainfed lands have shown only signs of a sustained improvement over the last decade (see fig. 6). Still, national yields have grown at a sufficient rate so that, together with the decreased loss rate, they offset the decrease in area harvested. As a result, Mexican production has fluctuated around the level of 1.2 mmt over the past 15 years, even though many of the year-to-year changes in output have been dramatic (fig. 9).

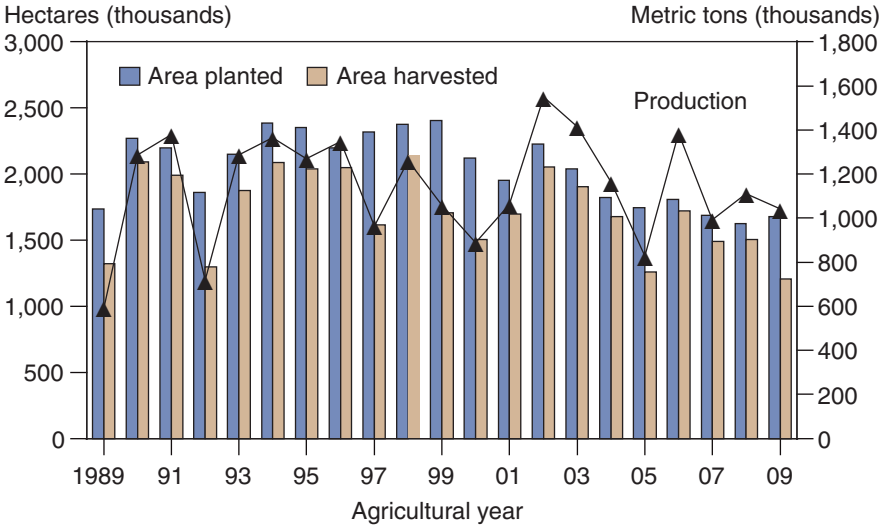
In the United States, the dry bean sector is much smaller than it was a decade ago (fig. 10). During 2007-09, production averaged 1.0 mmt per year, compared with 1.2 mmt during 1996-98. During these same two periods, area harvested averaged 526,000 hectares and 686,000 hectares, respectively. U.S. dry bean production has risen and fallen over the past decade with the competitiveness of navy bean exports and domestic consumer preferences for dry beans. As discussed in the trade section, U.S. navy bean exports experienced a modest rebound during marketing years 2005/06 to 2008/09, and this improved export performance was reflected in higher production of both navy beans and dry beans. Production of dry bean classes other than navy has fluctuated from one year to the next, but the long-term trend is stable.

The national loss rate in the U.S. dry bean sector is usually several percentage points less than that found in Mexico. During 2005-09, the median national loss rate in the United States was 5 percent. U.S. dry bean producers are fortunate to avoid the high loss rates that their Mexican counterparts occasionally see. Over the past two decades, the highest national U.S. loss rate was 13 percent for 1993 and 2001.

[16] Loss rate refers to the ratio between area harvested and area planted. When expressed as a percentage, it is calculated by subtracting the ratio of area harvested to area planted from 1 and then multiplying the result by 100.

Compared with leading U.S. field crops, such as corn and soybeans, less research has been done to develop new dry bean varieties over the past several decades. Nevertheless, U.S. dry bean yields (for all varieties) have been on a gradual upward trend over the last quarter century, which is due partly to favorable weather (see fig. 6). When considering individual varieties and major producing States, there are only isolated instances where there was a strong tendency for yields to rise over the past 15 years. A key example is pinto beans in Nebraska, where much of dry bean production is irrigated.

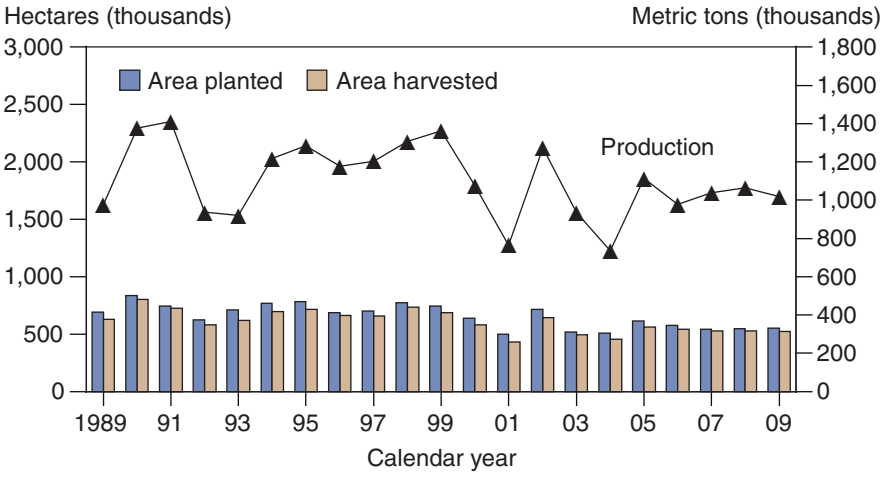
Figure 9
Mexican dry bean area and production, 1989-2009



Notes: The Mexican production statistics in this report correspond to Mexico's agricultural years, while the U.S. production statistics correspond to calendar years. Mexico's agricultural year is divided into two production cycles: fall/winter and spring/summer.

Source: Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP, 2010a).

Figure 10
U.S. dry bean area and production, 1989-2009



Notes: The Mexican production statistics in this report correspond to Mexico's agricultural years, while the U.S. production statistics correspond to calendar years. Mexico's agricultural year is divided into two production cycles: fall/winter and spring/summer.

Source: USDA, National Agricultural Statistics Service, *Crop Production*, January issues (1990-2010).

Mexico's Dry Bean Policies Aim To Increase Sector Productivity

The future of the dry bean sector is a vital issue to many Mexicans, partly because of the large number of small-scale producers, but also because the commodity takes on great economic importance in States, such as Zacatecas, Durango, Chihuahua, San Luis Potosí, Sinaloa, and Nayarit, that have substantial surpluses in dry bean production and are seeking additional market opportunities for their output. In light of the perceived importance of the dry bean sector, the Mexican Government operates a number of programs designed to increase its productivity, focusing on direct income support, commercialization, access to credit, adoption of superior technologies, and the organization of productive chains and product systems.

The Program of Direct Support for the Countryside (PROCAMPO—Programa de Apoyos Directos para el Campo) is Mexico's main program that provides direct income support to agricultural producers. PROCAMPO was developed in 1993 to compensate farmers for possible losses they might experience as a result of NAFTA and to improve their competitiveness in the face of other countries' farm supports. Under PROCAMPO, any producer who cultivates a legal crop on eligible land or uses that land for livestock or forestry production or some ecological project can receive payments, which are made on a per hectare basis. Eligible land is defined as that which had been cultivated with corn, dry beans, wheat, rice, sorghum, soybeans, cotton, safflower, soybeans, or barley in any of the three agricultural cycles prior to August 1993.

Since its inception, PROCAMPO has been modified several times to make the program more progressive in terms of income distribution. As a result of these modifications, PROCAMPO now gives preferential treatment to smaller producers during the spring-summer cycle so that they may receive larger transfers per hectare. According to operational rules published on April 8, 2009, the standard PROCAMPO payment rate is 963 pesos (about U.S. $77) per hectare for both the fall-winter and spring-summer agricultural cycles, while the spring-summer payment rate equals 1,300 pesos (U.S. $104) for those producers with less than 5 hectares of eligible land. Until December 2008, the opportunity also existed for producers enrolled in PROCAMPO to access their payments in advance to receive financing for productive projects from banking institutions. This program, known as PROCAMPO Capitaliza, also gave preference to farmers with less than 5 hectares of eligible land.

Mexico's dry bean farmers also count on a series of Government programs designed to facilitate the commercialization of their product and to avoid the negative price effects of excess production or market downturns. Specific commercialization programs for dry beans in 2009 included:

1. Support for Crop Storage: Partially or totally covers the costs of storage and financing for a period of 6 months and, in some cases, up to 9 months.

2. Support for the Transport of Bean Harvests: Partially or totally covers the shipping costs associated with transporting beans from the production region to consumption region.

3. Support for Value Added: Partially or totally covers the costs incurred from improving the quality and presentation of the product for sale.

To remedy excess production, the Mexican Government has established mechanisms for surplus management, utilizing pledge schemes to avoid price volatility. These schemes are oriented toward producer organizations in States with surpluses and/or marketing problems and provide assistance for as much as 25 percent of the total harvest volume.

Access to credit is one of the main challenges facing Mexico's dry bean sector. This problem arises partly from the inherent risks of agricultural activity, such as adverse climatological situations, pest or disease infestations, and marketing risks; in some cases, these are not fully covered by agricultural insurance or other risk management tools. To address this limitation, the Mexican Government has implemented the Program of Induction and Development of Rural Financing (Programa de Inducción y Desarrollo de Financiamiento al Medio Rural) to broaden the availability of financial services in rural areas. This program is directed toward financial intermediaries as well as people who traditionally have had difficulties obtaining loans from commercial banks. Federal resources for this program are dispersed in the form of Government guarantees, with maximum supports of 10 percent on total contracted credit, and up to 20 percent in highly marginalized and very highly marginalized regions. The program plays a fundamental role in fostering credit access for producer organizations that wish to sell crops housed in storage centers.

In a related effort, the Mexican Government is organizing dry bean producers using the framework of production systems (*sistemas producto*). Production systems are mechanisms of coordination among Mexico's Federal, State, and municipal governments that encourage the association and socioeconomic organization of producers and other economic agents involved in specific production chains. In the Production System for Beans, the development of activities is guided by a master plan that specifies short-, medium-, and long-term strategies; these activities range from the creation of statistical databases to competitiveness-enhancing activities, such as the consolidated purchase of inputs and advertising campaigns that promote dry bean consumption.[17]

[17] More information about the Production System for Beans is available at http://www.sisprofrijol.org.mx/.

Consistent with the objectives of the Production System for Beans, some dry bean producers receive support from the Program for the Sustainable Use of Natural Resources in Primary Production (Programa de Uso Sustentable de Recursos Naturales para la Producción Primaria). This program was first applied to the dry bean sector in 2004, after Mexico's National Institute for Forestry, Agricultural, and Fishing Research (INIFAP—Instituto Nacional de Investigaciones Forestales, Agrícolas, y Pecuarias) discovered that of the 1.2 million hectares planted with the crop in the States of Durango, San Luis Potosí, and Zacatecas during 1990-2003, 700 thousand hectares were located in areas of low or very low levels of potential productivity. This finding led to the implementation of a regional project that focused on the dry bean sector of these three States.

The Program for the Sustainable Use of Natural Resources in Primary Production features two main strategies for the dry bean sector. The first is to foster the use of improved seeds to produce varieties that are in greater

demand, increasing domestic production and participation in the national market. The second strategy—sometimes referred to as "conversion" or "reconversion"—is to encourage dry bean farmers in areas with low or medium levels of potential productivity to switch to other crops that are in greater demand and have lower environmental impacts, such as a better use of water. This strategy converted about 477,000 hectares from 2004 to 2008. In place of dry beans, these areas now produce almost 980,000 mt per year of fodders, such as oats, triticale, and corn.[18]

Supporting investments in various aspects of the productive chain is another approach used by the Mexican Government to assist the dry bean sector. In 2007, the Strategic Project of Support for the Productive Chain of Corn and Bean Producers (PROMAF—Proyecto Estratégico de Apoyo a la Cadena Productiva de Maíz y Frijol) was established to support landholders in areas with medium and high productivity potential. To access the program, beneficiaries must: 1) prove that they are the legitimate owners of the land; 2) organize themselves into a producer's organization; and 3) contribute to the establishment of guarantee funds.[19]

PROMAF supports investment projects in corn and dry beans through two methods. The first method is to provide direct partial payments to finance technical assistance (70 percent of the project's cost), the strengthening of organizations (up to 60,000 pesos or about U.S. $4,800 per organization), and the support of newly graduated professionals (5,000 to 7,500 pesos or about U.S. $400 to $600 per month, depending on the area's poverty rate). This method also supports the acquisition of basic farm machinery and infrastructure by providing liquidity guarantees to producers in rainfed and irrigated areas. Projects in zones with high or very high poverty rates receive guarantees up to 70 percent of the project's cost, with a limit of 2 million pesos (about U.S. $160,000) per project. In areas with low or medium poverty rates, each project receives a guarantee of up to 50 percent of its cost, also with a limit of 2 million pesos. The main types of acquisitions supported by this program include machinery for gathering, harvest, and post-harvest activities and irrigation equipment.

The second method is to support the application of technological packages in zones of medium or high productive potential using a risk-sharing approach. For first-time participants, PROMAF provides 25 percent of the package's cost, with a limit of 800 pesos (about U.S. $64) per hectare. For returning participants, PROMAF provides 10 percent of the package's cost, with a limit of 400 pesos (about U.S. $32) per hectare, conditional on the Government's recovery of at least 60 percent of the support provided during the first year of participation. For all participants, the maximum amount of land that may be supported is 20 hectares of rain fed land and 5 hectares of irrigated land.

Information on PROMAF's impact on the dry bean sector is gradually emerging. From 2007 to 2009, PROMAF provided improved technology and technical assistance to almost 1 million beneficiaries, corresponding to about 2.3 million hectares of corn and dry beans, 23 percent of which was cultivated with both crops (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Fideicomiso de Riesgo Compartido, (SAGARPA/FIRCO) 2010: p. 8). On average, dry bean producers participating in PROMAF in 2008 obtained higher yields and lower costs of

[18] A third possible strategy is to find new uses for dry beans. In an activity prompted by discussions in 2007 and 2008, just prior to the end of NAFTA's TRQs for corn and dry beans, USDA and SAGARPA financed efforts to encourage some dry bean farmers in the State of Zacatecas to use their product, blended with prickly pear cactus, to feed sheep imported from the United States (Figueroa Sandoval, 2009). Also, the U.S. Dry Bean Council has promoted several nutritional studies of tortillas made partly from dry beans.

[19] A guarantee fund consists of money allocated by SAGARPA that serves as collateral so that a prívate bank can lend money to a rural producer who otherwise would be ineligible.

production on a per ton basis than in the previous year (table 5). These results differed substantially by State, however, with only participants in Jalisco and San Luis Potosí (during the spring-summer production cycle) and in Chiapas (during the fall-winter cycle) experiencing both an increase in their average yields and a decrease in their average costs (again on a per ton basis). On average, both participants and nonparticipants in Jalisco, San Luis Potosí, and Chiapas experienced yield increases between 2007 and 2008. Caution should be exercised when interpreting the program statistics in table 5, which reflect no effort to disentangle the influence of factors, such as favorable weather, that would affect PROMAF participants and nonparticipants alike or to address the representativeness of the participants.

Table 5
Indicators of dry bean production by PROMAF participants during spring-summer 2008 and fall-winter 2008/09 agricultural cycles

	All dry bean producers			PROMAF participants only											
	Yields			Yields			Cost of production			Sale price			Cost of production		
Production cycle/State	2007	2008	Change	2007	2008	Change	2007	2008	Change	2007	2008	Change	2007	2008	Change
	Tons per hectare		*Percent*	*Tons per hectare*		*Percent*	*Pesos per hectare*		*Percent*	*Pesos per ton*		*Percent*	*Pesos per ton*		*Percent*
Spring-summer															
Total, seven States	0.53	0.62	17	0.48	0.59	23	3,013	3,895	29	6,013	8,574	43	10,280	9,817	-5
Chihuahua	0.77	0.86	12	0.53	0.87	64	2,409	4,175	73	6,225	9,400	51	4,688	5,051	8
Coahuila	0.37	0.31	-16	0.42	0.39	-7	3,772	3,756	0	8,000	10,000	25	8,981	9,631	7
Durango	0.54	0.57	6	0.64	0.70	9	3,448	4,474	30	6,829	8,908	30	6,301	8,330	32
Jalisco	0.92	1.00	9	0.48	0.59	23	2,737	3,056	12	6,000	10,275	71	6,296	5,587	-11
Queretaro	0.52	0.90	73	0.55	0.53	-4	2,621	3,859	47	8,000	8,169	2	5,273	11,364	116
San Luis Potosi	0.36	0.65	81	0.31	0.52	68	3,068	3,927	28	5,388	8,216	52	16,871	12,751	-24
Zacatecas	0.52	0.57	10	0.45	0.54	20	2,562	3,298	29	5,898	8,618	46	8,485	9,653	14
Fall-winter															
Chiapas	0.59	0.61	3	0.68	0.90	32	4,008	4,534	13	8,557	10,922	28	6,315	6,086	-4

PROMAF= Proyecto Estratégico de Apoyo a la Cadena Productiva de Maíz y Frijol.
Notes: The Mexican production statistics in this report correspond to Mexico's agricultural years, which are divided into two production cycles: fall/winter and spring/summer. Yield data in this table are for the fall-winter 2007/08 production cycle, which was part of Mexico's 2008 agricultural year. All participants during the fall-winter 2008/09 cycle were located in the State of Chiapas.

Source: State-level production data from SAGARPA/SIAP (2010a); PROMAF data from tables 18 and 19 in Colegio de Posgraduados (2009: p. 116, 118).

U.S. Agricultural Income Supports Exclude Dry Beans

Dry beans do not belong to the set of "program crops" supported by the main agricultural income support programs—direct payments, marketing loans, and countercyclical payments—operated by the U.S. Federal Government. Although some pulses[20] were incorporated into the set of program crops starting with the 2002 Farm Act (Farm Security and Rural Investment Act of 2002) and continuing with the 2008 Farm Act (Food, Conservation, and Energy Act of 2008), dry beans were not among these crops. Under the 2008 Farm Act, countercyclical payments, marketing assistance loans, and loan deficiency payments are available for dry peas, lentils, and chickpeas, while direct payments are not available for any pulse crops.[21] In addition, since some dry bean farmers have base acreage[22] for program crops other than pulses, they can participate in the income support programs associated with those crops.

Planting-flexibility restrictions within U.S. agricultural income support programs may actually limit the size of the U.S. dry bean sector. The 2008 Farm Act continues restrictions on the planting of fruits, vegetables, and wild rice (excluding mung beans, dry peas, lentils, and chickpeas) on base acreage. Dry beans are considered a vegetable within this framework, and the planting of dry beans on base acreage is prohibited unless the producer has a history of dry bean production.

Some research indicates that eliminating planting-flexibility restrictions would foster increased dry bean production in the United States. In a study focused on Michigan's fruit and vegetable sectors, Thornsbury, Martinez, and Schweikhardt (2007) found that the barriers to entry associated with converting from program crops to dry beans were low in comparison with the other fruits and vegetables studied—pickling cucumbers, processed tomatoes, fresh-market tomatoes, squash, and blueberries. Thus, the authors concluded that ending the restrictions could lead to the entry of new dry bean producers in Michigan, a State that is already home to a prominent dry bean sector.

In a farm- and market-level analysis, Johnson et al. (2006) suggest that the effect of eliminating the planting-flexibility restrictions on dry beans would vary across regions, since the variability of dry bean revenue differs across regions. While the authors' partial equilibrium model of the U.S. dry bean sector showed that eliminating the restrictions would increase U.S. dry bean area by 27 percent and lower the sector's revenue by 13 percent, the authors emphasize that the increase in dry bean area by some farm program participants would be partially offset by reductions in dry bean area by some nonparticipants.

The Federal Government also operates a number of programs that broadly benefit the vegetable sector, including producers of dry beans (Lucier et al., 2006). Examples of such programs include *ad hoc* disaster payments (Noninsured Crop Disaster Assistance Program—NAP), crop insurance, marketing and promotional assistance, food aid purchases, export promotion, and cost-share and other types of assistance for implementing conservation measures. The Federal Crop Insurance Corporation (FCIC) provides insurance coverage

[20] In North American agriculture, the term "pulse crops" commonly refers to dry (mature) peas, lentils, and small and large chickpeas (garbanzo beans) that are used as food by humans or as feed for animals.

[21] Appendix table 7 lists the payment rates, target prices, and loan rates associated with the 2008 Farm Act.

[22] Base acreage is defined as "a farm's crop-specific acreage of wheat, feed grains, upland cotton, rice, oilseeds, pulse crops, or peanuts eligible to participate in commodity programs" (USDA, Economic Research Service, Farm Policy Team, 2009).

for dry beans through a program called Actual Production History (APH), which is designed to protect against yield losses due to natural causes. Under this program, producers decide the amount of average yield as well as the percentage of the predicted crop price that they wish to insure. If a producer's harvested yield is less than the insured yield, they are paid an indemnity based on the difference.

Table 6 summarizes APH coverage statistics for dry beans. These statistics suggest that a large portion of U.S. dry bean producers buy crop insurance. The net area insured corresponds to roughly 85-95 percent of the area planted, and the number of policies sold exceeds the number of dry bean producers tallied by the agricultural census, suggesting that some producers purchase multiple policies for different parcels of land. Little research has been conducted on the effects of crop insurance on the U.S. dry bean sector, but in general, crop insurance is thought to have a small, positive effect on area planted (see, for instance, Young, Vandeveer, and Schnepf, 2001).

On occasion, USDA will purchase dry beans and other agricultural commodities for use in nutritional assistance programs. For instance, in May 2009, USDA announced that it would buy up to $25 million of dry beans for this purpose, following a request from Nebraska's dry bean industry. By the end of June 2009, USDA's Agricultural Marketing Service (AMS) had purchased about 11,800 mt (valued at $12.2 million) of Nebraska's Great Northern beans—an amount that corresponded to 16 percent of the Nation's 2008 Great Northern crop. The Great Northern crop of 2008 was unusually abundant—about 72,000 mt, compared with 54,000 mt in 2007.

Table 6
FCIC APH coverage and summary for dry beans, 2004-09

	2004	2005	2006	2007	2008	2009
Number of policies earning premium	7,485	8,665	7,893	7,116	6,600	6,882
			Hectares (thousands)			
Net hectares insured	490	614	584	555	517	544
			Dollars (millions)			
Liability[1]	206	266	277	292	411	429
Producer premium	12	16	17	18	25	27
Subsidy[2]	17	23	25	27	36	39
Total premium	29	39	42	45	61	66
Indemnity[3]	45	35	37	24	25	60

APH=Actual Production History program.
Note: Data as of October 18, 2010.
[1]Amount insurer would pay in the event of a total loss.
[2]Amount of total premium paid by the Federal Crop Insurance Corporation (FCIC).
[3]Amount paid out by insurer based on loss suffered by insured.

Source: USDA, Risk Management Agency (RMA) (2010).

Dietary Changes Shape the Prospects for Demand

Long-term prospects for U.S. and Mexican dry bean demand will depend on future dietary patterns in each country. In Mexico, the key questions yet to be answered about the outlook for dry bean demand are:

1. To what extent will the country's traditional diet based largely on white corn and dry beans persist?

2. What role will dry beans play in the nontraditional diets that emerge over time?

Currently, annual per capita consumption of dry beans is about 11 kilograms in Mexico, compared with 3 kilograms in the United States.[23] Dry beans are consumed throughout Mexico in households of every income level and in communities large and small (table 7); and something akin to the traditional diet is still prevalent in rural communities (less than 2,500 inhabitants), where households that indicate they are consuming dry beans report annual dry bean consumption of about 21 kilograms per capita.

Mexico's lower-income households tend to consume more dry beans. For members of these households, beans provide an important part of their daily intake of proteins, carbohydrates, and other nutrients, as well as a means for coping with higher food prices and/or lower earnings via increased bean

[23] The Mexican statistic was calculated using estimates of dry bean consumption for food purposes from SAGARPA/SIAP (2010b) and population estimates from CONAPO for the period 2006-10; the U.S. statistic was obtained from USDA/ERS (2010a).

Table 7

Annual Mexican consumption of dry beans in grain or processed form by households that indicated that they consumed dry beans, by size of community and income decile, 2008

Income decile	Size of community				National total
	> 100,000	15,000-99,999	2,500-14,999	< 2,500	
	Kilograms per capita				
I	18.8	20.4	21.4	26.7	24.4
II	17.0	18.4	17.2	21.0	19.2
III	16.0	16.2	19.0	20.1	18.1
IV	14.8	17.0	16.6	24.1	18.1
V	16.3	16.2	14.6	16.5	16.0
VI	14.9	13.9	14.7	18.6	15.4
VII	14.4	15.6	14.0	17.1	15.0
VIII	14.3	15.2	13.4	16.9	14.7
IX	14.5	13.1	13.8	16.1	14.4
X	13.7	14.7	19.1	19.1	14.8
All deciles	15.0	15.8	16.4	21.4	17.1

Note: Decile I refers to the poorest 10 percent of Mexican households in terms of income, while decile X refers to the wealthiest 10 percent.

Source: Author calculations based on data from Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH) 2008, Instituto Nacional de Estadística y Geografía (INEGI, 2008).

consumption. Among Mexican households that reported consuming dry beans, the poorest decile (tenth) of households devoted 15.3 percent of their expenditures on proteins in 2008 to dry beans and other vegetables, compared with 6.8 percent for all households (INEGI, 2008).

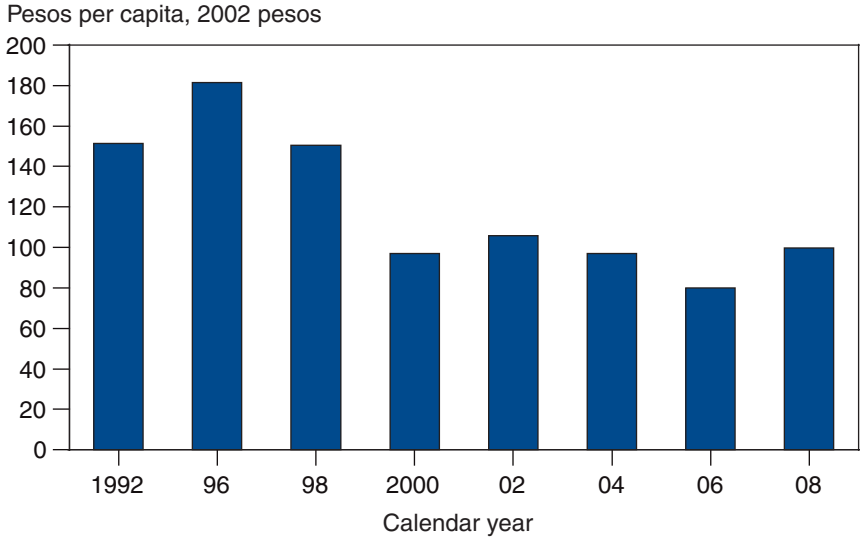
Nevertheless, the long-term tendency is indicative of lower dry bean demand in Mexico. Between 1992 and 2008, real per capita expenditures on dry beans decreased at a compound annual rate of 2.7 percent (fig. 11). This decline is observable in all income deciles and in both rural and urban areas. Factors behind this decline include rising incomes, greater affordability of chicken and other meats, and increased consumption of alternative low-priced foods with a high caloric content, such as instant soups and noodles (Dickerson, 2005). Increased consumption of processed dry beans, such as canned beans and ready-to-eat meals that include dry beans, is offsetting some portion of the decreased consumption of dry beans in grain form.

Although the long-term tendency is one of lower demand, Mexican expenditures on dry beans tend to increase during periods of economic difficulties. Table 8 compares changes in Mexico's gross domestic product (GDP) with changes in dry bean expenditures. The three periods in the table in which dry bean expenditures expanded include years when Mexico's real GDP per capita contracted: -6.16 percent in 1995, -0.03 percent in 2001, and -1.65 percent in the fourth quarter of 2008 (compared with fourth quarter 2007).

Overall, the correlation between GDP growth and expenditure growth is negative (correlation coefficient of -0.79), which suggests that dry beans are an inferior good.[24] This negative correlation also is present across income deciles for a given year: in general, the higher the income decile, the lower the household expenditures on dry beans.

[24] Economists define a good as inferior when consumption is negatively related to income—when income rises, the quantity consumed decreases, and when income falls, the quantity consumed increases.

Figure 11
Mexican household expenditures on dry beans, 1992-2008



Sources: Author calculations based on expenditure data from Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH) in Instituto Nacional de Estadística y Geografía (INEGI, 1992-2008) and population data from Consejo Nacional de Población (CONAPO, 2009).

Table 8

Change in Mexican Gross Domestic Product (GDP) versus change in dry bean expenditures, 1992-2008

Period	Compound annual growth rate	
	Real GDP per capita	Dry bean expenditures per capita
	Percent	
1992-96	1.24	4.68
1996-98	5.90	-8.98
1998-2000	5.16	-19.66
2000-02	0.37	4.42
2002-04	2.77	-4.24
2004-06	4.00	-9.18
2006-08	2.33	11.62
	Correlation	-0.79

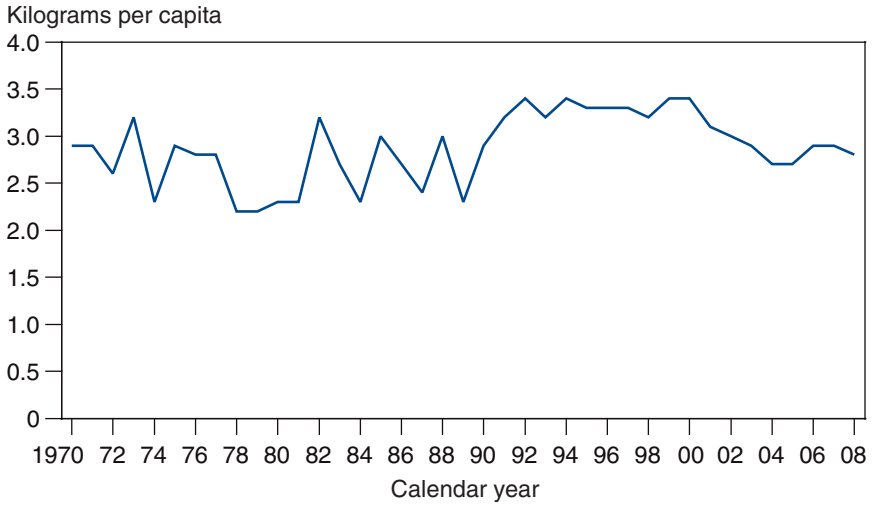
Source: Author calculations based on real GDP data from Instituto Nacional de Estadística y Geografía (INEGI, 2009a), population data from Consejo Nacional de Poblacion (CONAPO, 2009), and expenditure data from Instituto Nacional de Estadística y Geografía (INEGI, 1992-2008).

In the United States, the future of dry bean demand hinges largely on the extent to which people adopt diets that feature higher levels of dry bean consumption. U.S. dry bean demand is substantially lower than Mexican demand on a per capita basis. Annual per capita availability of dry beans in the United States peaked around 5 kilograms in 1942 and has never approached the level currently observed in Mexico (fig. 12). Still, U.S. dry bean producers face a challenge similar to that of their Mexican counterparts—little if any demand growth in their domestic market. During the early 2000s, annual per capita dry bean availability in the United States dropped as low as 2.7 kilograms, caused partly by the increased popularity of low-carbohydrate diets. At a national level, this change corresponded to a total decline in annual availability of roughly 150,000 mt (300 million people times 0.5 kilograms), or 13 percent of U.S. dry bean production in 2006.

U.S. dry bean demand has experienced a modest resurgence since 2004, with annual per capita dry bean availability stabilizing just under 3 kilograms. Factors behind this development include the declining popularity of low-carbohydrate diets, higher than average consumption by the country's growing Latino population, and efforts to promote dry bean consumption (Lucier and Jerardo, 2006). The most recent observation of annual per capita availability is 2.8 kilograms in 2008.

Further efforts to publicize the health benefits associated with dry bean consumption may hold the key to increasing U.S. dry bean demand. The 2005 edition of the *Dietary Guidelines for Americans* recommends the consumption of 2-1/2 cups of vegetables per day for a reference daily intake of 2,000 calories, as well as the selection of vegetables "from all five vegetable subgroups (dark green, orange, legumes, starchy vegetables, and other vegetables) several times a week" (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005: p. 24). Loss-adjusted data indicate that daily per capita vegetable consumption in the United States continues to be around 1.7 cups (USDA, Economic Research

Figure 12
Annual availability of dry beans in the United States, 1970-2008



Source: Author calculations based on data from USDA, Economic Research Service (2010a).

Service, 2010d). Thus, increased per capita dry bean consumption would be one way to move toward the recommended level of vegetable consumption (Young and Cantor, 1999). As a low-fat food, dry beans also can play a role in meeting dietary recommendations to "make choices that are lean, low-fat, or fat-free" when "selecting and preparing meat, poultry, dry beans, and milk or milk products" (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2005: p. 30).

Conclusions

Liberalization of U.S.-Mexico dry bean trade concluded on January 1, 2008, with the removal of NAFTA's transitional TRQs. The gradual loosening of these trade restrictions during 1994-2007 enabled U.S. dry beans to provide a larger and steadier share of Mexican supply. Today, imports supply about 10 percent of Mexico's dry bean consumption, compared with 5 percent during the decade that preceded NAFTA (1984-93).

With the completion of NAFTA's transition to regional free trade, the outlook for the integrated North American dry bean market is shaped primarily by market forces and domestic agricultural programs, rather than anticipated reductions in tariffs and quotas. On the supply side, the restructuring of Mexico's dry bean sector will continue, most likely toward a smaller number of producers working larger plots of land. Recent improvements in yields, especially on irrigated lands, suggest that further yield growth is possible. The Mexican Government operates a number of programs designed to improve the competitiveness of the dry bean sector, focusing on direct income support, commercialization, access to credit, the adoption of superior technologies, and the organization of productive chains and production systems. Some of these programs have encouraged dry bean producers to pursue other agricultural activities instead.

In the U.S. dry bean sector, the number of producers has steadily decreased over the past two decades, and the area devoted to the crop has stabilized over the last several years to around 534,000 hectares. Output growth is constrained by market opportunities as well as competition for land and other inputs. Recent yields exhibit a modest upward trend, due partly to favorable weather. U.S. producers who aspire to increase their dry bean sales outside the NAFTA region must contend with strong competition from other major producing countries, such as Burma (Myanmar) and China. Over the last several years, U.S. producers have had some success in recouping some of the previously lost share in the international navy bean market because of a contraction in Canadian production and a weaker U.S. dollar. Nevertheless, Mexico will remain a major destination for U.S. dry bean sales given Mexico's high levels of per capita dry bean consumption, the close proximity of Mexico to the United States, and the duty-free access to the Mexican market afforded by NAFTA.

On the demand side, the prospects for dry bean producers and marketers are challenging in both Mexico and the United States. Per capita net disappearance of dry beans in Mexico is likely to decline even further from its current level of about 11 kilograms per year, as consumers diversify their diets and shift away from the traditional staples of beans and tortillas. Further declines in per capita consumption will limit the opportunities in Mexico's dry bean market for both Mexican producers and U.S. exporters. For the time being, however, beans are an indispensible source of protein and other nutrients for many Mexicans, particularly in households of modest means. Expenditure data suggest that beans are an inferior good in Mexico: consumption declines when income increases, and consumption increases when income declines.

In the United States, per capita annual availability of dry beans has rebounded to about 3 kilograms per year—about a fourth of the level in Mexico. Greater U.S. consumption of dry beans on a per capita basis could potentially have tremendous impacts on dry bean demand. For example, a 1-kilogram increase in annual U.S. per capita consumption would translate into an additional 300,000 mt in annual demand, requiring over 150,000 hectares in additional dry bean area. Over the long term, the demand-side challenge facing U.S. and Mexican dry bean sectors is fundamentally the same: how to cultivate demand for a product that is such a small dietary component for many higher-income consumers.

References

Agriculture and Agri-food Canada, Specialty Crops Section. *Statistical Overview of the Canadian Pulse Industry: 2008*, June 24, 2009, http://www.ats-sea.agr.gc.ca/can/4753-eng.htm.

Ag Weekly Online. "Bean Commission awarded specialty crop grant," October 5, 2009, http://www.agweekly.com/articles/2009/10/05/commodities/crop/crop41.txt.

Banco de México. *Índices de Precios al Consumidor y UDIS: Índice de Precios al Consumidor: Por Objeto del Gasto y Actividad Económica: INPC Nacional: Mensual*, 2010, http://www.banxico.org.mx/politica-monetaria-e-inflacion/estadisticas/inflacion/indices-precios.html.

Colegio de Posgraduados. *Proyecto Estratégico de Apoyo a la Cadena Productiva de los Productores de Maíz y Frijol 2008: PROMAF II: Acompañamiento Técnico e Indicadores de Impacto: Informe*, 2009 (circa).

Consejo Nacional de Población (CONAPO). "República Mexicana: Indicadores Demográficos, 1990-2050," spreadsheet, 2009, http://www.conapo.gob.mx/00cifras/00indicadores/00.xls.

Dickerson, Marla. "Steeped in a New Tradition," *Los Angeles Times*, October 21, 2005, http://articles.latimes.com/2005/oct/21/business/fi-ramennation21.

Figueroa Sandoval, Benjamin. "Engorda de ovinos con productos regionales: raciones a base de nopal deshidratado y frijol extrusado," presentation, 2009.

Food and Agriculture Organization of the United Nations (FAO). *FAOSTAT: Production: Crops*, 2009a, http://faostat.fao.org/site/567/default.aspx#ancor.

Food and Agriculture Organization of the United Nations (FAO). *FAOSTAT: Trade: TradeSTAT: Crop and Livestock Production*, 2009b, http://faostat.fao.org/site/535/default.aspx#ancor.

Global Trade Information Services, Inc. *World Trade Atlas*, internet version 4.7 b, Columbia, South Carolina, 2010.

Guzmán, Abel. "El Cultivo de Frijol en Durango," presentation at the 2010 International-U.S. Dry Bean and Other Specialty Crop Congress, Cancún, Quintana Roo, Mexico, February 12, 2010.

Idaho State Department of Agriculture. *International Trade and Domestic Market Development*, 2006, http://www.agri.state.id.us/Categories/AboutISDA/ annual_marketing.php.

Instituto Nacional de Estadística y Geografía (INEGI). *Banco de Información Económica*, 2009a, http://dgcnesyp.inegi.org.mx/bdiesi/bdie.html.

Instituto Nacional de Estadística y Geografía (INEGI). "Cuadro 8: Unidades de Producción con Cultivos en el Ciclo Primavera-Verano 2007 Según Superficie Sembrada, Cosechada y Producción Obtenida por Cultivo y Entitad Federativa," *Estados Unidos Mexicanos: Censo Agropecuario 2007: VIII Censo Agrícola, Ganadero, y Forestal*, Aguascalientes, Mexico, 2009b, http://www.inegi.org.mx/sistemas/TabuladosBasicos/Default.aspx?c=17177&s=est.

Instituto Nacional de Estadística y Geografía (INEGI). "Cuadro 9: Unidades de Producción con Cultivos en el Ciclo Otoño-Invierno 2006-2007 Según Superficie Sembrada, Cosechada y Producción Obtenida por Cultivo y Entitad Federativa," *Estados Unidos Mexicanos: Censo Agropecuario 2007: VIII Censo Agrícola, Ganadero, y Forestal*, Aguascalientes, Mexico, 2009c, http://www.inegi.org.mx/sistemas/TabuladosBasicos/Default.aspx?c=17177&s=est.

Instituto Nacional de Estadística y Geografía (INEGI). *Encuesta Nacional de Ingresos y Egresos de Hogares*, 1992-2008, http://www.inegi.org.mx/inegi/default.aspx?s=est&c=10656.

Johnson, Demcey, Barry Krissoff, Edwin Young, Linwood Hoffman, Gary Lucier, and Vince Breneman. *Eliminating Fruit and Vegetable Planting Restrictions: How Would Markets Be Affected?* U.S. Department of Agriculture, Economic Research Service, Economic Research Report No. 30, November 2006, http://www.ers.usda.gov/publications/err30/.

Juárez, Benjamin, and Mark Ford. *Mexico Grain and Feed Annual*, U.S. Department of Agriculture, Foreign Agricultural Service, Global Agricultural Information Network (GAIN) Report No. MX0017, March 12, 2010, http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Mexico%20City_Mexico_3-12-2010.pdf.

Lucier, Gary, and Alberto Jerardo. *Vegetables and Melons Outlook*, U.S. Department of Agriculture, Economic Research Service, Electronic Outlook Report VGS-314, April 2006, http://www.ers.usda.gov/publications/vgs/2006/04apr/vgs314.pdf.

Lucier, Gary, Rachael Dettmann, and Michelle Da Pra. *Vegetables and Melons Outlook*, U.S. Department of Agriculture, Economic Research Service, Outlook Report VGS-333, June 25, 2009, http://usda.mannlib.cornell.edu/usda/current/VGS/VGS-06-25-2009.pdf.

Lucier, Gary, Susan Pollack, Mir Ali, and Agnes Perez. *Fruit and Vegetable Backgrounder*, U.S. Department of Agriculture, Economic Research Service, Electronic Outlook Report VGS-313-01, April 2006, http://www.ers.usda.gov/publications/VGS/apr06/vgs31301/vgs31301.pdf.

Rodríguez Gómez, María Guadalupe. *La Comercialización en la Cadena Agroindustrial del Frijol: Los Casos de Zacatecas y Sinaloa*, Guadalajara, Jalisco: Universidad de Guadalajara, 2006.

Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Fideicomiso de Riesgo Compartido (SAGARPA/FIRCO).

PROMAF 2010, January 12, 2010, http://www.firco.gob.mx/promaf2010/docs/Presentacion_PROMAF_2010.pdf.

Secretaría de Agricultura, Ganaderia, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP). *Agricultura: Producción Annual: Cierre de la Producción Agrícola por Cultivo*, 2010a, http://www.siap.gob.mx/index.php?option=com_wrapper&view=wrapper&Itemid=350.

Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación, Servicio de Información Agroalimentaria y Pesquera (SAGARPA/SIAP). *Balanzas Disponibilidad-Consumo de Productos Agrícolas and Históricos de Balanzas Disponsibilidad-Consumo*, May 19, 2010b, http://www.siap.gob.mx/index.php?option=com_content&view=article&id=58&Itemid=379.

Secretaría de Economía. "Anuarios Estadísticos de Mercados Nacionales: Granos y Semillas," *Sistema Nacional de Información e Integración de Mercados*, 2010, http://www.economia-sniim.gob.mx/Nuevo/.

Stewart-Williams, Kathy. "Idaho Certified Bean Seed for Mexico," presentation at Expo Agro Chihuahua, August 14, 2009, http://www.expoagrochihuahua.com/expo/kathy%20stewart.pdf.

Thornsbury, Suzanne, Lourdes Martinez, and David Schweikhardt. *Michigan: A State at the Intersection of the Debate Over Full Planting Flexibility*, U.S. Department of Agriculture, Economic Research Service, Contractor and Cooperator Report No. 29, February 2007, http://ddr.nal.usda.gov/dspace/bitstream/10113/33691/1/CAT31036247.pdf.

U.S. Department of Agriculture, Agricultural Marketing Service, Livestock and Seed Division, Market News Branch. *Bean Market News*, GL_GR851, Greeley, Colorado, various issues, 2005-09, http://search.ams.usda.gov/mnsearch/mnsearch.aspx.

U.S. Department of Agriculture, Economic Research Service. *2008 Farm Bill Side-By-Side*, April 15, 2009, http://www.ers.usda.gov/Data/FoodConsumption/.

U.S. Department of Agriculture, Economic Research Service. *Food Availability: Spreadsheets: Legumes*, February 1, 2010a, http://www.ers.usda.gov/Data/FoodConsumption/FoodAvailSpreadsheets.htm#vegfr.

U.S. Department of Agriculture, Economic Research Service. *Nominal Monthly Country Exchange Rates*, September 22, 2010b, http://www.ers.usda.gov/Data/ExchangeRates/.

U.S. Department of Agriculture, Economic Research Service. *Real Monthly Country Exchange Rates*, September 22, 2010c, http://www.ers.usda.gov/data/exchangerates/.

U.S. Department of Agriculture, Economic Research Service. *U.S. Per Capita Loss-Adjusted Food Availability: Custom Reports*, March 19, 2010d, http://www.ers.usda.gov/Data/FoodConsumption/app/loss_adjusted.aspx.

U.S. Department of Agriculture, Economic Research Service, Farm Policy Team. *Farm and Commodity Policy: Glossary*, September 21, 2009, http://www.ers.usda.gov/Briefing/FarmPolicy/Glossary.htm.

U.S. Department of Agriculture, Foreign Agricultural Service. *Global Agricultural Trade System*, 2010, http://www.fas.usda.gov/gats/Default.aspx.

U.S. Department of Agriculture, National Agricultural Statistics Service. *Crop Production*, various issues, January 1991-2010, http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1047.

U.S. Department of Agriculture, National Agricultural Statistics Service. "Table 33. Specified Crops by Acres Harvested: 2007 and 2002," *2007 Census of Agriculture: United States Summary and State Data: Volume 1, Geographic Area Series: Part 51*, AC-07-A-51, December 2009a (updated version), http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_US/st99_1_033_033.pdf.

U.S. Department of Agriculture, National Agricultural Statistics Service. *Crop Values: 2009 Summary*, February 2010a, http://usda.mannlib.cornell.edu/usda/current/CropValuSu/CropValuSu-02-19-2010_new_format.pdf.

U.S. Department of Agriculture, National Agricultural Statistics Service. *2007 Census of Agriculture: Quick Stats Ad-hoc Query Tool*, 2010b, http://quickstats.nass.usda.gov/.

U.S. Department of Agriculture, National Agricultural Statistics Service. "Table 34. Specified Crops by Acres Harvested: 2002 and 1997," *2002 Census of Agriculture: United States Summary and State Data: Volume 1, Geographic Area Series: Part 51*, AC-02-A-51, June 2004, http://www.agcensus.usda.gov/Publications/2002/Volume_1,_Chapter_1_US/st99_1_034_034.pdf.

U.S. Department of Agriculture, National Agricultural Statistics Service. "Table 42. Specified Crops by Acres Harvested: 1997 and 1992," 1*997 Census of Agriculture: United States Summary and State Data: Volume 1, Geographic Area Series: Part 51*, AC97-A-51, March 1999, http://www.agcensus.usda.gov/Publications/1997/Vol_1_Chapter_1_U._S._National_Level_Data/us-51/us1_42.pdf.

U.S. Department of Agriculture, National Agricultural Statistics Service. "Table 42. Specified Crops by Acres Harvested: 1992 and 1987," *1992 Census of Agriculture: Volume 1, Chapter 1: U.S. National Level Data*, October 1994, http://www.agcensus.usda.gov/Publications/1992/v1-tbl42.pdf.

U.S. Department of Agriculture, Risk Management Agency (RMA). *Summary of Business Reports and Data: Pregenerated SOB Reports:*

National Summary by Crop, October 18, 2010, http://www.rma.usda.gov/data/sob.html.

U.S. Department of Health and Human Services, and U.S. Department of Agriculture. *Dietary Guidelines for Americans 2005*, 2005, http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2005/2005DGPolicyDocument.pdf.

U.S. Department of Labor, Bureau of Labor Statistics. *Consumer Price Index: CPI Databases: All Urban Consumers (Current Series)*, 2009, http://www.bls.gov/cpi/#data.

Vallejo Díaz, Jesús. "Producción de Frijol en Zacatecas," presentation at the 2010 International-U.S. Dry Bean and Other Specialty Crop Congress, Cancún, Quintana Roo, Mexico, February 12, 2010.

Vollrath, Thomas. *North American Agricultural Market Integration and Its Impact on the Food and Fiber System*, U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin No. 784, September 2003, http://www.ers.usda.gov/publications/aib784/.

Wilkins, Dave. "Trade Trip Provides Optimism on Seed Beans," *Capital Press*, September 6, 2009, http://cps.live.mediaspanonline.com/idaho/dw-seed-beans-090409.

Wingett, Yvonne. "Latino Importer Knows His Beans," *Arizona Republic*, January 28, 2006, http://www.azcentral.com/arizonarepublic/news/articles/0128beanimporters.html.

World Bank, Agriculture and Rural Development Team, Sustainable Agriculture Department, Latin America and the Caribbean Region, and Instituto Mexicano para la Competividad. *Mexico: Integration of the North American Market for Sensitive Agricultural Commodities: Policy Notes Overview and Dry Bean Market–Implications for Mexican Producers and Consumers*, December 2007, http://siteresources.worldbank.org/EXTLACREGTOPRURDEV/Resources/503766-1225476272295/publicacion4.pdf.

Young, C. Edwin, and Linda Scott Cantor. *Moving Toward the Food Guide Pyramid: Implications for U.S. Agriculture*, U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 779, May 1999, http://www.ers.usda.gov/publications/aer779/.

Young, C. Edwin, Monte L. Vandeveer, and Randall D. Schnepf. "Production and Price Impacts of U.S. Crop Insurance Programs," *American Journal of Agricultural Economics* Vol. 83, No. 5, Proceedings Issue (December 2001), pp. 1196-1203.

Appendix Tables

Appendix table 1
Tariff lines considered as dry common beans in this report

HTS code	Description
0713322000	Small red (Adzuki) beans (*Phaseolus* or *Vigna* Angularis), except seed, dried, shelled
0713333000	Navy or pea beans, except seed, dried, shelled
0713335000	Kidney beans, except seed
0713335020	Dark red kidney beans, except seed, dried, shelled
0713335040	Light red kidney beans, except seed, dried, shelled
0713335050	Pink beans, except seed
0713335060	Kidney beans, NESOI, including white pea beans (*Phaseolus* vulgaris), except seed, dried, shelled
0713335070	Kidney beans, except seed, other
0713395010	Black beans (*Vigna* spp., *Phaseolus* spp.), except seed, dried, shelled
0713395020	Great Northern beans (*Vigna* spp., *Phaseolus* spp.), except seed, dried, shelled
0713395050	Pinto beans (*Vigna* spp., *Phaseolus* spp.), except seed, dried, shelled
0713395060	White beans (*Vigna* spp., *Phaseolus* spp.), NESOI, except seed, dried, shelled
0713395070	Cranberry beans, except seed
0713395080	Beans (*Vigna* spp., *Phaseolus* spp.), NESOI, except seed, dried, shelled
0713395090	Beans, except seed, other

HTS = Harmonized tariff schedule.
NESOI = Not elsewhere specified or included.

Source: Author compilation of tariff lines in USDA, Foreign Agricultural Service (2010).

Appendix table 2

NAFTA's transitional TRQ for Mexican dry common bean imports from the United States and Canada, 1994-2008

Year	Over-quota tariff	Minimum duty-free quota, originating from:		Imports from United States		Imports from Canada	
		United States	Canada	U.S. statistics	Mexican statistics	Mexican statistics	Canadian statistics
	Percent				*Metric tons*		
1994	133.4	50,000	1,500	34,310	--	--	--
1995	127.8	51,500	1,545	17,712	24,049	696	68
1996	122.3	53,045	1,591	105,592	119,974	4,877	361
1997	116.7	54,636	1,639	61,892	86,649	1,685	60
1998	111.2	56,275	1,688	169,922	189,980	6,336	2,791
1999	105.6	57,964	1,739	73,006	121,619	1,736	1,918
2000	93.9	59,703	1,791	58,855	84,708	1,791	2,257
2001	82.1	61,494	1,845	72,860	115,675	8,600	5,526
2002	70.4	63,339	1,900	68,816	99,463	4,189	3,204
2003	58.7	65,239	1,957	61,001	76,232	4,389	2,117
2004	46.9	67,196	2,016	39,193	58,292	1,946	288
2005	35.2	69,212	2,076	62,681	74,323	1,867	1,169
2006	23.5	71,288	2,139	108,067	122,936	6,149	7,102
2007	11.8	73,427	2,203	79,994	85,341	4,113	3,309
2008	Free	Free	Free	99,110	87,339	5,486	3,867

TRQ = Tariff rate quota.
-- = Data not available.

Source: North American Free Trade Agreement (NAFTA) tariff schedule (TRQ information); Statistics Canada, as cited by Global Trade Information Services, Inc. (2010) (Canadian trade statistics); Mexico, Secretariat of Economy (Mexican trade statistics); U.S. Department of Commerce, Census Bureau, *Foreign Trade Statistics*, as cited by USDA, Foreign Agricultural Service (2010) (U.S. trade statistics).

Appendix table 3

Leading world exporters of dry beans: 1991-93 and 2005-07

Rank	Country	Annual average exports 1991-93	Annual average exports 2005-07	Change
		Metric tons (thousands)		*Percent*
1	China	455	779	71
2	Burma (Myanmar)	376	511	36
3	**United States**	**357**	**312**	**-13**
4	**Canada**	**90**	**302**	**237**
5	Argentina	187	236	26
6	United Kingdom	13	53	319
7	Kyrgyzstan	--	41	--
8	Thailand	105	37	-65
9	Australia	16	36	130
10	Nicaragua	2	32	1,356
11	Ethiopia	*	32	81,988
12	Egypt	2	32	1,290
13	Colombia	9	27	194
14	Peru	3	26	671
15	Bolivia	8	25	199
16	Indonesia	2	22	999
17	Belgium	4	20	405
18	Uganda	24	19	-21
19	Netherlands	32	18	-43
20	**Mexico**	**8**	**18**	**109**
	World total	1,976	2,755	39

-- = Data not available.

*Exports averaged less than 500 metric tons during 1991-93.

Notes: **Countries in bold designate NAFTA countries.** Data exclude broad beans, horse beans, and cowpeas. The definition of dry beans used by the Food and Agriculture Organization of the United Nations (FAO) differs somewhat from that used by USDA, so the data above do not necessarily match other figures in this report.

Source: Food and Agriculture Organization of the United Nations (2009b).

Appendix table 4

Leading world importers of dry beans: 1991-93 and 2005-07

Rank	Country	Annual average imports 1991-93	Annual average imports 2005-07	Change
		Metric tons (thousands)		*Percent*
1	India	53	470	791
2	**United States**	**17**	**157**	**824**
3	Cuba	--	135	--
4	United Kingdom	95	121	27
5	Japan	105	120	14
6	Italy	41	101	148
7	**Mexico**	**13**	**101**	**702**
8	Brazil	91	89	-2
9	Pakistan	24	77	225
10	South Africa	54	70	28
11	Venezuela	60	68	14
12	Spain	35	54	53
13	Korea, Republic of	25	52	105
14	Algeria	31	51	63
15	France	59	48	-18
16	China	58	48	-17
17	Malaysia	23	42	84
18	Kenya	19	40	109
19	Portugal	21	39	90
20	Costa Rica	1	38	3,091
21	Angola	30	37	23
22	Netherlands	67	36	-45
23	Turkey	3	35	979
24	Indonesia	45	35	-22
25	**Canada**	**11**	**35**	**206**
	World total	1,626	2,766	70

-- = Data not available.

Notes: **Countries in bold designate NAFTA countries**. Data exclude broad beans, horse beans, and cowpeas. The definition of dry beans used by the Food and Agriculture Organization of the United Nations (FAO) differs somewhat from that used by USDA, so the data above do not necessarily match other figures in this report.

Source: Food and Agriculture Organization of the United Nations (2009b).

Appendix table 5

Leading world producers of dry beans: 1991-93 and 2006-08

Rank	Country	Annual average production 1991-93	Annual average production 2005-07	Change
		Metric tons (thousands)		*Percent*
1	India	3,558	3,710	4
2	Brazil	2,673	3,363	26
3	Myanmar	471	2,501	430
4	China	848	1,305	54
5	**Mexico**	**1,128**	**1,167**	**3**
6	**United States**	**1,183**	**1,137**	**-4**
7	Tanzania	223	487	118
8	Uganda	404	433	7
9	Kenya	420	409	-3
10	Argentina	206	329	59
11	Indonesia	761	322	-58
12	**Canada**	**126**	**305**	**142**
13	Korea, Democratic People's Republic of	310	300	-3
14	Rwanda	174	281	62
15	Iran	176	223	26
16	Burundi	341	206	-39
17	Ethiopia	32	201	536
18	Cameroon	90	200	122
19	Nicaragua	71	176	147
20	Pakistan	92	173	89
	World total	16,168	20,321	26

Notes: **Countries in bold designate NAFTA countries**. Data exclude broad beans, horse beans, and cowpeas. The definition of dry beans used by the Food and Agriculture Organization of the United Nations (FAO) differs somewhat from that used by USDA, so the data above do not necessarily match other figures in this report.

Source: Food and Agriculture Organization of the United Nations (2009a).

Appendix table 6

Area harvested, production, and yields of U.S. dry beans, by commercial class: Annual averages, 2007-09

Commercial class	Area harvested	Production	Yield
	Hectares (thousands)	*Metric tons (thousands)*	*Metric tons per hectare*
Navy	86	177	2.05
Great Northern	24	57	2.39
Small white	1	2	2.68
Cranberry	3	5	1.72
Pink	12	25	2.10
Light red kidney	21	42	2.05
Dark red kidney	18	38	2.06
Black	70	132	1.88
Pinto	261	498	1.91
Small red	14	31	2.18
Total	527	1,041	1.98

Note: Total represents only those classes considered as common beans in this report.

Source: USDA, National Agricultural Statistics Service, *Crop Production* (January 2010).

Appendix table 7

Payment rates, target prices, and loan rates according to the 2008 Farm Act for calendar years 2010-12

Commodity	Direct payment rates		Target prices for countercyclical payments		Commodity loan rates	
	English measure	*Metric equivalent (per metric ton)*	*English measure*	*Metric equivalent (per metric ton)*	*English measure*	*Metric equivalent (per metric ton)*
Wheat	$0.52/bu	$19.12	$4.17/bu	$153.31	$2.94/bu	$108.09
Corn	$0.28/bu	$11.02	$2.63/bu	$103.54	$1.95/bu	$76.77
Grain sorghum	$0.35/bu	$13.78	$2.63/bu	$103.54	$1.95/bu	$76.77
Barley	$0.24/bu	$11.01	$2.63/bu	$120.64	$1.95/bu	$89.45
Oats	$0.024/bu	$1.66	$1.79/bu	$123.45	$1.39/bu	$95.86
Upland cotton	$0.0667/lb	$147.05	$0.7125/lb	$1,570.80	$0.52/lb	$1,146.41
Long-grain rice	$2.35/cwt	$51.81	$10.50/cwt	$231.49	$6.50/cwt	$143.30
Medium-grain rice	$2.35/cwt	$51.81	$10.50/cwt	$231.49	$6.50/cwt	$143.30
Soybeans	$0.44/bu	$16.18	$6.00/bu	$220.59	$5.00/bu	$183.82
Peanuts	$36/ton	$39.68	$495/ton	$545.64	$355/ton	$391.32
Other oilseeds	$0.80/cwt	$17.64	$12.68/cwt	$279.55	$10.09/cwt	$222.45
Dry peas	None		$8.32/cwt	$183.43	$5.40/cwt	$119.05
Lentils	None		$12.81/cwt	$282.41	$11.28/cwt	$248.68
Small chickpeas	None		$10.36/cwt	$228.40	$7.43/cwt	$163.80
Large chickpeas	None		$12.81/cwt	$282.41	$11.28/cwt	$248.68

bu = bushel; lb = pound; cwt = hundredweight; and ton = short ton.

Note: Converted to metric equivalent using conversion factors from USDA, National Agricultural Statistics Service (2009).

Source: USDA, Economic Research Service (2009).