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Commodity Highlight: Dry Beans^{1,2}

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The U.S. dry bean sector is unique among the Nation's field crops. In terms of its large farms, capital intensity, and strong export orientation, the sector resembles the U.S. grain and oilseeds sector, and many dry bean farmers in the United States also produce grains or oilseeds. Unlike grains and oilseeds, however, the dry bean sector has experienced little if any overall growth during the past decade. Dry beans are a nutrient-dense food that is both a vegetable and a source of protein, and increased consumption of dry beans would be one way by which the United States could improve the quality of its diet and stimulate dry bean production.

The Sector at a Glance

In 2013, the United States produced about 1.1 million metric tons (24 million hundredweight) of dry beans (including garbanzo and lima beans), with a value of \$977 million and area harvested of about 531,000 hectares (1.3 million acres). Production typically fluctuates from one year to the next, as farmers adjust their area planted in response to expected market conditions, the size of stocks carried over from the previous crop, and other factors, and as varying weather conditions affect yields. Total output, however, has remained fairly stable over the past decade. During 2009-13, annual production averaged about 1.2 million metric tons, and area harvested averaged about 605,000 hectares. The three leading commercial classes produced during that period were pinto (39 percent), navy (15 percent), and black (13 percent).

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² This commodity highlight draws upon material presented at the U.S. Dry Bean Convention in Coeur d'Alene, Idaho, on August 5, 2014. The authors thank the participants in that convention for their attention and feedback. The authors also thank Steve Haley, Andrew Muhammad, Mirvat Sewadeh, and Dan Sturt for their comments and suggestions.

Table 1--The 2014 dry bean crop is likely to be larger than the 2013 crop

State	Area planted with dry edible beans			Change
	2012	2013	2014f	2014f versus 2013
	<i>Thousands of hectares</i>			<i>Percent</i>
United States	705	548	708	29
North Dakota	283	178	283	59
Michigan	81	71	85	20
Nebraska	59	53	71	35
Minnesota	65	51	51	0
Idaho	59	51	57	12
Washington	47	47	53	13
Other States	112	99	109	10

1 hectare = 2.47 acres.

f = Forecasted area planted from USDA, National Agricultural Statistics Service (2014b).

Sources: USDA, National Agricultural Statistics Service (2014a,b).

USDA data for area planted suggest that the 2014 dry bean crop will be about 30 percent larger than the 2013 crop and similar in size to the 2012 crop, with large increases in the top three producing States, North Dakota, Michigan, and Nebraska (table 1). Changes in absolute and relative price levels help to explain the increase in area planted in 2014. First, monthly grower prices during the first half of marketing year (MY) 2013/14 (September 2013 to August 2014) were higher than they were during the corresponding months of the previous MY. This absolute price increase may have been due in part to lower stock levels, as the 2013 crop was smaller than average. Second, the price ratio between dry beans and corn increased between 2012 and 2013, suggesting that the relative returns to dry bean production in 2014 were expected to be higher compared with alternative crops.

Trends in Dry Bean Production

The long-term stability of total dry bean production conceals two related structural changes that have taken place in the U.S. dry bean sector over the past decade. First, the composition of production by commercial class has changed, even though total production has remained roughly the same (table 2). In particular, garbanzo beans are now a more prominent part of U.S. dry bean production. During 2008-13, garbanzo beans accounted for 9 percent of total production, compared with 4 percent during 1998-2003. In 2013, garbanzo bean production reached a record 157,000 metric tons, following 6 years of successive increases. Black beans' share of total production also increased between 1998-2003 and 2008-13, from 7 to 13 percent, due in part to increased exports to Mexico. Using the period of 1998-2003 for the comparison, however, somewhat exaggerates this increase in black beans' share, since the 2001 crop was unusually small due to droughts in Michigan and New York (Lucier and Plummer, 2001). Shares of most commercial classes other than garbanzo and black decreased between 1998-2003 and 2008-13.

Second, the distribution of dry bean production by State has also changed (table 3). Three regions account for the vast majority 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.³ But the total share of production associated with these three regions dropped from about three-fourths to about two-thirds over the past decade. Increased garbanzo bean production in Washington and Idaho helps to explain the increased importance of these two States as dry bean producers, while decreased production of pinto beans in Colorado and of Great Northern beans in Nebraska helps to explain the diminished importance of those producing States.

³ Zahniser et al. (2007) provides more detail about these three regions.

Table 2--Garbanzo and black beans now account for a larger share of total dry bean production than they did a decade ago

Class	Average production		Share of total	
	1999-2003	2009-13	1999-2003	2009-13
	<i>Metric tons (thousands)</i>		<i>Percent</i>	
Total	1,198	1,211	100	100
Pinto	490	477	41	39
Navy (pea bean)	202	178	17	15
Black	90	154	7	13
Garbanzo, total	45	112	4	9
Red kidney, total	96	77	8	6
Great Northern	98	57	8	5
Other	177	155	15	13

Source: USDA, National Agricultural Statistics Service (2014d).

Table 3: U.S. Dry Bean Production by State: 1999-2003 versus 2009-13

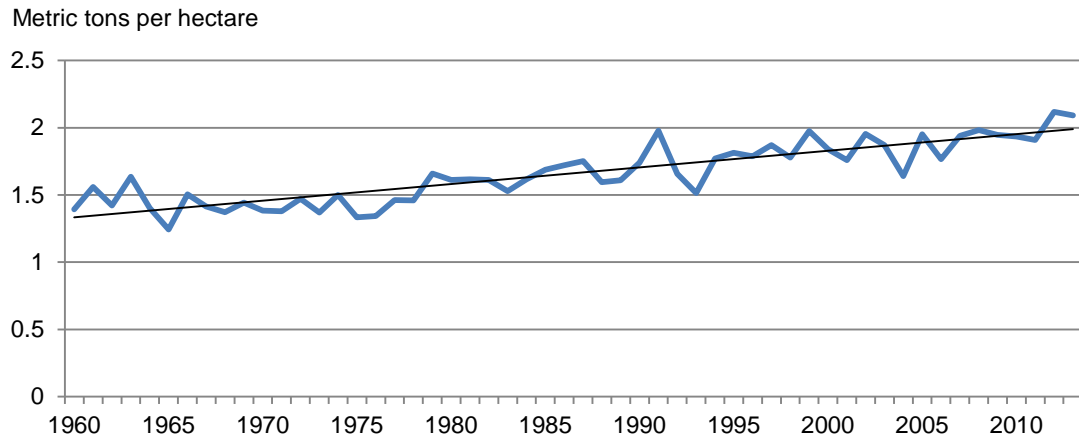
State	Average annual production		Share of total	
	1999-2003	2009-13	1999-2003	2009-13
	<i>Metric tons (thousands)</i>		<i>Percent</i>	
United States	1,198	1,211	100	100
North Dakota	367	396	31	33
Michigan	178	162	15	13
Nebraska	152	124	13	10
Minnesota	100	121	8	10
Idaho	79	107	7	9
Washington	30	75	3	6
California	83	60	7	5
Wyoming	30	40	3	3
Colorado	84	37	7	3
Other States	95	89	8	7

Source: USDA, National Agricultural Statistics Service (2014).

U.S. dry bean yields continue to rise (fig. 1). In 2013, the national average yield (all commercial classes) equaled 2.1 metric tons per hectare. The year before, this yield surpassed 2 metric tons per hectare for the very first time. This trend of rising yields is present for almost all the major commercial classes, even though yields differ substantially by class. During 2009-13, the average yield ranged from 1.7 metric tons per hectare for cranberry beans to 2.7 metric tons per hectare for baby lima beans. This wide range is due to the influence of irrigation and region of production on yields.

The 2012 Agricultural Census suggests that the trend toward further concentration in the dry bean sector has abated, at least for the time being (table 4). Between 1987 and 2007, the number of farms producing dry beans dropped from about 15,900 to 6,200, while the area of dry beans harvested per farm climbed from 42 hectares to 94 hectares. The 2012 Census, however, indicates that the number of dry bean farm has increased to nearly 6,900, while area harvested per farm has expanded to 96 hectares. These data also illustrate how the area devoted to the sector changes from one year to the next, as the 2012 crop featured larger than average quantities of area harvested and production.

Figure 1
U.S. Dry Bean Yields Continue to Trend Upward, 1960-2013



Source: USDA, National Agricultural Statistics Service.

Table 4--U.S. dry bean sector: number of farms and area harvested, 1987-2012

Census year	Number of farms	Area harvested	Average dry bean area per farm
	<i>Number</i>	<i>Hectares</i>	
2012	6,896	664,817	96
2007	6,236	589,040	94
2002	8,647	684,638	79
1997	11,348	700,875	62
1992	13,201	626,764	47
1987	15,914	675,865	42

Note: Data do not include lima beans.

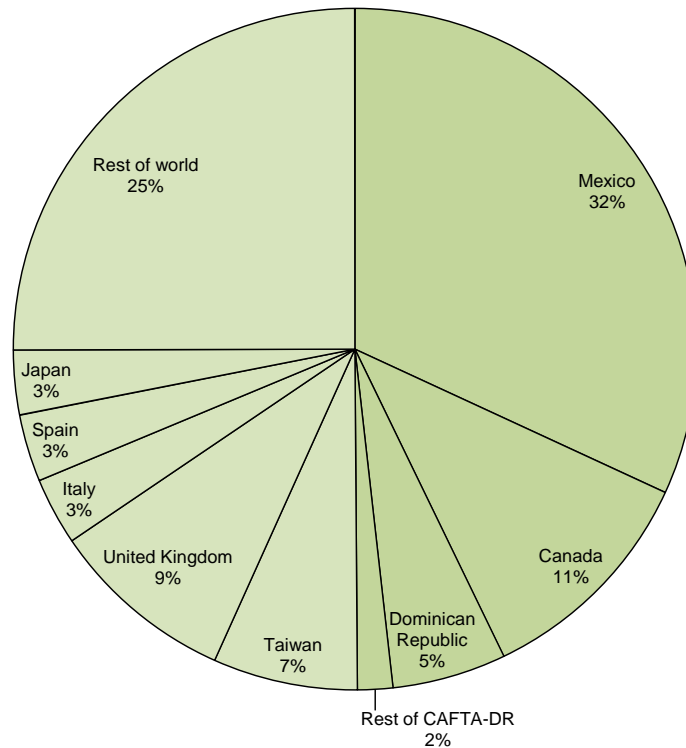
Sources: USDA, National Agricultural Statistics Service (2014d, 2009, 2004, 1999, 1994).

International Trade Is Important to the Sector

The U.S. dry bean sector has become more integrated with the international market over the past decade, due in part to the broader market access afforded by such trade accords as the North American Free Trade Agreement (NAFTA) and the Central America-United States-Dominican Republic Free Trade Agreement (CAFTA-DR). Together, the NAFTA and CAFTA-DR countries purchased about half of total U.S. dry bean exports during MY 2008/09 to 2012/13 (September 2008 to August 2013) (fig. 2). Exports were the destination for 24 percent of U.S. dry bean production during this period, while imports supplied 15 percent of U.S. consumption. During MY 1998/99 to 2002/03, these shares were 18 percent and 9 percent, respectively.

Export growth takes on heightened importance for U.S. dry bean farmers given that per capita dry bean consumption in the United States has not increased much in recent years. Exports averaged about 479,000 metric tons per year (with an average annual value of \$361 million) during MY 2008/09 to 2012/13, compared with 354,000 metric tons (\$191 million) for MY 1998/99 to 2002/03. Imports provide an opportunity to supplement U.S. supplies and to access varieties and commercial classes that are not produced in the United States in large quantities. During MY 2008/09 to 2012/13, imports averaged about 139,000 metric tons per year (\$153 million), compared with 77,000 metric tons (\$45 million) for MY 1998/99 to 2002/03.

Figure 2
The NAFTA and CAFTA-DR countries purchased about half of U.S. dry bean exports during MY 2008/09 to 2012/13



Data include garbanzo and lima beans and are for MY 2008-09 to 2012-13, when total U.S. dry bean exports (to all countries) averaged about 479,000 metric tons per year. NAFTA = North American Free Trade Agreement, whose members are the United States, Canada, and Mexico. CAFTA-DR = Central America-United States-Dominican Republic Free Trade Agreement, whose members are the United States, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua.
 Source: USDA, Foreign Agricultural Service (2014).

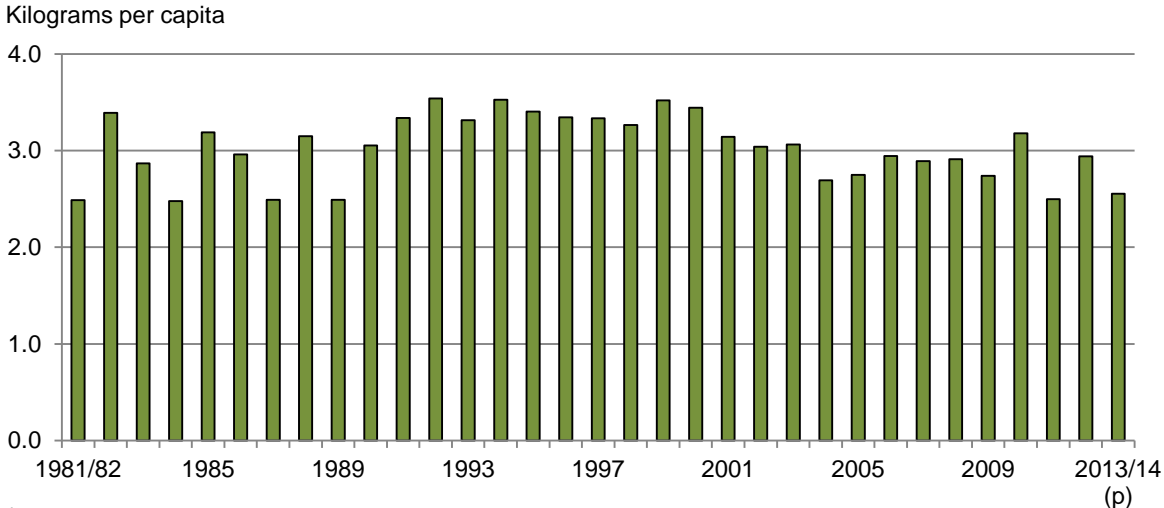
The composition of U.S. dry bean exports by commercial class differs from the composition of corresponding imports. U.S. trade data contain detailed information about the classes and varieties of dry bean trade, although there is some question as to whether these details are consistently and correctly identified over time. According to the available data, the leading classes exported during MY 2008/09 to 2012/13 in terms of volume were pinto (23 percent), black (19 percent), and navy (18 percent), while the leading classes imported were *Vigna mungo* and *Vigna radiata* (28 percent combined), garbanzo (14 percent), and black (13 percent). Some commercial classes are substitutes for others, and this provides U.S. dry bean exporters with short-term marketing opportunities in response to production shortfalls in other countries.

Dietary Changes Shape the Prospects for Domestic Demand

The future of U.S. dry bean demand hinges largely on the extent to which people adopt diets featuring higher levels of dry bean consumption. Annual per capita availability of dry beans in the United States peaked around 5 kilograms (11 pounds) in 1942, and so far during the 21st century, annual availability has averaged 2.9 kg (6.4 lbs) per capita (fig. 3) (1 kg = 2.2 lbs). Despite 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, there are no signs in the data of a long-term upward trend in dry bean consumption at the per capita level. The most recent estimate of annual per capita availability is 2.6 kilograms (5.7 lbs) for MY 2013/14.

Further efforts to publicize the health benefits associated with dry bean consumption may hold the key to increasing U.S. dry bean demand. The 2010 edition of *Dietary Guidelines for Americans* emphasizes that “Americans currently consume too much sodium and too many calories from solid fats, added sugars, and refined grains” and recommends that Americans consume more dry beans, along with other nutrient-dense foods, given that dry beans are both a vegetable and a protein food (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2010: ix). For a reference daily intake of 2,000 calories, the publication recommends that Americans consume about 1-1/2 cups (cooked) of beans and peas per week (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2010: 81). Adopting this recommendation would correspond to an approximate doubling of U.S. dry bean consumption. Such an increase would be a historic event for the U.S. dry bean sector, raising per capita consumption to new levels and bringing hundreds of thousands of hectares of more farmland into dry bean production.

Figure 3
Annual per capita dry bean availability is less than 3 kilograms



(p) = Preliminary. 1 kg = 2.2 lbs.
 Source: Prepared by USDA, Economic Research Service, using data from 2013 *Vegetables and Pulses Yearbook* report.

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