The Dry Pea and Lentil Industry: United States vs. Canada

This section briefly discusses market developments in the dry pea and lentil industry in the United States in terms of their supply, demand, and factors that affect net returns. The development of the dry pea industry in Canada is also discussed to provide insights into the prospects of developing feed markets for dry peas in the United States.

U.S. Production of Dry Peas and Lentils

The U.S. dry pea crop consists mainly of green and yellow peas, with the former more common and the latter expanding rapidly. In the 2004/05 marketing year, which began on July 1, 2004, green peas accounted for 75 percent of all dry pea production, and yellow peas accounted for 20 percent (with other pea varieties accounting for the rest). Dry peas are destined for both food (the term for human use) and a small feed market, while lentils are destined largely for the food market. Until 2007 for dry peas and 2006 for lentils, acreage planted to these pulse crops expanded in the United States. In 2006, U.S. planted acreage reached 925,500 acres for dry peas and 429,000 acres for lentils, compared with 308,700 and 226,000 acres in 2002 (USDA, 2004; USDA, Nov. 9, 2006).[2] U.S. production in 2006 reached 13.2 million hundredweight (cwt) for dry peas and 3.2 million for lentils.

Traditionally, dry pea and lentil production was concentrated within a 90-mile radius of Pullman, Washington—an area called the Palouse that also encompasses portions of nearby Idaho and Oregon. Pea and lentil growers in the Palouse are able to produce and pack a large percentage of top-grade product that commands a premium price, a fact that—along with the strength of the dollar—sometimes placed exports of U.S. dry peas and lentils at a disadvantage before the 2002 farm legislation. The Marketing Loan Program has served as an income support, providing growers with incentives to expand dry pea and lentil acreage, particularly when market prices fall below the loan rate. The lower priced product grown in the upper Midwest (mainly in North Dakota and Montana) has largely moved into export markets for use as both human food and animal feed. Meanwhile, growers in the better quality, higher cost Palouse area appear to be still responding to market signals from the human food market and have yet to expand their production area.

U.S. dry pea production started to increase in 2000, due to a 36-percent increase in planted acreage in North Dakota. This expansion was largely attributed to an increase in the expected dry pea yield and to lower costs of production. The 2002 Farm Act created further incentive to expand production. After its passage, most of the increased production of dry peas was attributed to higher acreage, thought to have been largely triggered by the Marketing Loan Program established by the act (World Perspectives, Inc.).

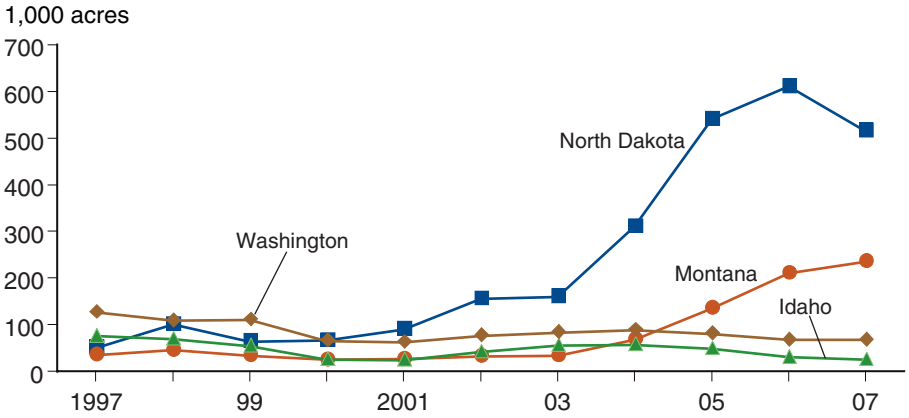
Acreage expansion for dry peas was particularly dramatic in North Dakota and Montana for the 2004 and 2005 crops, but it slowed down in 2006 (fig. 2).[3] In addition to the price protection offered by the Marketing Loan Program, higher expected yield, lower costs of production, and the benefits of dry peas as a rotation crop contributed to higher expected returns for dry peas

[2]The use of 2002 as the reference year is due to the fact that the 2002 Farm Act was not signed into law until mid-May of that year—too late to have an impact on farmers' planting decisions (Lin and Dismukes). While many producers may have perceived the likelihood of having the Marketing Loan Program for pulse crops included in the farm legislation, few knew with certainty what the loan rate would be at planting decision time for the 2002 dry pea and lentil crops.

[3]Most of the growth in North Dakota reportedly was in yellow peas, which are easier to grow and higher yielding. As a result, yellow peas were the choice for most new growers. Lower expected yield for dry peas, and a greater increase in the expected farm price for spring wheat than for dry peas, contributed to the slowdown in dry pea acreage expansion in 2006.

Figure 2

Planted area for dry peas in North Dakota, Montana, Idaho, and Washington: 1997-2007[1]



[1]Excludes chickpeas.

Sources: USDA, National Agricultural Statistics Service, *Field Crops* and *Crop Production Annual*.

than for spring wheat—the major alternative crop for dry pea farmers—in North Dakota and Montana than in the western region. As a result, the bulk of production growth in recent years came from expanded acreage in North Dakota and, to a much lesser degree, Montana.

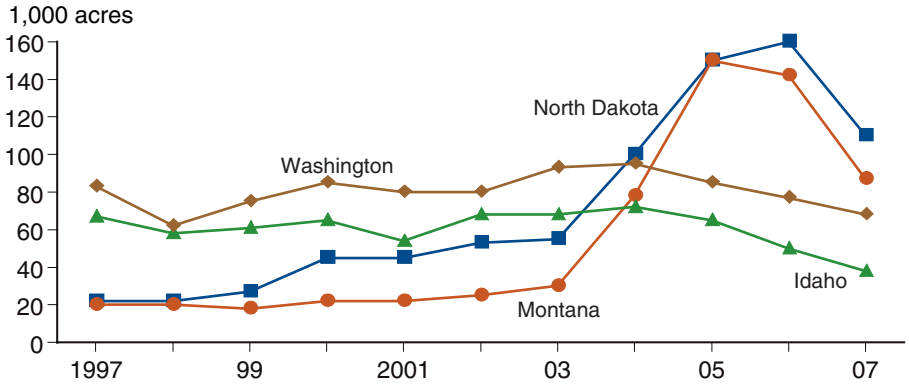
Acreage planted to dry peas has remained largely flat over the last decade in Washington and Idaho, the traditional growing States. In 1997, Washington and Idaho were the first- and second-largest producing States; however, in 2006 they were dwarfed by North Dakota and Montana production. Relatively higher costs of production in Washington and Idaho contributed to lower net returns for dry peas than for competing crops like spring wheat. In addition, wheat yields are much higher in the Pacific Northwest relative to pulses than in North Dakota and Montana.

U.S. lentil production expanded rapidly in 2004, increasing from 2.4 million hundredweight (cwt) in 2003 to 4.2 million cwt in 2004 and 5.2 million in 2006 (USDA, Nov. 9, 2006). The pace of expansion for lentils, however, was not as strong as for dry peas. During 2003-04, for example, while acreage planted to U.S. lentils expanded by 40 percent (99,000 acres), acreage for dry peas expanded by 57 percent (192,500 acres). The lower cost of growing lentils in North Dakota and Montana, relative to Idaho and Washington, also contributed to the acreage expansion in the former two States after 2001 (fig. 3). The spike in seeded area for lentils in Montana reportedly came from a small number of large growers.

U.S. dry pea yields fluctuated between 13 and 24 cwt per acre over the last 15 years (through 2007), with no upward or downward trend. During 2000-2006, while dry pea yields in Idaho were either comparable with or below the national average, yields in North Dakota were mostly higher. Relatively high yields in North Dakota probably contributed to the expansion in planted acreage there. Similarly, U.S. lentil yields exhibited no trend during 1992-2006.

Figure 3

Planted area for lentils in North Dakota, Montana, Idaho, and Washington: 1997-2007



Sources: USDA, National Agricultural Statistics Service, *Field Crops* and *Crop Production Annual*.

During 2003-05, acreage planted to dry peas and lentils expanded rapidly in North Dakota, reflecting that the expected net returns for these crops exceeded those for spring and durum wheat, the major alternative crops for the State's pulse farmers. The expected net returns include market sales, marketing loan benefits, and the extra value of reducing wheat yield losses from the wheat-pulse rotation and nitrogen credit due to peas and lentils after variable costs of production are subtracted (see box, "Benefits of Growing Peas and Lentils as Rotation Crops"). For example, the expected net returns averaged $62.20 (inflation-adjusted) per acre for dry peas in North Dakota in 2005, compared with $53.60 for spring and durum wheat.[4]

U.S. Trade in Dry Peas and Lentils

Since 2000, more than half of the lentils and about half of the dry peas produced in the United States have been exported. The U.S. dry pea and lentil industry has historically been geared toward the production of a high-quality, food-grade (U.S. No. 1) product, a large portion of which is purchased by the Federal Government for foreign food aid distribution under programs such as PL-480. During the 2000-04 crop years, food aid accounted for about half of U.S. dry pea exports and 70 percent of U.S. lentil exports (Lucier and Jerardo, 2006; Skrypetz, Feb. 24, 2006). The remainder of the dry pea and lentil crop was mostly sold domestically or exported privately into a very competitive world market, where Canada is the leading supplier

The United States is a net exporter of dry peas and lentils. U.S. dry pea imports have been small and stable, accounting for only 1.5 percent of the world trade. U.S. dry pea exports, which were generally destined for food markets, averaged 7.8 percent of the world trade during 2003-05 (table 1). U.S. exports of dry peas (excluding chick peas) have been trending upward, from 74,000 metric tons in 2000 to 395,000 metric tons in 2005/06. This rising trend also applies to U.S. exports to Canada, which reached 53,000 metric tons in 2005/06, up from 6,000 metric tons in 2000. Canada is the leading foreign market for U.S. dry peas, accounting for about 14 percent of U.S. exports in 2005. Other export destinations include India, Kenya, the Philippines, and Cuba.

[4]Peas and lentils as spring crops, often grown as rotation crops with grains, directly compete with spring wheat (including durum) for cropland. In Washington and Idaho, winter wheat is double-cropped with peas and lentils, leaving spring wheat as the main competing crop. In Montana, winter wheat does compete with spring wheat. Due to a high correlation between winter wheat and spring wheat prices, however, including spring wheat in our analysis as a major competing crop will capture the essence of competition between wheat and pulse crops in that State.

Benefits of Growing Peas and Lentils as Rotation Crops

Dry peas and lentils are good rotation crops with grains. According to a crop yield response model developed by the Northern Great Plains Research Laboratory, a USDA Agricultural Research Service (ARS) facility at Mandan, North Dakota, a dry peas-wheat rotation in North Dakota would average a wheat yield of 49.5 bushel per acre (bu/ac), up from 45 bu/ac for continuous wheat operations, reducing yield losses by about 10 percent. (These trial yields are larger than recent actual wheat yields in North Dakota, mainly because they are obtained from good soil under a controlled environment and best-management practices.) A major benefit of rotating dry peas with grains is the interruption of pest cycles. Soil-borne root rot in continuous cereal systems may cause yield losses up to an average of 10 percent (Saskatchewan Agriculture and Food), which is consistent with the USDA/ARS modeling result. The same yield-enhancing effect applies to dry peas in other States, as well as to lentils in major producing States, because lentils are an equally good rotation crop.

As legume crops, dry peas and lentils are capable of fixing the bulk of their nitrogen requirements.[1] Total nitrogen fixed by field peas was estimated to range from 155 to 175 pounds per acre per year in Missouri (Killpack and Buchholz). Similarly, total nitrogen content fixed by Austrian winter peas was estimated at 128 and 203 kg/ha in separate trials in Idaho (Mahler and Auld). Almost all of the nitrogen fixed by dry peas goes directly into the plant—56 percent of the total nitrogen fixed was contained in the seed, 37 percent in the stubble, and only 6-8 percent in the root system (Herdina and Silsbury). Little fixed nitrogen is left in the soil for the following non-legume crop in the rotation system, especially if the legume crop is cut and removed from the field (Lindemann and Glover). Applying the 6-8 percent of the nitrogen fixed in the root system to the total fixed nitrogen, as estimated in the previously mentioned studies, yields nitrogen for the following crop of about 10.2-11.6 pounds per acre. This estimate is conservative, because nitrogen in pulse crops' stems and leaves, if incorporated back into the soil, could also be available for the ensuing crop. The amount of nitrogen left for other crops is often referred to as the "nitrogen credit" attributable to dry peas and lentils.

[1]Farmers can obtain atmospheric nitrogen for their crops by growing inoculated legumes, such as dry peas and lentils. Inoculation of legumes means the introduction of legume bacteria into the soil to enable the plants to fix atmospheric nitrogen, that is, to change it into usable form. The inoculating process consists of mixing legume seeds with the correct strain of bacteria before the seeds are planted. Soon after the legumes begin to grow, the legume bacteria invade the root hairs. The legumes form growths on the roots called nodules. The bacteria live in these nodules and do their beneficial work (Erdman).

U.S. lentil exports also have been trending upward, from 75,000 metric tons in 2000/2001 (July to June) to 159,000 metric tons in 2005/06. Imports of lentils, mostly from India and Canada, have been low and variable, reaching nearly 12,000 metric tons in 2005/06. U.S. lentil exports go mostly to Europe, Africa, and the Americas, with Spain the largest importer (Skrypetz, May 12, 2006). U.S. lentil trade with Canada has been relatively small.

Table 1
Shares of U.S. and Canadian dry peas and lentils in the world market[1]

Item	United States	Canada	Rest of the world
		Percent	
Dry peas			
Production	4.2	25.1	70.7
Export	7.8	50.5	41.7
Lentils			
Production	5.0	25.6	69.5
Export	10.7	39.0	50.3

[1]Three-year average of 2003-05.

Source: United Nations Food and Agriculture Organization, *FAOStat* (11/07).

The feed market for dry peas and lentils is largely undeveloped in the United States. While dry peas were grown for food use in the Pacific Northwest areas, expanded production in North Dakota and Montana has been increasingly used as a feed crop. Dry peas are an inexpensive but nutrient-dense source of protein, essential amino acids, and carbohydrates, which makes them an attractive ingredient for animal feed rations. Lentils are primarily used as human food. To the extent that the expanded production is exported because of the lack of an established domestic feed market, the marketing loan program could have an impact on the world price, as was seen in recent years. The timeline of growth in the feed market for dry peas in Canada thus might offer insights into the prospects of developing feed markets for dry peas in the United States.

Canadian Production of Dry Peas and Lentils

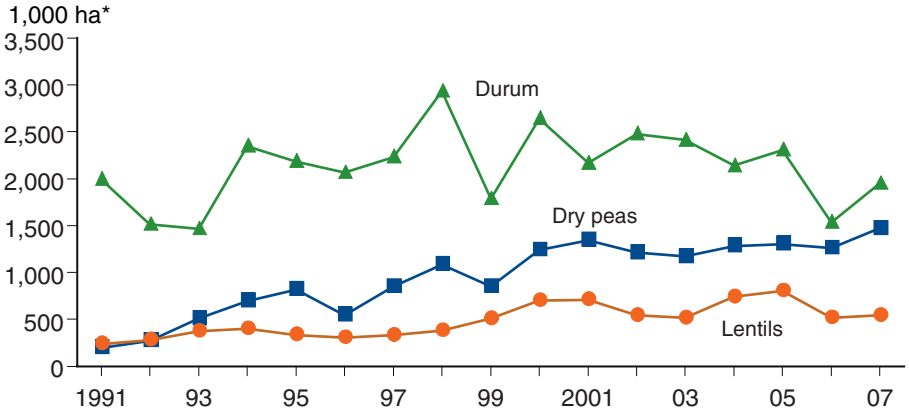
Canadian dry pea production has increased more than sixfold since the early 1990s, reaching 1.4 million tons in 2002/03 and 3.1 million tons in 2005/06. Production increased as producers diverted cropland from traditional grains, such as durum wheat, in response to the relatively higher net returns from dry peas (fig. 4). In 2004/05, pulse crops accounted for 8 percent of Canadian grain, oilseed, and pulse production—up from 2 percent in 1991/92, with dry peas accounting for most of the growth (Skrypetz, Feb. 3, 2006).

Canada's share of world dry pea production rose from 11 percent in 1996-97 to 28 percent in 2004-05 and 2005-06. That growth stems largely from industry efforts beginning in the early 1990s to develop Canada's feed markets (Skrypetz, Feb. 3, 2006). The growth in dry pea production has taken place largely in Saskatchewan, which in 2005/06 accounted for 78 percent of Canadian production, while Alberta and Manitoba accounted for 20 percent and 2 percent, respectively. These Prairie Provinces are located directly north of the U.S. dry pea high-growth areas, North Dakota and Montana. Canada produces several types of dry peas, with yellow peas accounting for about two-thirds of production.

Canada exports all but 35 percent of its dry pea production. The largest end-use in the domestic market is livestock feed, followed by seed and food. Most of the increase in domestic use is due to feed use in the major producing areas, especially for hogs, for whom dry peas are a good source of

Figure 4

Canadian area planted to dry peas, lentils, and durum wheat: 1991-2007



* 1 ha (hectare) = 10,000 square meters or 2.471 acres.

Source: Skrypetz, Stan. *Dry Peas: Situation and Outlook* and *Lentils: Situation and Outlook*, Agriculture and Agri-Food Canada, 2007.

protein and energy. When protein quality and amino acids, such as lysine, are considered in the dietary formulation for hogs, peas are very price competitive. Dry peas usually displace soybean meal and high-energy grains and can comprise from one-third to two-thirds of hog rations (Skrypetz, Feb. 3, 2006). A common feed product is a mixture of two-thirds ground peas and one-third canola meal. But feed use of dry peas remains a niche use in Canada, despite the fact that the area planted to dry peas has expanded rapidly since the early 1990s, reaching nearly 1.5 million hectares in 2006 (fig. 4). This area is not considered large enough to ensure a sustainable supply for feed use.

The Canadian experience suggests that exports will be key to continuing the expansion of U.S. dry pea production for several more years. Feed markets will be slow to develop until there are several million acres and the dry pea industry proves it can deliver a consistent supply to feed mills. With the potential for the United States to become an important competitor in the world market, developing sustainable domestic feed markets will become more critical for the Canadian dry pea industry.