farmdoc DAILY

Agricultural, Consumer & Environmental Sciences | University of Illinois Urbana-Champaign

International Benchmarks for Corn Production

Michael Langemeier

Center for Commercial Agriculture
Purdue University

January 8, 2024

***farmdoc daily* (1): 5**

Recommended citation format: Langemeier, M. "International Benchmarks for Corn Production." *farmdoc daily* (1): 5, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 8, 2024.

Permalink: https://farmdocdaily.illinois.edu/2024/01/international-benchmarks-for-corn-production-7.html

Examining the competitiveness of corn production in different regions of the world is often difficult due to lack of comparable data and agreement regarding what needs to be measured. To be useful, international data needs to be expressed in common production units and converted to a common currency. Also, production and cost measures need to be consistently defined across production regions or farms.

This paper examines the competitiveness of corn production for important international corn regions using 2018 to 2022 data from the *agri benchmark* network. An earlier paper examined international benchmarks for the 2015 to 2019 period (Langemeier, 2021). The *agri benchmark* network collects data on beef, cash crops, dairy, pigs and poultry, horticulture, and organic products. There were 20 countries with corn, soybean, and/or wheat enterprise data for 2022 represented in the cash crop network. The *agri benchmark* concept of typical farms was developed to understand and compare current farm production systems around the world. Participant countries follow a standard procedure to create typical farms that are representative of national farm output shares, and categorized by production system or combination of enterprises and structural features. Costs and revenues are converted to U.S. dollars so that comparisons can be readily made. Data from six typical farms with corn enterprise data from Argentina, Brazil, Canada, Ukraine, and United States were used in this paper. It is important to note that corn enterprise data is collected from other countries. These five countries were selected to simplify the illustration and discussion.

The farm and country abbreviations used in this paper are listed in Table 1. While the farms may produce a variety of crops, this paper only considers corn production. Typical farms used in the *agri benchmark* network are defined using country initials and hectares on the farm. To fully understand the relative importance of the corn enterprise on each typical farm, it is useful to note all of the crops produced. The typical farm in Argentina produced corn, sweet corn, soybeans, sunflowers, and winter wheat in 2022. Corn was produced on approximately 24 percent of the typical farm's acreage during the five-year period. The typical farm in Brazil produced corn and soybeans in 2022. Corn was a second crop following soybeans and was produced on approximately 85 percent of the typical farm's acreage during the five-year period. The farm in Canada produced corn, summer rapeseed, soybeans, and summer wheat in 2022. Corn was produced on approximately 13 percent of the typical farm's acreage during the five-year period. Crops produced on the farm in the Ukraine in 2022 included corn, winter rapeseed, soybeans,

sunflowers, and winter wheat. Corn was produced on approximately 45 percent of the typical farm's acreage during the five-year period. There are five U.S. farms with corn in the network. The two farms used to illustrate corn production in this paper are the Iowa typical farm (US700) and the west central Indiana typical farm (US1215). Both of these farms utilize a corn/soybean rotation.

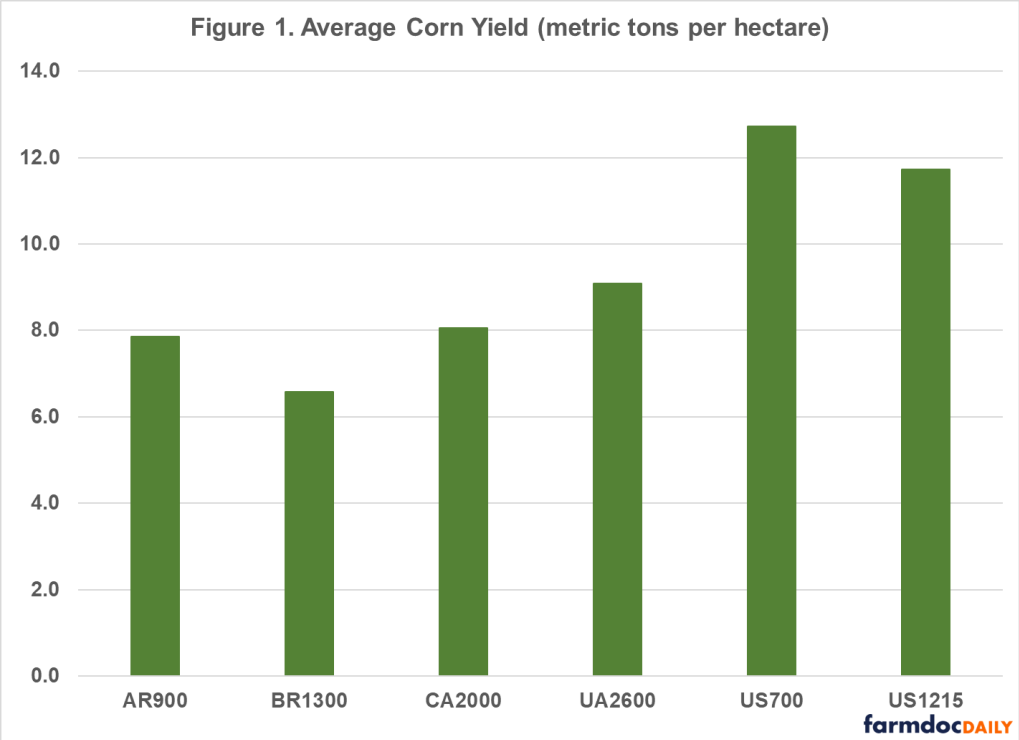
Table 1. Abbreviations of Typical Farms

Farm	Country	Hectares	Region
AR900	Argentina	900	West of Buenos Aires
BR1300	Brazil	1,300	Mato Grosso
CA2000	Canada	2,000	Red River Valley
UA2600	Ukraine	2,600	Western Ukraine
US700	United States (Iowa)	700	Iowa
US1215	United States (west central Indiana)	1,215	Central Indiana

farmdocDAILY

Corn Yields

Although yield is only a partial gauge of performance, it reflects the available production technology across farms. Average corn yield for the farms in 2018 to 2022 was 9.34 metric tons per hectare (148.8 bushels per acre). Average farm yields ranged from approximately 6.57 metric tons per hectare for the Brazilian farm (104.7 bushels per acre) to 12.73 metric tons per hectare for the Iowa farm (202.8 bushels per acre). Figure 1 illustrates average corn yield for each typical farm. Both of the U.S. farms had average corn yields above 11.6 metric tons per hectare (185 bushels per acre).

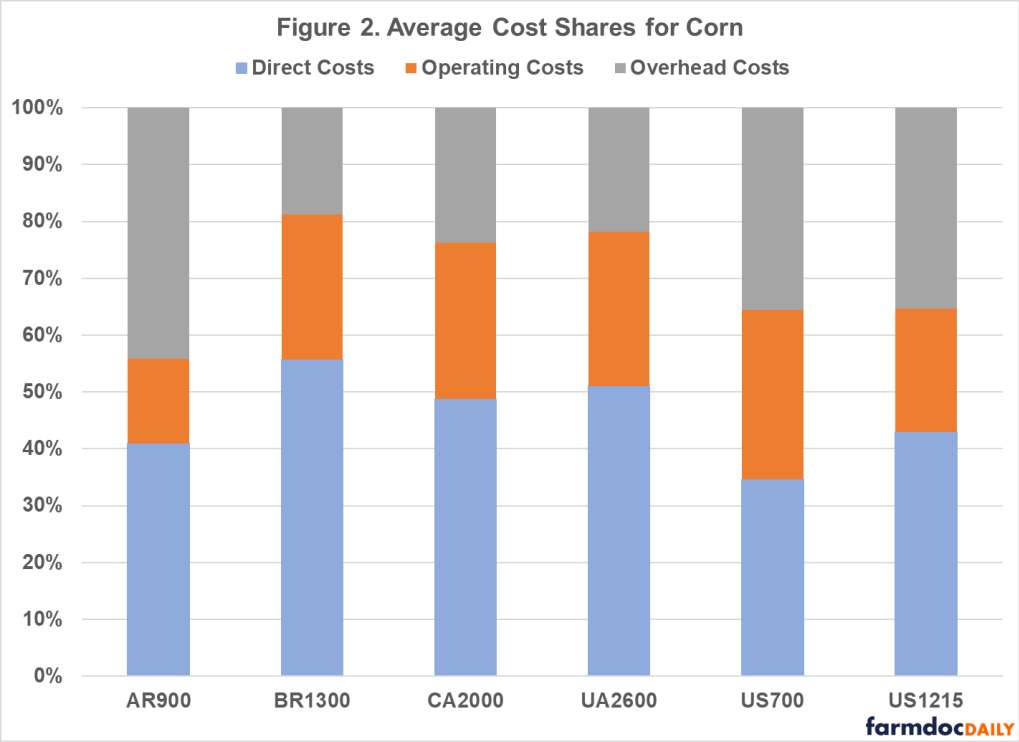


Input Cost Shares

Due to differences in technology adoption, input prices, fertility levels, efficiency of farm operators, trade policy restrictions, exchange rate effects, and labor and capital market constraints, input use varies across corn farms. Figure 2 presents the average input cost shares for each farm. Cost shares were

broken down into three major categories: direct costs, operating costs, and overhead costs. Direct costs included seed, fertilizer, crop protection, crop insurance, and interest on these cost items. Operating cost included labor, machinery depreciation and interest, fuel, and repairs. Overhead cost included land, building depreciation and interest, property taxes, general insurance, and miscellaneous cost.

The average input cost shares were 45.7 percent for direct cost, 24.4 percent for operating cost, and 29.9 percent for overhead cost. The typical farms in Argentina and the United States have below average cost shares for direct cost. The typical farm in Argentina and Indiana had below average cost shares for operating cost. Labor costs as a proportion of total costs were relatively higher for the typical farm in the Ukraine. Overhead costs as a proportion of total costs were relatively higher in Argentina and the United States. The relatively large cost share for overhead cost in the U.S. reflects our relatively high land cost.



Revenue and Cost

Figure 3 presents average gross revenue and cost for each typical farm. Gross revenue and cost are reported as U.S. dollars per hectare. It is obvious from Figure 3 that gross revenue per hectare is substantially higher for the two U.S. farms. However, cost is also substantially higher for these two farms. All of the typical farms exhibited economic profit during the five-year period. Average economic profit ranged from $84 per hectare in Brazil to $399 per hectare in Canada. Examining individual years, the typical farm in Argentina had an economic loss in 2020; the typical farm in Brazil had economic losses in 2018, 2019, and 2021; the typical farm in the Ukraine had an economic loss in 2022; the typical farm in Iowa had economic losses in 2018 and 2020; and the typical farm in Indiana had economic losses in 2018 and 2019.

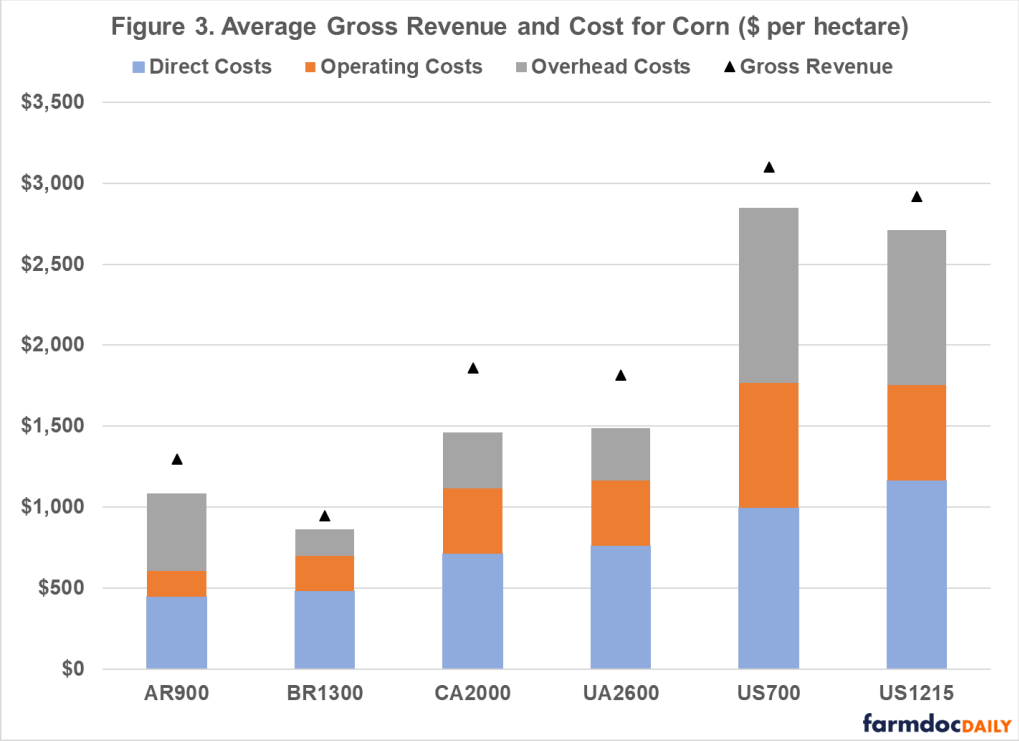
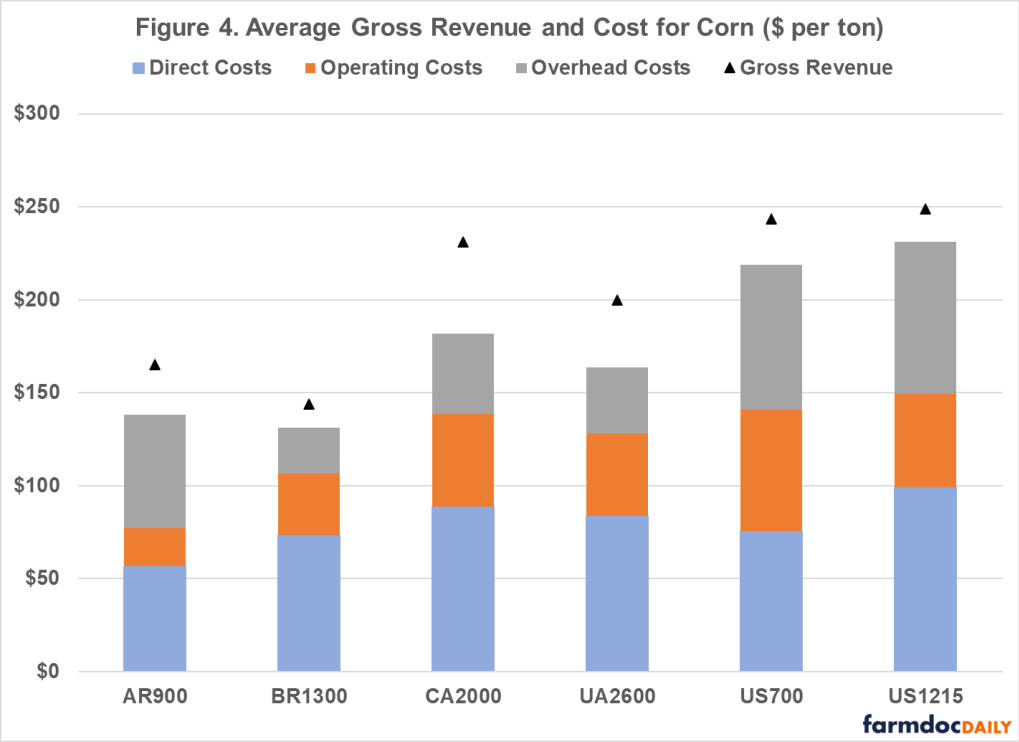


Figure 4 presents average gross revenue and cost for corn on a per ton basis. Gross revenue per ton was relatively higher for the typical farm in Canada and the two typical U.S. farms. However, the two U.S. typical farms also had relatively higher costs per ton. Economic profit for the five-year period ranged from $13 per ton in Brazil to $50 per ton in Canada, and averaged $28 per ton.



Conclusions

This paper examined yield, gross revenue, and cost for farms in the *agri benchmark* network from Argentina, Brazil, Canada, the Ukraine, and the United States with corn enterprise data. Yield, gross

revenue, and cost were substantially higher for the U.S. farms. In general, the 2018 to 2022 period was a profitable period for corn production with each of the typical farms illustrated in this article exhibiting a positive average economic profit. A subsequent article will examine the relative profitability of soybean production during the same period for the six typical farms discussed in this article.

References

agri benchmark. http://www.agribenchmark.org/home.html. Accessed on December 27, 2023.

Langemeier, M. "International Benchmarks for Corn Production." *farmdoc daily* (11):89, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, June 4, 2021.