International Benchmarks for Corn Production

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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 2015 to 2019 data from the *agri benchmark* network. An earlier paper examined international benchmarks for the 2013 to 2017 period (here). *The agri benchmark* network collects data on beef, cash crops, dairy, pigs and poultry, horticulture, and organic products. There are 23 countries with data for 2019 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, Russia, 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.

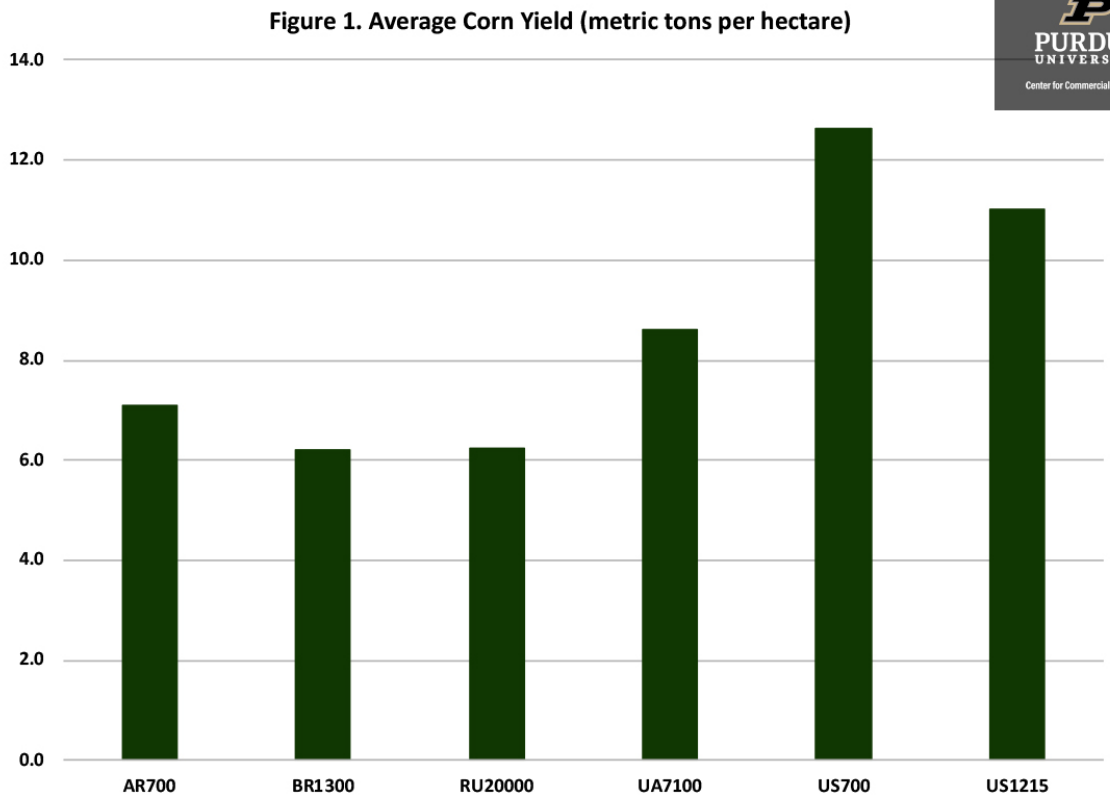
The farm and country abbreviations used in this paper are listed in table 1. While the farms may produce a variety of crops, this paper only considers corn production. Typical farms used in the *agri benchmark* network are defined using country initials and hectares on the farm. To fully understand the 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, soybeans, sunflowers, winter barley, and winter wheat in 2019. Corn was produced on approximately 10 percent of the typical farm's acreage during the five-year period. The typical farm in Brazil produced corn and soybeans in 2019. Corn was a second crop following soybeans and was produced on approximately 76 percent of the typical farm's acreage during the five-year period. The farm in Russia produced alfalfa, chickpeas, corn, corn silage, fodder grass, soybeans, summer barley, sugar beets, sunflowers, winter rye, and winter wheat in 2019. 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 2019 included corn, soybeans, sunflowers, winter rapeseed, and winter wheat. Corn was produced on approximately 27 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
AR700	Argentina	700	South East of Buenos Aires
BR1300	Brazil	1,300	Mato Grosso
RU20000	Russia	20,000	Chernozem/Black Soil Region
UA7100	Ukraine	7,100	Poltava region, Central part of Ukraine
US700	United States (Iowa)	700	Iowa
US1215	United States (west central Indiana)	1,215	Central Indiana

CORN YIELDS

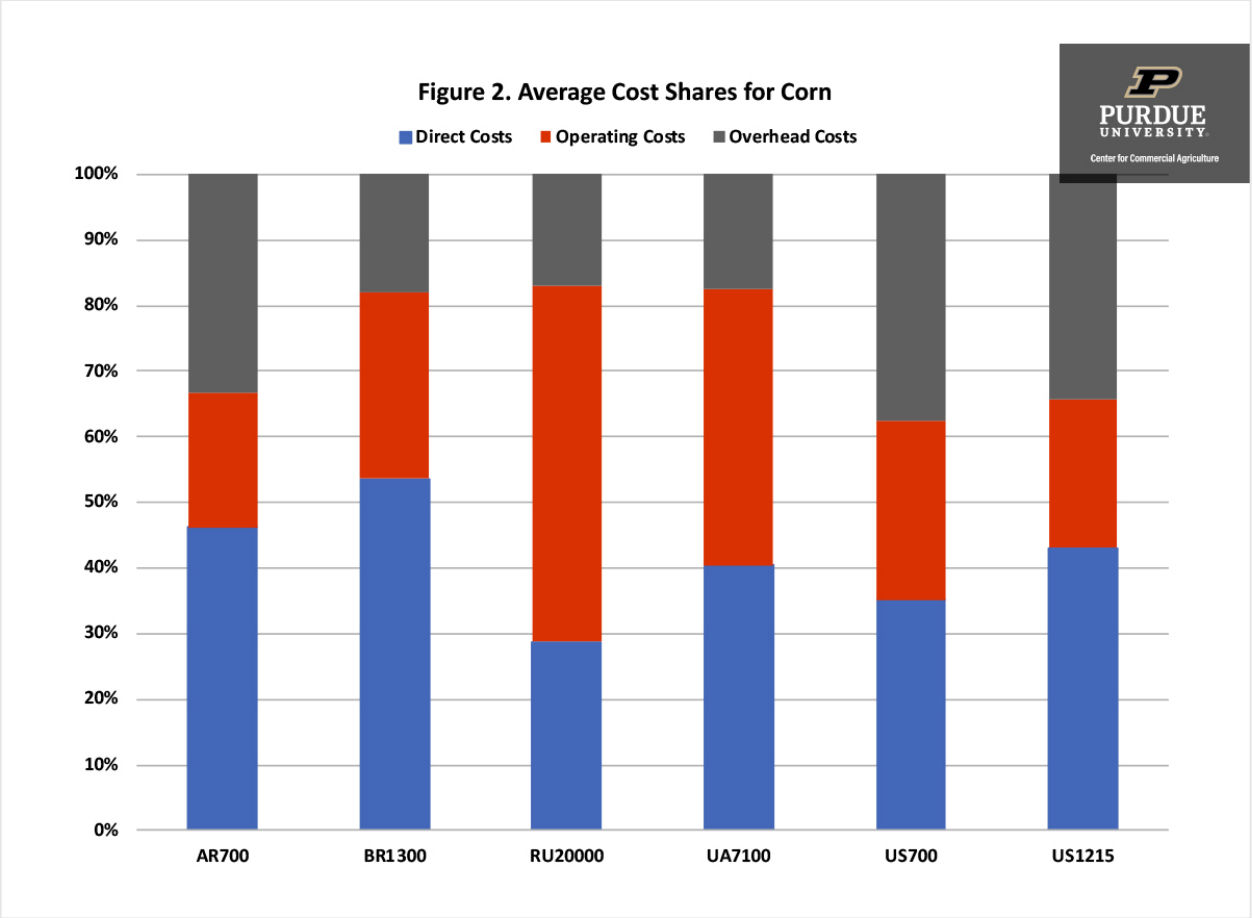
Although yield is only a partial gauge of performance, it reflects the available production technology across farms. Average corn yield for the farms in 2015 to 2019 was 8.63 metric tons per hectare (137.5 bushels per acre). Average farm yields ranged from approximately 6.20 metric tons per hectare for the Brazilian farm (98.7 bushels per acre) to 12.64 metric tons per hectare for the Iowa farm (201.4 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 metric tons per hectare (175 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 41.2 percent for direct cost, 32.6 percent for operating cost, and 26.2 percent for overhead cost. The typical farms in Russia and in Iowa had below average cost shares for direct cost. All of the farms except the typical farm in Russia and the typical farm in Ukraine had below average cost shares for operating cost. Labor costs as a proportion of total costs were relatively higher for the typical farms in Russia and 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. The typical farms from Argentina, Russia, and Ukraine exhibited economic profit during the five-year period. Average losses for the typical farms from Brazil, Iowa, and west central Indiana were $52, $41, and $191 per hectare, respectively, during the five-year period. The lowest economic profit during the five-year period for the typical farms was 2017 with an average loss of $125 per hectare. The lowest economic profit for each typical farm was as follows: 2015 for the typical farms in Argentina and Indiana, 2016 for the Iowa farm, and 2017 for the typical farms in Brazil, Russia, and the Ukraine.

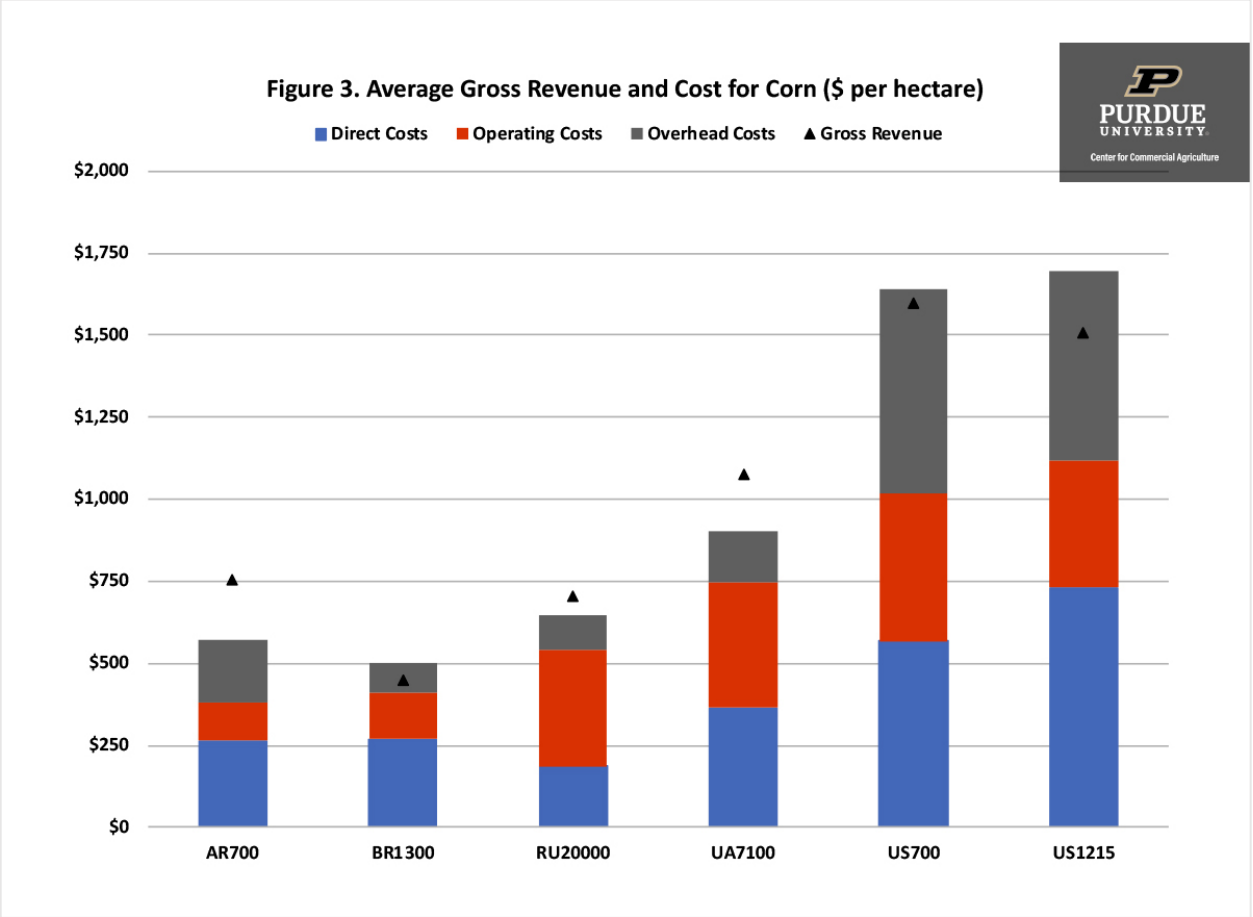
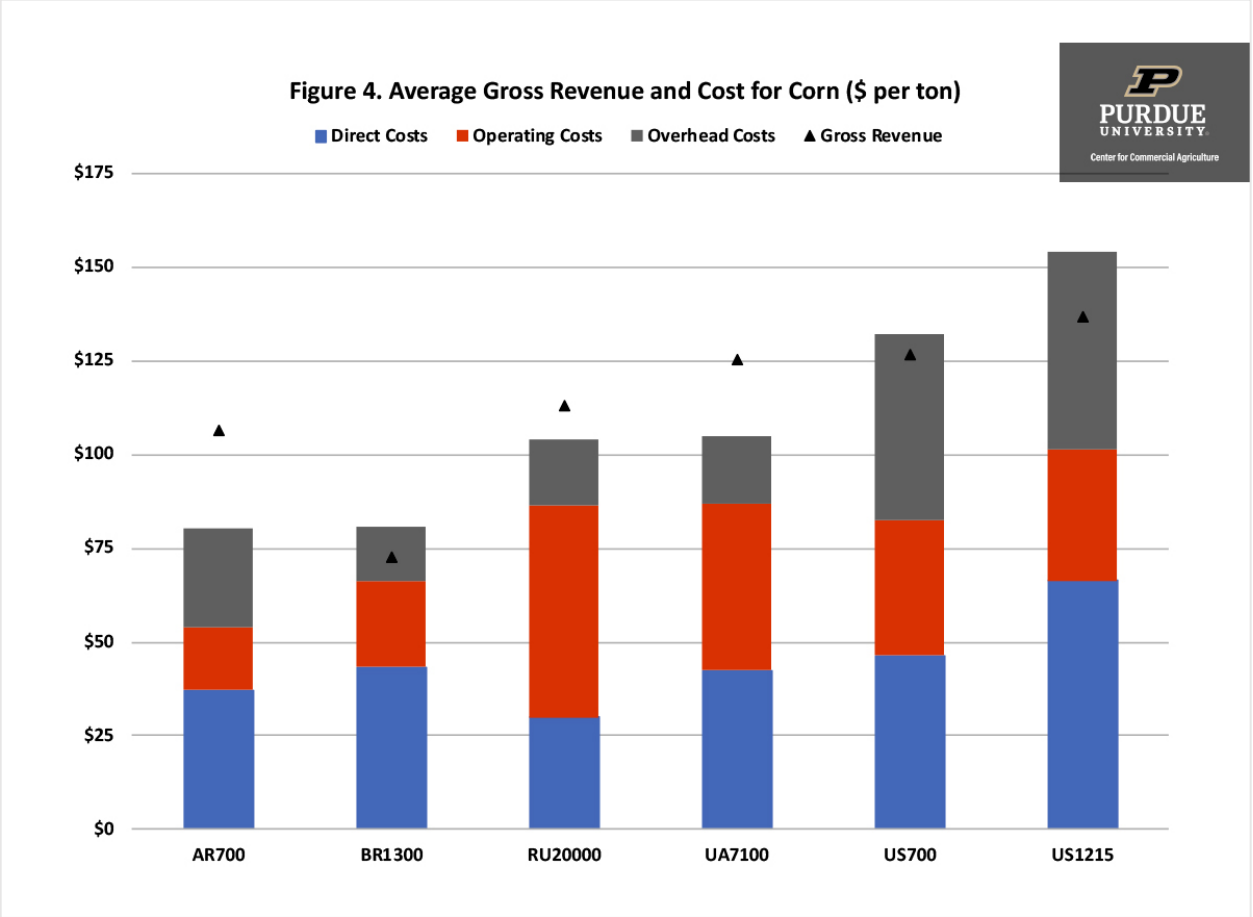


Figure 4 presents average gross revenue and cost for corn on a per ton basis. Gross revenue per ton was relatively higher for the typical farm in the Ukraine and the two typical U.S. farms. However, the two U.S. typical farms also had relatively higher costs per ton. Economic profit for the five-year period was positive for the typical farms in Argentina, Russia, and the Ukraine.



CONCLUSIONS

This paper examined yield, gross revenue, and cost for farms in the *agri benchmark* network from Argentina, Brazil, Russia, the Ukraine, and the United States with corn enterprise data. Yield, gross revenue, and cost were substantially higher for the U.S. farms. The typical farms in Argentina, Russia, and Ukraine exhibited a positive average economic profit during the 2015 to 2019 period. The data for 2020 will be available early this fall. It will be interesting to see how the strong crop prices that occurred in the later part of 2020 will impact comparative results.

REFERENCES

agri benchmark. http://www.agribenchmark.org/home.html. Accessed on May 24, 2021.

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