

# Are International Beef Prices Converging and, if so, Why?

by

**Lovell S. Jarvis, José E. Bervejillo, and José P. Cancino**

*Beef export prices have converged, implying liberalization of commercial and sanitary policies in many trading nations and a more competitive international beef market.*

During the 1980s and 1990s, the United States received higher average prices for its beef exports than did most of its competitors. However, during this period the average U.S. beef export price was declining relative to the beef export prices of other countries. This trend appears to be part of a process of convergence among beef export prices from different countries, as is shown in figure 1. This paper reports the results of efforts to test whether beef prices did converge from 1980-2002 and, if they did, to determine why. What forces are determining international market prices and are such forces affecting U.S. export prices?

The United States was one of the world's largest beef exporters until a case of BSE was found in the state of Washington nearly two years ago. U.S. beef exports then declined precipitously. The United States is attempting to demonstrate the safety of its beef and hopes to regain an important share of international beef markets. U.S. producers must examine the market within which they will compete in the future. We hypothesize that U.S. beef export prices have been declining relative to the prices of other countries because major export markets for U.S. beef have become increasingly competitive. Several important beef importers that previously gave preference to U.S. beef liberalized their imports, allowing other countries to compete directly with the U.S.

In addition, exports from Brazil and Uruguay expanded. These countries, traditionally excluded from important markets because of endemic Foot and Mouth Disease (FMD), gained access to additional markets. After World War II, countries with FMD were largely unable to export fresh beef to countries that were free of FMD. The international beef market was thus segmented. In one part, trade occurred between exporters and importers that were FMD-free. In another part, trade occurred between importers and exporters that were FMD-compromised, i.e., FMD was endemic, occurred fairly regularly, or was controlled through vaccination. Prices in the FMD-free market, primarily the Pacific Rim countries including the United States, Canada, Japan, Australia, and New Zealand, were generally significantly higher than prices in the FMD-compromised market, which included the rest of the world,

the European Union (EU) and the Southern Cone of South America, as well as the Middle East, Eastern Europe, and parts of Asia. However, in recent years, Brazil and Uruguay have increasingly controlled FMD, while several importers that traditionally excluded beef from exporters with FMD have begun to accept such beef, with specific restrictions.

## Methodology and Data

Studies utilizing beef prices often assume that beef is a homogeneous commodity. This was a more reasonable assumption in the 1960s, when trade was predominantly in carcasses. Today, almost all beef is exported as differentiated cuts, with roughly 85 percent as boneless cuts. To compare price trends, it is important to categorize beef cuts into more homogeneous products. We utilize bone-in beef and boneless beef as the two quality categories. Beef sold as carcasses, half carcasses, and quarters are classified as bone-in beef, as are a number of rather simple bone-in cuts, most of which involve little value-added in processing. Boneless cuts generally imply a higher degree of processing. Using these two categories, we apply two common tests of price convergence to the prices of 17 exporting countries that each accounted for at least one percent of the international beef market in 2002. Collectively, they accounted for 90 percent of world beef trade. Using annual data, we calculate the implicit beef export price for each country's beef products by dividing the value of exports by the quantity of exports. We deflate each price series using the U.S. Producer Price Index (PPI) for all commodities. We tested for price convergence from 1961 to 2002 and, because important changes occurred in markets around 1980, for the period 1980 to 2002. We also tested for price convergence using monthly data for a subset of seven important exporters for 1990-2002.

We defined price convergence as a shrinking divergence over time in the prices obtained by the principal beef-exporting countries. We tested the hypothesis of convergence using two variations of an approach previously published to analyze changes in price dispersion. One test utilized *the mean of the absolute price differentials* and the other utilized *the standard deviation of*

**Table 1. Tests for Convergence of Beef Export Prices**

A. Annual data		
Group 1 (All 17 Exporters)	1961-2002	1980-2002
Bone-in	C	C
Boneless	C	C
Group 2 (10 European Exporters)		
Bone-in	C	C
Boneless	C	C
Group 3 (8 Largest exporters, including EU as one exporter)		
Bone-in	NS/C	NS/C
Boneless	D/NS	D/NS
Group 4 (2 FMD free and 2 FMD endemic exporters)		
Bone-in	C	C
Boneless	C	C
B. Monthly data		
7-Major Exporters	Jan 1990-Dec 2002	
Bone-in	C	
Boneless	C	
Notes: The tests use 1) absolute price differentials (APD) and 2) standard deviations of price differentials (SD). C corresponds to price convergence with P<10%, for both tests. NS/C corresponds to no significance for APD test and convergence for SD test; while D/NS correspond to price divergence for APD test and no significance for SD test.		

*absolute price differentials.* We fit a linear trend to each of the series of annual observations. The null hypothesis was that the estimated trends would be negative, reflecting a tendency for the mean or the standard deviation of the differentials to decline over time. We applied each test to the prices of a) bone-in beef and b) boneless beef, for each period analyzed. We analyzed convergence for the entire set of countries and for several subsets to determine whether any of the results appeared sensitive to the particular set of countries chosen. The country sets were:

**Group 1:** The 17 principal exporters: Argentina, Australia, Austria, Belgium-Luxembourg, Brazil, Canada, Denmark, France, Germany, Ireland, Italy, Netherlands, New Zealand, Poland, Spain, United States, and Uruguay.

**Group 2:** The European exporters from Group 1: Austria, Belgium-Luxembourg, Denmark, France, Germany, Ireland, Italy, Netherlands, Poland, Spain.

**Group 3:** The eight largest exporters from Group 1, excluding Poland and taking the EU as a single country with intra-bloc trade excluded.

**Group 4:** The four major grass-fed exporters: Australia, New Zealand, Uruguay, and Brazil. The first two countries have always been FMD-free, whereas Uruguay and Brazil have almost always been FMD-endemic. This set probably provides the best test of convergence between the FMD segments.

## Results

Table 1, part A, contains results for the tests applied to the prices of boneless and bone-in beef, using annual data for 1961-2002 and 1980-2002, for the four sets of countries. In almost every case, the results are consistent with price convergence.

The results suggest that price convergence occurred for all exporters taken together (Group 1), for the European exporters (Group 2), and for the matched set of FMD-free and FMD-endemic exporters (Group 4), in each case for bone-in and boneless beef, and in both periods, except for Group 4, which was not significant. The prices of the largest exporters (Group 3) also show convergence for the prices of bone-in beef in both periods when the test uses the standard deviations of price differentials, but not when the test uses the mean of the absolute price differentials. When the same tests are applied to the prices of boneless beef, the results from both tests support divergence in 1961-2002 and indicate a constant trend in 1980-2002. Note particularly that the prices in a matched set of FMD-free and FMD-endemic country prices (Group 4) show convergence for both types of beef and in both periods, except in one case, which is insignificant. Thus, there is evidence that the price differential attributed to FMD has shrunk.

Table 1, part B, contains the results for the tests carried out using monthly data for 1990-2002 for Group 3 (excluding Argentina, for which monthly data were not available), again for both bone-in and boneless beef. The results provide strong evidence of price convergence for bone-in and boneless beef in 1990-2002. The use of annual data for 1990-2002 produced highly similar results, with and without the inclusion of Argentina. It seems clear that the tendency toward price convergence was strong throughout the 1990s.

## Why Have Prices Converged?

We believe that price convergence has been caused principally by 1) changes in commercial policy following the Uruguay Round, 2) the erosion of the price penalty traditionally faced by beef-producing countries with endemic FMD, and 3) the industry's shift toward the

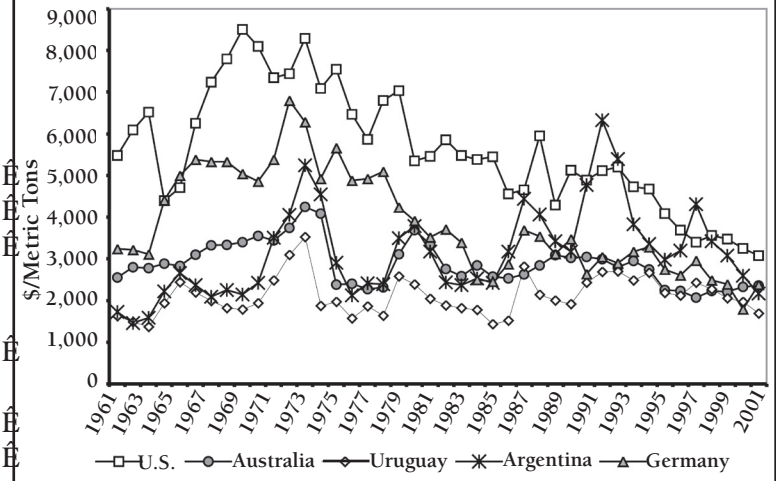
export of cuts instead of carcasses. Historically, beef trade has been strongly influenced by tariffs, quotas, and other forms of commercial policy. The last two decades have witnessed considerable liberalization in import quotas and a reduction of export subsidies by the EU. The liberalization of commercial policy is probably a factor in the observed convergence of beef export prices and, as such, probably implies significant global welfare gains in this important commodity market.  $\hat{E}$

Qualitative analysis indicates that the greatest divergence among market prices at the beginning of the period was the result of several exporting countries having preferential access to several strongly protected markets. For example, the United States emerged as an important beef exporter, largely in response to the preferential access it received in the Japanese and then the South Korean markets. The United States received prices in these protected markets that were higher than it could have received in other markets. However, as Japan and South Korea liberalized their markets, imports from Australia and New Zealand competed more strongly with U.S. imports, gradually driving down prices to more closely approximate prices in less-protected markets (Figure 1). Similarly, the EU's decision to reduce the magnitude of its subsidies on beef exports to the "Atlantic" market, gradually raised the average EU export price.

Although FMD continues to segment the world beef market, its effect appears to be decreasing. Some producing countries have increasingly brought FMD under control. Simultaneously, greater scientific knowledge has shown that properly processed boneless beef from FMD-endemic countries poses little risk of contamination. On the basis of such evidence, the EU altered its sanitary policy from that of "zero tolerance," in which beef from FMD-endemic countries was strictly prohibited, to one of "minimum risk," in which properly processed, deboned beef was accepted. During the Uruguay Round, numerous other countries, including the United States and Canada, agreed to base their sanitary policies on science-based information. As a result, these countries also began to import beef from exporters with FMD, provided that the beef had been properly processed and deboned.

The shift toward the disassembly of the carcass in the exporting country and the associated export of cuts instead of carcasses also allowed exporters to arbitrage

**Figure 1. Export Price of Fresh Beef, Major Exporters, 1961-2002**



beef more effectively across markets, domestically and internationally, particularly within the context of declining trade restrictions. Exporters who were previously restricted to selling carcasses to lower-priced markets can sell lower-quality cuts to these markets, while selling higher-priced cuts to higher-priced markets. Although this process is little studied, we believe it also contributed to price convergence.

Although world beef trade remains impeded by FMD and commercial policies, such barriers have diminished in the last two decades, bringing economic benefit to producers and consumers of beef. In the process, U.S. producers have lost some of the preferential benefits they once enjoyed and face greater competition in the United States and in international markets in the future. Nonetheless, U.S. beef exports continued to rise over the period of price convergence that we have analyzed, at least until many foreign markets were closed following discovery of a case of BSE. We may therefore expect that as foreign markets become persuaded that U.S. beef is safe, U.S. beef will continue to be competitive in international markets.

Adapted from Jarvis, L.S., J.P. Cancino, and J.E. Bervejillo. (2005) "International Beef Prices: Is There Evidence of Convergence?" *Review of Agricultural Economics*, 27(3):1-7.

Lovell Jarvis is a professor in the ARE department and an associate dean in the College of Agricultural and Environmental Sciences at UC Davis. He can be reached by e-mail at [lsjarvis@ucdavis.edu](mailto:lsjarvis@ucdavis.edu). José Bervejillo was an assistant project scientist in the Agricultural Issues Center and is now a rancher in Uruguay. He can be reached at [jberve@yahoo.com](mailto:jberve@yahoo.com). José Cancino is a Ph.D. candidate in the ARE department at UCD and can be reached at [jpcancino@ucdavis.edu](mailto:jpcancino@ucdavis.edu).