

THE IMPACT OF FOREIGN TRADE OF CATTLE  
ON THE U.S. BEEF INDUSTRY

by

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## INTRODUCTION

### Purpose

For some time there has been a great deal of conjecture about the effects of foreign trade of cattle on the domestic market for beef cattle. Little in the way of factual evidence has appeared to show just what role is played by the element of foreign trade in the United States market. It was, therefore, the purpose of this study to attempt to establish more accurately the importance of imports of livestock and meat to the United States beef producers and consumers.

It would be logical to assume that some type of relationship exists between the quantity of cattle and beef being exported by foreign countries to the United States and the prices being paid at the American markets since the importations in essence represent a portion of the supply of cattle and meat. Hence, one aspect of this study was the calculation of the relationship between domestic market prices and the ensuing amount of beef shipped into the United States.

A second major area of importance was a study of the impact on United States prices of cattle and beef entering this country from foreign countries.<sup>1</sup> This portion of the study involved the use of price elasticities of demand in determining the effect

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<sup>1</sup> Hereafter beef and cattle imports will be referred to simply as "beef" unless specifically noted.

of the additional supplies on the price in this country.

The results of such a study are important in shaping national agricultural programs and policy and in the forecasting of future market conditions. In addition, the data can serve as a foundation for planning possible future action on United States tariffs on cattle and beef.

### Scope and Limitations

Imports of beef are of national magnitude, although the actual exchange of foreign livestock and meat in the United States may involve generally just the meat packing companies and a small percentage of the total population which invests in foreign livestock for the purpose of trading the animals on the United States market. However, the remainder of the cattle producing industry is affected in one way or another as the amount of foreign beef being marketed changes. At the same time, retail prices of beef would tend to reflect any alterations in the prices received by farmers and thus be of concern to the consuming public, or the total population. For these reasons, the data used in this study were on a national level. The data used were based on information from United States Department of Agriculture publications.

Most research work has certain limitations. Any work with definite statistics such as population, prices and pounds of meat will overlook intangible items, such as expectations of cattle feeders who may purchase large numbers of stocker and feeder cattle from Canada or Mexico in anticipation of rising market prices.

At best any such study can be used as a guide, not as an unquestioned law. The conclusions reached show what has happened to the cattle market in past years. From such information estimates can be made about what likely will occur in the future, given a certain set of conditions. However, in the social sciences much of what happens depends upon the behavior of people, which, at best, is highly difficult to predict.

A few other limitations should also be realized before embarking on the major part of this study. The number of cattle and the quantity of beef shipped in and out of the United States depend not only on prices but various other factors, i.e., prices of cattle in the foreign countries, embargoes, feed supplies and range conditions in the United States and other countries.

Seasonal patterns of foreign trade of beef are omitted when considering the annual movement of cattle and beef to and from this country. Studying the United States as a whole also reduces the effects of foreign trade in particular sectors of the country such as the southwest or the north central portions which receive much of the live animal imports.

In addition, certain economic, social or political phenomena occur which may alter the significance of certain portions of the basic data. World War II with price ceilings seriously altered the economic picture facing cattle producers during the years 1942-46. For this reason, these years were omitted from this study. Price supports on various agricultural commodities also affect the feed costs incurred by the livestock producer.

The above limitations, while perhaps seemingly inconsequential, are of sufficient magnitude in certain periods to change the normal supply-demand relations. Undoubtedly, the variation in these conditions can account for much of the unexplained variation found in analyzing the economic data of this study.

#### BACKGROUND

Most of the concern exhibited by members of the cattle industry has been over the importation of beef into this country. Since the United States is a substantial net importer of cattle and beef, there has been little argument about the exports of beef.

The charges have been many. Domestic producers have argued that foreign producers have production costs far lower than in the United States. A past official of the American National Cattlemen's Association, Radford Hall, asserted "We know that certain nations are gearing their production to substantially increase exports of cheaply-raised cattle."<sup>1</sup>

Hall also told a Senate Finance Committee in 1951 that:

In the marketing of a perishable product such as meat, an oversupply of even a small percentage has an over-all effect upon the entire economy that is entirely out of proportion with the actual amount of the oversupply.<sup>2</sup>

Nor did the country's cattlemen take kindly to reductions in the tariff on cattle and beef through the General Agreement on

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<sup>1</sup> "Asks Foreign Meat for Sale be so Labeled." News item. St. Joseph Stockyards Journal, January 15, 1959, p.1.

<sup>2</sup> "Hall Testifies on Tariff," American Cattle Producer, April 1951, 32 (11): 16.



Tariffs and Trade and other reciprocal trade agreements. During the last few years, the American National Cattlemen's Association has lobbied strongly for higher and more protective tariffs. At their 1958 annual meeting, the members adopted the following resolution on cattle imports:

WHEREAS, Cattle and dressed, canned and processed beef from foreign countries are attracted to our markets whenever domestic prices reach a level at which we can operate without a loss, and

WHEREAS, The present import duties are inadequate to protect our markets against the importations of more cheaply produced cattle and beef from foreign countries, and

WHEREAS, Our present protective tariff was written several decades ago and is now inadequate under present conditions of greatly increased costs of production in the United States; therefore be it

RESOLVED, That we ask Congress and the Tariff Commission to revise these old import duty rates and import quotas to a more realistic basis which will preserve the American market for American producers.<sup>1</sup>

Other suggestions have included designating a point based on parity prices at which additional imports would be deemed "undesirable per se" and would represent a threat to the domestic cattle industry.<sup>2</sup>

For the most part, however, such charges and claims have evidenced more emotion than serious study. A few more concrete analyses have been made of foreign trade, however, and will be

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<sup>1</sup> American National Cattlemen's Association. Resolutions Adopted at the Sixty-First Annual Convention of the American National Cattlemen's Association, p.3.

<sup>2</sup> "Controlling Our Imports," American Cattle Producer, August 1958, 40 (3): 7.

mentioned in more detail later.

## HISTORY

Before presenting the statistical analysis of foreign trade, the author considered it well to take a look at the past performances of the United States in the world cattle-beef market. At the beginning of this century, the United States reversed its role as an exporter of live cattle to that of a net importer.

In 1926, Lynn R. Edminster wrote:

Until about 20 years ago the United States produced enough beef for her own needs and in addition an exportable surplus larger than that of any other country. Although exports from the United States had previously declined somewhat, it was not until 1905 that Argentina whose exports had been rapidly increasing, replaced this country as the leading beef-exporting nation of the world.<sup>1</sup>

A few years after Argentina had assumed the top spot among cattle exporting nations, the United States became an importing country for live animals. In 1910, this country imported 211,230 head of cattle compared with 109,629 head of cattle exported.<sup>2</sup> Since 1910 with the exception of one year, 1921, the United States has imported more live cattle than it has exported.

Edminster also noted that the imports of beef in the 1920s were "small in comparison both with cattle imports and with our total beef production."<sup>3</sup>

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1 Lynn R. Edminster, The Cattle Industry and the Tariff, p.41.  
 2 Livestock and Meat Statistics 1957, Statistical Bulletin 230, United States Department of Agriculture, pp.290, 292.  
 3 Edminster, op. cit., p.89.



Although this country has imported more cattle than it has sent out of the country since 1921, the United States exported more beef than it imported as recently as 1947 when it shipped out 197 million pounds of meat and imported only 64 million pounds.

H.E. Reed, director of the Livestock Branch of the Production and Marketing Administration, described the beef and veal development thus:

The United States has been a net importer of beef and veal since 1924, with the exception of two years, 1946 and 1947, and the net imports have usually been equal to less than 2.5 percent of the annual production of beef and veal.<sup>1</sup>

In recent years the development of faster, refrigerated transportation facilities has increased the importance of meat imports in the overall picture. In only nine of the last 28 years has the percentage of imports of live animals exceeded that of meat (based on the dressed weight of the live animals). Figure 1, Plate I, shows the relation of live animal imports to the total imports. The live animals have been converted to a pound basis by the average dressed weight for each year. The solid line represents the total imports and the broken line shows the live animal imports. Figure 2, Plate I, indicates the percentage of total imports represented by live animals. Only from 1938 through 1943 and in 1945, 1946 and 1957 did imports of live animals exceed 50 percent of the total import figure.

Importations of both live animals and beef vary a great deal

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<sup>1</sup> "Foreign Trade in Agricultural Products," Hearings Before the Committee on Agriculture and Forestry, U.S. Senate, p.433.

EXPLANATION OF PLATE I

Fig. 1. Relation of live animal imports to total imports. (Total imports are solid line; live animals expressed in dressed weight are broken line.)

Fig. 2. Percentage of total imports represented by live animals.

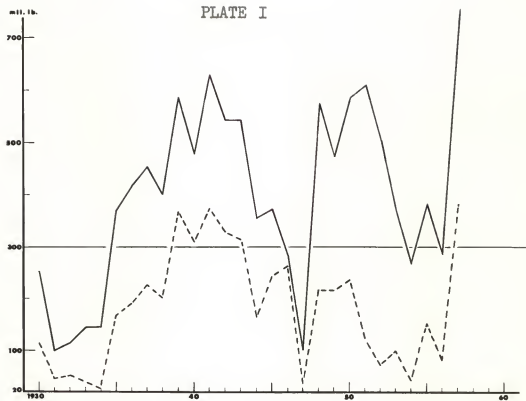


Fig. 1.

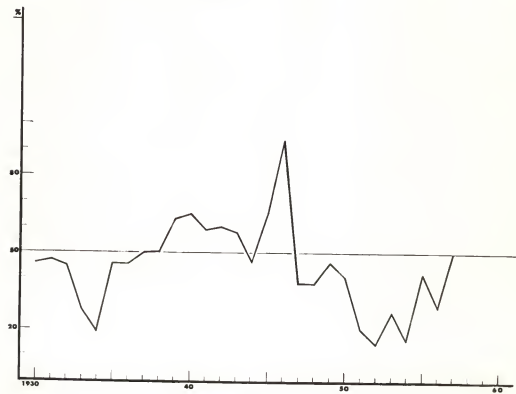


Fig. 2.

from one year to the next. The breaking of a drought in cattle feeding areas of the United States may serve as a stimulus for Canadian or Mexican cattle exporters, while surplus feed production in this country similarly attracts more cattle from outside the United States' borders. When cattle numbers in the United States expand and eventually reach the market, the number of animals coming into the country dwindles.

This phenomena can be explained by the supply and demand situation. A series of profitable years, especially when coupled with surplus feed conditions, generally prompt the cattlemen in this country to hold back their beef cattle from the market in an effort to expand operations. Packers then increase the prices they will pay for cattle, attracting larger numbers of foreign animals. The build-up in numbers finally swamps the market, depressing prices and the profits available from foreign animals.

#### Origin of Imports

Imports of cattle and beef into the United States originate at various locations on the globe, but mainly from the western hemisphere. Distance is an important factor in determining what form the imports take -- live or dressed. Problems of shrinkage and death loss of live animals necessitate fairly short distances between exporting and importing countries, but modern transportation facilities for dressed meat have reduced most of the problems related to distance.

Most of the live animals imported into the United States come

from the neighboring countries of Canada and Mexico. Apparently the shrinkage problems which would affect slaughter cattle have resulted in the greatest profits for the exporters being in stocker and feeder cattle.

Harold Abel in a recent study found that:

Normally, the bulk of live cattle imports is of the stocker-feeder classes. Virtually all Mexican imports are cattle of this type. Sometimes a substantial number of fat Canadian cattle are received, but the majority of Canadian imports also are stockers and feeders.<sup>1</sup>

Generally these feeder steers from Canada move into the country in the fall from Alberta, Saskatchewan, Manitoba and British Columbia.<sup>2</sup>

On the other hand, imports of meat come from a number of foreign nations. Most of this meat is either processed or meat which will be processed. Generally, the beef and veal imports are heaviest during late winter and early spring, supplementing the domestic supplies during their normally slack season. These meat imports tend to be of lower quality than meat from live animals which are imported. Abel described them:

Beef imports, on the other hand, tend to be lower quality products. The average value of imported beef per pound, for instance, is less than the value of cattle imports (carcass equivalent basis). Most of the beef that is imported is cured, processed, or fresh boneless beef for processing. All come from the cheaper portions of the carcass, or from lower grade animals.<sup>3</sup>

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1 Harold Abel, "Factors Influencing the Importation of Live-stock and Meat into the United States," The Livestock and Meat Situation, December 1958, p.17.

2 John E. Ray, "Cattle Across the Border," Foreign Agriculture, February 1958, 22 (2): 13.

3 Abel, loc. cit.

Abel further explained that the reason for the lower grade imports of beef and veal stems from the fact that a larger number of top grade animals are produced in the United States than in other countries. The development of the feeding industry in this country has increased the percentage of the slaughter accounted for by fed animals and pared the share formerly held by utility and commercial animals.<sup>1</sup>

Argentina for many years has been the major supplier of beef and veal for the United States with New Zealand, Canada and Mexico accounting for most of the remainder. As indicated by the data in Table 1, Argentina has not been challenged seriously as the major exporter of beef and veal to the United States.

Table 1. Imports of beef and veal, by country of origin, product weight (million pounds).<sup>2</sup>

Country	1950	1951	1952	1953	1954	1955	1956	1957
Canada	73.4	91.6	2.0	17.5	7.7	8.0	11.9	47.4
Mexico		46.4	72.4	25.0	18.1	10.4	6.5	12.9
Argentina	90.4	141.7	107.6	87.5	64.5	86.5	73.1	86.3
Uruguay	22.8	18.7	16.9	16.9	24.3	1.3	3.7	11.4
Denmark							3/	3/
West Germany						3/	3/	3/
Netherlands						3/		
Ireland	0.4	9.8	15.9	5.6	3.1	0.8	4.2	6.5
Australia	0.1	0.4	2.3	0.3	1.8	2.2	2.9	5.5
New Zealand		2/	58.8	2.4	1.1	2.6	4.3	50.0
Other	23.0	15.5	8.4	4.9	5.1	6.7	5.3	12.4
Total	210.1	324.1	284.3	160.1	125.7	118.5	111.9	232.5

2 Livestock and Meat Statistics 1957, op. cit., p.293.

3 Less than 50,000 pounds.

Most of the carcass beef and cuts imported by the United

1 Abel, op. cit., p.19.



States originate in Canada, Mexico, Costa Rica and the Dominican Republic. On the other hand, Argentina, Uruguay, Paraguay and Brazil specialize in corned beef in consumer sized cans. Boneless beef, which is used primarily for making bologna, hamburger, frankfurters and other processed meats is imported mainly from New Zealand, Canada, Ireland, Australia and Mexico.<sup>1</sup>

### Tariffs

Just as are many other commodities, imports of both cattle and meat are subject to import tariffs. The proper magnitude of the tariffs has been a matter of controversy for years, as explained earlier. Although most cattlemen apparently favor higher tariffs for beef, veal and cattle, there has been some doubt in the past as to the effectiveness of such restrictive measures in helping prop up sagging beef prices in the United States.

Edminster, for instance, wrote in 1926 that:

It would appear that the cattle industry is one in which the tariff cannot be made a very effective instrument for increasing prices and stimulating output. The significance of this situation is not to be escaped. The marked inclination of consumers to resort to substitutes imposes a very distinct check upon the gain that can accrue to producers from duties on cattle and beef; and by the same token, it diminishes the money burden that will be visited upon consumers.<sup>2</sup>

He also concluded that tariffs on cattle from Canada had not bettered the American conditions a great deal, but merely reduced

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1 "Why the United States Imports Beef and Veal," Foreign Agriculture, August 1958, 22 (8): 6.

2 Edminster, op. cit., pp. 240, 241.

the prices in Canada. "Statistical analysis suggests that the beef duty has had some effect on imports, but fails to show how far it raised domestic prices," he added.<sup>1</sup>

The basis for the current tariffs was established under the Tariff Act of 1930; however, the import duties have been reduced considerably through the reciprocal trade agreement programs and the General Agreement on Tariffs and Trade (GATT).

Some of the cattle imports are subject to import quotas which limit the number of head that can be shipped into this country during a single year under the reduced tariff rate. The quotas are also in some cases further subdivided into quarterly periods. All imports above the quotas pay the full import duty. At the present time there are no import quotas on meat.

The current tariff rates and those set up in 1930 (designated as "full rate") are listed in Table 2.

Table 2. Tariffs on cattle, beef and veal imports.<sup>2</sup>

Commodity	Full rate	Reduced rate
Cattle		
Under 200 pounds	2.5¢/lb.	1.5¢/lb. For not over 200,000 head entered in the 12-month period beginning April 1 in any year.
200-700 pounds	2.5¢/lb.	2.5¢/lb.
700 pounds and over:		
Dairy	3.0¢/lb.	1.5¢/lb.
Other	3.0¢/lb.	1.5¢/lb. For not over 400,000 head entered in the 12-month period beginning April 1 in any year of which not over

<sup>1</sup> Ibid., p.189.

Table 2 (concl.)

Commodity	Full rate	Reduced rate
		120,000 shall be entered in any quarter beginning April 1, July 1, October 1 and January 1, and 2.5 cents a pound for such "other" cattle entered in excess of the foregoing limitations.
Beef and veal, fresh, chilled or frozen	6.0¢/lb.	3.0¢/lb.
Meats, prepared or preserved not specifically provided for.		
Beef in air-tight containers and cured or pickled beef or veal:		
Valued per pound:		
not over 15 cents	6.0¢/lb.	3.0¢/lb.
15 to 30 cents	6.0¢/lb.	20% ad. val.
over 30 cents	20% ad. val.	20% ad. val.
Meats, fresh, chilled, frozen not specifically provided for.		
Edible animal brains, hearts, kidneys, livers, sweetbreads, tongues, and tripe:		
Valued per pound:		
under 20 5/8 cents	6.0¢/lb.	1.25¢/lb.
20 5/8 to 30 cents	6.0¢/lb.	6% ad. val.
over 30 cents	20% ad. val.	6% ad. val.
Other:		
under 30 cents	6.0¢/lb.	3.0¢/lb.
over 30 cents	20% ad. val.	10% ad. val.

<sup>2</sup> United States Import Duties (1958), U.S. Tariff Commission, pp. 116, 117.

Mexico has in some instances placed export quotas on their own cattle, designed to prevent excessive numbers of cattle from leaving that country.

Although the problem of transportation has been a major factor

in limiting the number of live animals being imported by the United States, it remains to be seen if this will be a problem in the future. Transportation by air has been successfully performed with cattle on a few occasions and could quite conceivably cut shrinkage from long distance travel in the future.

Dairy animals, for instance, have been flown by transport plane from Ireland to the United States. The plane was specially conditioned for the 18 head of Jersey cows and made the trip flying at 19,000 feet without apparent ill effects.<sup>1</sup> In the immediate future, such shipping methods will not have a major role in livestock transportation because of the large expense involved.

#### PREVIOUS WRITINGS

Discussions of imports recently by some agricultural economists have pointed up the consideration that despite their effect on domestic beef prices, imports may possess a good side also. Imports which show a seasonal variation help smooth out the troughs in the yearly beef production in the United States. In addition, they help fill out the demand for lower quality meat for processed use.

Abel in a recent study commented:

It may seem odd, but increased imports usually are a sign of prosperity for the American cattle producer. Imports have never been large on a depressed market.<sup>2</sup>

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<sup>1</sup> Melvin Garvick, "Imported by Air!", Jersey Journal, August 5, 1956, 3 (15): 21.

<sup>2</sup> Abel, op. cit., p.21.

He added that "as a rule, imports are large when production of beef in the United States is cyclically reduced and United States prices are cyclically higher."<sup>1</sup>

Abel also concluded from his work that a certain price differential must exist for the live animals before Canada and Mexico would send substantial quantities of cattle into the United States. Tariffs, transportation and costs of marketing the animals, he said, pose limitations on imports which the United States price must offset if imports are to increase.

As a result, the spread between prices in the United States and even our next door neighbors of Mexico and Canada must be at least \$3.00-\$4.00 before any large volume enters. Higher cost of transportation, greater death loss and shrink and the likelihood of price changes serve to limit or prevent shipments of live cattle from nations other than Canada and Mexico.<sup>2</sup>

Another economist, Herrell DeGraff, Cornell University, also said: "Basically it is my view that the recent imports of cattle and beef have not been wholly to the disadvantage of cattle producers."<sup>3</sup> He noted that hamburger, hot dogs, grinding and sausage beef have become a major factor in the United States' marketing of beef. In 1955 some 30 percent of the beef purchased for home consumption was ground beef as compared with 17 percent before World War II.<sup>4</sup>

These figures prompted him to comment:

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1 Ibid., p.24.

2 Ibid., p.21.

3 Herrell DeGraff, Unpublished address, American National Cattlemen's Association, Omaha, Neb., January 1959.

4 Ibid.



The rising popularity of hamburger has been an important market-building factor for the whole cattle industry. Not only does it provide a good, comparatively inexpensive beef item in competition with other meats -- but also it provides an improved outlet for large quantities of lean cow beef to be combined with the fat trim from fed-beef carcasses. The retail utilization-value of our total beef supply is thus improved . . . . . It is far better for cattlemen, I believe, to have some imports now, to help hold consumers against the time when our own production will sharply increase, than to have them drift away to alternative foods from which later it would be difficult to bring them back.<sup>1</sup>

DeGraff also explained that while imports in some years might tend to hold down the profits, they also could serve the purpose of preventing the periodic entering in to the cattle business of "every drugstore cowboy and other fly-by-night cattlemen who want to scalp the good times and then add seriously to the industry's troubles in the bad times."<sup>2</sup>

#### DATA

The method of analysis in this study and the materials used were mentioned in the introduction, but it was felt that a clearer picture of the results of the study could be obtained by a more detailed discussion of the data involved and the manner in which they were analyzed. It should be remembered that statistics alone cannot forecast the future. They can, however, be used to study past happenings, and, when coupled with logic and common sense, can serve as a basis for estimating what might occur in the future under certain conditions and circumstances.

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1 Ibid.

2 Ibid.



Nearly all of the data involved were obtained from various publications of the United States Department of Agriculture. The time period under consideration in the study was from 1930 through 1957, a period which began with falling prices, but then saw prices rise erratically until the latter few years when they fell steadily. The last year of the study, 1957, however, was one of the beginning years of increasing prices as the upward swing of the cattle price cycle had apparently begun. Data were not available for 1958.

During the 28-year period covered by the study, the country's economy was seriously altered by World War II. The war, starting late in 1941, likely affected the normal tendencies of cattle marketing very little that year, but there can be little doubt that the market was in an "abnormal" state from 1942 until 1946 when price ceilings were cancelled. Therefore, the five years 1942 through 1946, were eliminated from consideration in most of this study in an effort to view the cattle market when it was not unduly influenced by abnormal occurrences. For the sake of continuity, however, these years were retained on the various graphs presented in the study.

In studying imports and cattle prices, the author was concerned with a number of variables other than simply prices. There was a question of what factors affect the importations to the greatest extent, and, once these were determined, how could the data best be used to minimize the other changes in the year-to-year status of the market.

In dealing with total livestock production, it was decided

that the use of pounds rather than head would show most accurately the situation for cattle, hogs and sheep. The use of total pounds rather than the number of head circumvented the complication of calves, yearlings or heavy fat cattle in the overall slaughter figures.

In order to determine the total supply of beef, veal, pork and mutton for a given year, the beginning stocks of the meats were combined with the annual production (includes animals slaughtered and consumed on the farms) and imports of meat. Live animals imported were not included because they would already have been included in the total slaughter.

Obtaining the total import figure for beef involved transforming the live animals imported on a head basis to a poundage basis. This was done by multiplying the average dressed weight per animal of total slaughter in the United States for each year involved (see Table 3) times the number of head of live animals imported that same year. This assumes that the average slaughter weight of imported cattle was equal to that of domestically produced cattle. This assumption may be somewhat in error but no basis is known for determining the separate slaughter weights of imported cattle and domestically produced cattle. The imports of dressed meat were on a carcass weight equivalent (see Tables 4 and 4a).

Table 3. Average dressed weight for beef cattle, United States, 1930 to 1957<sup>4</sup>

Year	Pounds	Year	Pounds	Year	Pounds	Year	Pounds
1957	526	1950	514	1943	482	1936	463

Table 3 (concl.)

Year	Pounds	: Year	Pounds	: Year	Pounds	: Year	Pounds
1956	523	1949	503	1942	492	1935	446
1955	512	1948	473	1941	495	1934	428
1954	502	1947	466	1940	482	1933	491
1953	508	1946	473	1939	480	1932	483
1952	520	1945	474	1938	466	1931	497
1951	519	1944	461	1937	446	1930	491

1 Livestock and Meat Statistics 1957, op. cit., p.196.

Table 4. Cattle imports.

Year	Live cattle <sup>1</sup> (head)	Dressed wght.: (mil. lb.):	Year	Live cattle <sup>1</sup> (head)	Dressed wght.: (mil. lb.):
1957	727,853	382.8	1943	652,610	314.6
1956	159,359	83.3	1942	668,851	329.1
1955	314,377	161.0	1941	749,757	371.1
1954	86,056	43.2	1940	643,832	310.3
1953	198,226	100.7	1939	763,653	366.6
1952	140,461	73.0	1938	433,961	202.2
1951	238,959	124.0	1937	507,324	226.3
1950	460,969	236.9	1936	410,299	190.0
1949	433,458	218.0	1935	378,124	168.6
1948	461,679	218.4	1934	66,304	28.4
1947	84,505	39.4	1933	81,591	40.1
1946	557,904	263.9	1932	105,612	51.0
1945	511,623	242.5	1931	95,355	47.4
1944	358,269	165.2	1930	234,173	115.0

1 Ibid., p.290, 291.

Table 4a. Beef, veal and total imports, millions of pounds.

Year	Beef <sup>1</sup>	Veal <sup>2</sup>	Total	: Year	Beef <sup>1</sup>	Veal <sup>2</sup>	Total
1957	371	5	758.8	1943	225	1	540.6
1956	204		287.3	1942	211	1	541.1
1955	222		383.0	1941	257		628.1
1954	225	1	269.2	1940	168		478.3
1953	271		371.7	1939	219		585.6
1952	429		502.0	1938	200		402.2
1951	472	12	608.0	1937	227		453.3
1950	338	10	584.9	1936	226		416.0
1949	247	7	472.0	1935	201		369.6
1948	351	5	574.4	1934	118		146.4

Table 4a (concl.)

Year	Beef <sup>1</sup>	Veal <sup>2</sup>	Total	:	Year	Beef <sup>1</sup>	Veal <sup>2</sup>	Total
1947	64		103.4		1933	104		144.1
1946	19	1	283.9		1932	63		114.0
1945	127	1	370.5		1931	52	1	100.4
1944	189	1	355.2		1930	134	2	251.0

1 Ibid., p.285.

2 Ibid., p.286.

The prices used in this study included a weighted average price received by farmers for beef cattle per hundred pounds and an average retail price of beef per pound paid by consumers. Within a period of 28 years the value of the currency changed considerably. In order to hold constant the value of the price received and paid by farmers and consumers respectively, the prices were deflated by the index of United States wholesale prices with the years 1947-49 equal to 100.

Table 5. Wholesale index.<sup>1</sup>

Year	Index	:	Year	Index	:	Year	Index
1957	117.6		1950	103.1		1943	67.0
1956	114.3		1949	99.2		1942	64.2
1955	110.7		1948	104.4		1941	56.8
1954	110.3		1947	96.4		1940	51.1
1953	110.1		1946	78.7		1939	50.1
1952	111.6		1945	68.8		1938	51.1
1951	114.8		1944	67.6		1937	56.1
						1936	52.5
						1935	52.0
						1934	48.7
						1933	42.8
						1932	42.1
						1931	47.4
						1930	56.1

1 Economics Statistics Bureau of Washington, D.C., Handbook of Basic Economic Statistics, April 15, 1959, 13:122.

With the exception of two years, 1938 and 1934, the adjusted prices of prices received by farmers followed the same up-and-down trend exhibited by the actual prices. This can be observed in

Plate II which shows the year-to-year trend in prices received by farmers, both actual and adjusted. The solid line represents the actual price and the broken line is the adjusted price level.

In 1934, the actual price averaged \$4.13 compared with \$3.75 the previous year. The adjusted price, however, fell in the same period from \$8.76 to \$8.48. While the actual price jumped by 39 cents, the increase percentagewise was not as great as that of the wholesale index; therefore, the rapid climb of the index was more than enough to offset the increase in actual prices, hence the adjusted figure was lower than the previous year.

The opposite situation occurred in 1938 when the actual price fell to \$6.54 from \$7.00 in 1937. The fall in the wholesale index of from 56.1 percent to 51.1 percent was greater proportionally than that of the actual price and as a result the adjusted price was higher in 1938 than it had been in 1937. This simply indicated that the farmer in 1938 could purchase more from a lower price received than he could the year earlier.

The same phenomena is evident in greater numbers in the comparison between actual retail prices and those adjusted by the wholesale index. In these cases also, the change in the wholesale index from year to year has been greater proportionally than that of the actual price as evidenced in Table 6.

Table 6. Actual retail prices and the same prices after adjustment by the wholesale index.

Year	Actual prices <sup>1</sup>	Adjusted	Year	Actual prices <sup>1</sup>	Adjusted
1957	70.6	60.0	1943	36.2	54.0
1956	66.0	57.7	1942	35.0	54.5
1955	67.5	61.0	1941	31.5	55.5



#### EXPLANATION OF PLATE II

Year-to-year trend in prices received by farmers for beef cattle per hundred pounds. Solid line represents actual prices; broken line indicates prices after adjustment by the wholesale price index.



PLATE II

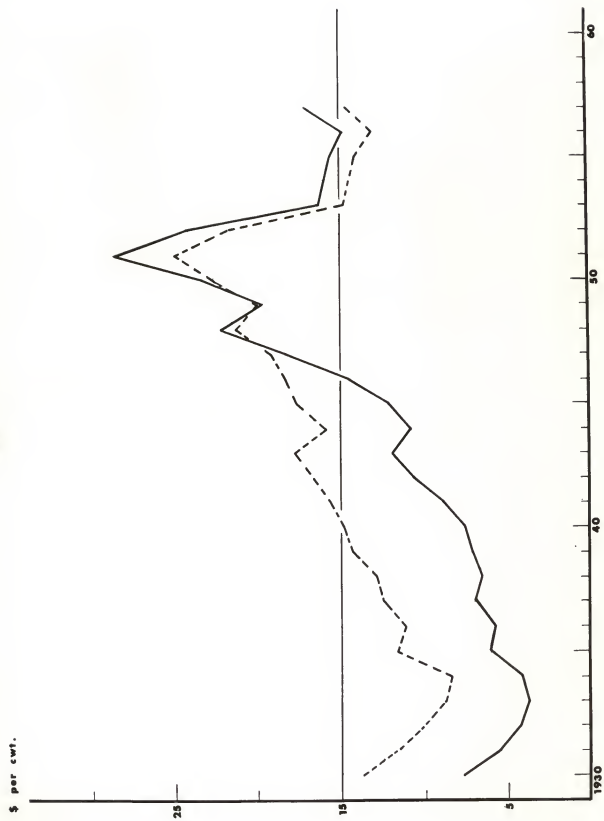


Table 6 (concl.)

Year	Actual prices <sup>1</sup>	Adjusted	Year	Actual prices <sup>1</sup>	Adjusted
1954	68.5	62.1	1940	29.5	57.7
1953	69.1	62.8	1939	29.5	58.9
1952	86.6	77.6	1938	28.7	56.2
1951	88.2	76.8	1937	32.5	57.9
1950	75.4	73.1	1936	28.6	54.5
1949	68.4	69.0	1935	30.5	58.7
1948	75.3	72.1	1934	23.3	47.8
1947	61.8	64.1	1933	21.5	50.2
1946	42.5	54.0	1932	24.9	59.1
1945	33.5	48.7	1931	30.0	63.3
1944	34.2	50.6	1930	36.2	64.5

<sup>1</sup> Livestock and Meat Statistics 1957, op. cit., p.271.

In order to avoid the erroneous conclusion that imports of beef were taking a larger share of the market because their absolute quantity had increased, the total supply data for beef, pork, and mutton and the data on imports were divided by the country's population to put them on a per capita basis. This, it was felt, would eliminate the confusion of increased supplies and imports without any change in price as the additional supplies were consumed by the new population.

#### METHODOLOGY

Since the primary objective of this study was to find the relationship between beef imports and cattle prices and what impact, if any, the imports of beef exercise on such prices, a multiple regression analysis was made using imports as the dependent variable and domestic prices, supplies of beef, pork, mutton and feed as independent variables. Although imports would

logically be assumed to have some effect on prices, it was felt that a simple multiple regression with prices as the dependent variable would not show such an effect. In this case it was expected that as prices rise, imports concurrently, or soon thereafter, similarly increase. The higher prices would be expected to attract larger quantities of imports, but the latter would act as a price "limit" holding price increases below their potential maximum. In such a case, it would also seem logical to expect a positive correlation between prices and imports, which might lead to the mistaken assumption that increased imports would cause higher prices.

While this study was concerned with the relationship between prices and imports, it was evident that other factors in the domestic economy might affect the rate of imports also; these factors would include total supplies of beef in this country, supplies of competing products, namely pork and mutton, and feed supplies.

Abundant, inexpensive feed would serve as an attraction for stocker and feeder cattle from Canada and Mexico, while surplus quantities of beef or of pork and mutton in this country, all of which are substitutes for imported beef and veal, would help restrict imports.

Hence, by including these other factors in the multiple regression, it was thought that a more accurate picture of the import-price relationship would be obtained. Such an analysis also permitted a study of this relationship holding the other

variables constant.

The regression problem was solved by use of the International Business Machines Corporation 650 electronic computer at Kansas State University.

The other method of analysis utilized by the author in this study was the use of price elasticities of demand to determine the effect the importation of beef imposed on prices received by the farmers in the United States for their cattle.

Elasticity shows the relationship between the changes in quantity demanded and changes in price. The coefficient of elasticity is obtained by dividing the percentage change in the quantity by the percentage change in price, or as expressed by the formula:

$$E = \frac{\frac{\text{Change in quantity}}{\text{Quantity}}}{\frac{\text{Change in price}}{\text{Price}}}$$

If the coefficient of elasticity is greater than one, the demand for the commodity is said to be relatively elastic, while if it is less than one, the commodity is considered relatively inelastic.

According to Harold Halcrow, "Elasticity of demand expresses the responsiveness of quantity (demanded or consumed) to a change in price, within a given demand schedule."<sup>1</sup> He also noted:

Where the demand is highly inelastic . . . . small changes in output will bring large fluctuations in price

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<sup>1</sup> Harold G. Halcrow, Agricultural Policy of the United States, p.58.

and instability in producer income . . . . . When agricultural output increases or decreases, it is the elasticity of demand for total food and for total farm products which determines how much the general level of agricultural prices is going to change, assuming stable demand.<sup>1</sup>

Just as demand for a commodity can be changed, so can the demand elasticity be altered. Changes in tastes, income and/or technology subject the elasticity coefficient to transformation. If consumer tastes, for instance, become strongly inclined toward beef, they may tend to buy more beef no matter what happens to the price, thus making the demand more inelastic. On the other hand, if incomes decrease, the consumers may suddenly become more responsive to price changes, buying considerably less beef if prices rise.

Development of substitute goods also make consumers more sensitive to price changes and thus changes the elasticity of demand for that commodity. Alfred Marshall explained:

We must however remember that the character of the demand schedule for any commodity depends in a great measure on whether the prices of its rivals are taken to be fixed or to alter with it. If we separated the demand for beef from that for mutton, and supposed the price of mutton to be held fixed while that for beef was raised, then the demand for beef would become extremely elastic. For any slight fall in the price of beef would cause it to be used largely in the place of mutton and thus lead to a very great increase of its consumption: while on the other hand even a small rise in the price would cause many people to eat mutton to the almost entire exclusion of beef.<sup>2</sup>

Several studies have been made about the elasticity of beef at the farm level in recent years. George Mehren calculated the

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<sup>1</sup> *Ibid.*, p.72.

<sup>2</sup> Alfred Marshall, Principles of Economics, p.105.

price elasticity of demand for beef at the farm level at  $-0.8$ ,<sup>1</sup> meaning that a one percent increase in prices would result in an 0.8 percent decrease in demand. Perhaps it would be more accurate to refer to the change in the manner that an 0.8 percent decrease in quantity -- or the amount of cattle slaughtered -- would result in a price increase of one percent. Such a rewording might be more logical considering that the United States will consume all the beef it produces. The changes in quantity, however, will result in changes in prices, which can be explained by the elasticity coefficients.

Karl Fox found a one percent change in production would mean a 1.19 percent change in prices in the opposite direction.<sup>2</sup> This relationship yields an elasticity coefficient of  $-0.84$ , arbitrarily used in this study. Fox also found the elasticity of consumer demand, which is the relation between retail price and per capita consumption, to be  $-0.79$ , which was also used in this study.<sup>3</sup>

In the use of elasticities to estimate the effect of imports on domestic prices, both at the farm level and at the retail level, the author considered imports and total demand on a per capita basis. The imports were used as a percentage change in the domestic production of beef and veal plus stock carried over from the

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1 George Mehren, "Comparative Costs of Agricultural Price Supports," American Economic Review, May 1951, 41 (2): 720.

2 Karl Fox, The Analysis of Demand for Farm Products, U.S. Department of Agriculture Technical Bulletin 1081, p.43.

3 Karl Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption," Agricultural Economics Research, July 1951, 3 (3): 76.



previous year.

## FINDINGS

### Factors Associated with Variations in Imports

In analyzing the relationship between imports and prices through multiple regression, the units of the different variables were studied on a per capita level -- with the exception of prices and feed supplies -- in order to eliminate the influence of population growth as a "demand shifter."

As mentioned earlier, prices were deflated by the wholesale index. Feed supplies were on a grain-consuming unit basis.

The problem was set up in the general equation form of  $Y = f(X_1, X_2, X_3, X_4, X_5)$ , where Y, the dependent variable, was imports of beef and veal (including live animals adjusted to dressed equivalent),  $X_1$  was the price of beef cattle,  $X_2$  was the supply of domestically-produced beef,  $X_3$  was the supply of feed concentrates,  $X_4$  was the supply of pork, and  $X_5$  was the supply of mutton. In table form, the analysis was as shown in Table 7.

Table 7. Data used in multiple regression problem.

Year	Y	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$
1957	4.45	14.62	91.61	1.36	63.96	4.24
1956	1.72	13.04	96.91	1.24	70.38	4.50
1955	2.33	14.09	92.30	1.19	70.55	4.68
1954	1.66	14.50	91.72	1.13	64.17	4.62
1953	2.34	14.80	88.91	1.10	67.03	4.74
1952	3.21	21.77	70.20	1.05	77.65	4.27
1951	3.96	25.00	64.62	1.01	78.28	3.50
1950	3.87	22.60	70.56	1.06	74.24	4.06
1949	3.18	19.96	72.17	1.07	72.39	4.26
1948	3.93	21.26	71.68	1.05	72.39	5.26

Table 7 (concl.)

Year	Y	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>
1947	0.72	19.09	84.78	0.87	75.26	5.68
1941	4.72	15.53	66.52	0.90	76.60	6.97
1940	3.63	14.79	60.10	0.90	79.79	6.68
1939	4.48	14.25	58.89	0.87	69.92	6.70
1938	3.10	12.80	59.89	0.88	62.78	6.94
1937	3.52	12.48	61.21	0.89	59.84	6.70
1936	3.25	11.08	67.63	0.65	62.35	6.73
1935	2.91	11.62	62.54	0.82	52.09	7.34
1934	1.16	8.48	76.40	0.63	71.64	6.78
1933	1.15	8.76	58.48	0.75	77.58	6.82
1932	0.91	10.10	53.05	0.86	76.14	7.11
1931	0.81	11.67	55.39	0.78	74.80	7.19
1930	2.04	13.74	54.56	0.74	74.17	6.77
Mean	2.74	15.04	70.87	0.95	70.61	5.76
Std. Dev.	1.27	4.50	13.72	0.19	6.97	1.28

The initial part of the analysis showed that during the 23-year period under study, the mean for the imports was 2.74 pounds per person, while the mean for the prices was \$15.04 per hundred pounds. The standard deviation from the mean in these two cases was 1.27 and 4.50 respectively.

The other variables had the following means and standard deviations: beef, 70.87 and 13.72; feed, 0.95 and 0.19; pork, 70.61 and 6.97; and mutton, 5.76 and 1.28.

As might be expected the highest correlation between imports and the other variables was between imports and prices. The simple correlation between these two variables was 0.464, and the nearest simple correlation of any of the other variables was feed supply and imports with 0.299. The same sequence held true with the partial correlations. Prices and imports had a partial correlation coefficient of 0.456, while the nearest variable was feed supply with

0.398. Pork supply also had a partial correlation of -0.390, indicating a negative response of imports to changes in the pork supply.

At the five percent rejection level, with 21 degrees of freedom ( $n - 2$ ), any simple correlation coefficient of less than 0.413 indicated that the correlation was so small that one could assume very little relationship existed. The similar rejection level for partial correlation coefficients with 17 degrees of freedom was 0.4555. Only the correlation of imports and prices was high enough to escape rejection at the five percent level. Table 8 shows both the partial and simple correlation coefficients.

Table 8. Partial and simple correlation coefficients with beef imports as the dependent variable.

Variable	Partial correlation	Simple correlation
Prices	0.45568	0.46414
Feed supply	0.39805	0.29892
Pork supply	-0.39038	-0.13155
Beef production	-0.28129	-0.08659
Mutton supply	0.21475	-0.22820

The correlations between the various independent variables, as indicated by the simple correlation coefficients, varied considerably in size. High correlation between the independent variables in some cases might have indicated that the inclusion of one of them in the regression analysis was unnecessary. Mutton exhibited relatively high correlation with feed supply, beef supply and domestic beef prices with coefficients of -0.802, -0.653 and -0.725, respectively. However, the correlation was negative showing that mutton tends to move in opposite directions

with these other independent variables. It was felt that none of the independent variables had sufficient intercorrelation to warrant their exclusion from the analysis, (see Table 8a).

Table 8a. Simple correlation coefficients from the regression analysis.

	Imports	Prices	Beef	Feed	Pork	Mutton
Imports	1.0	0.46414	-0.08659	0.29892	-0.13155	-0.22820
Prices		1.0	0.15118	0.45911	0.35246	-0.72490
Beef			1.0	0.70392	-0.17933	-0.65280
Feed				1.0	-0.04270	-0.80235
Pork					1.0	-0.16593
Mutton						1.0

The simple correlation coefficient indicates the linear relationship between any two variables without regard to the other variables. For instance, the simple correlation of imports and prices shows the similarities in action between prices and imports during the time when the other variables -- beef, pork, feed and mutton supplies -- were also changing.

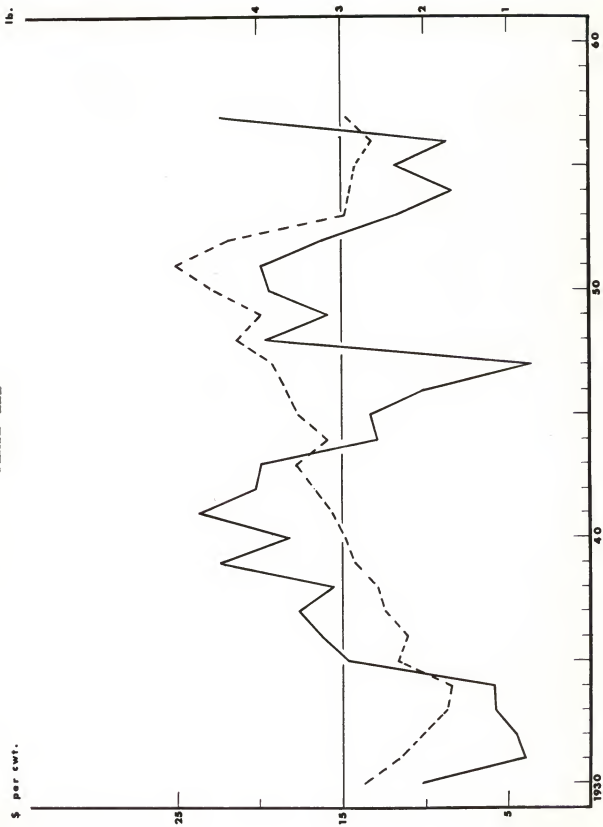
The partial correlation represents the linear relationship between the dependent and independent variables, taking into account the effect of the other variables by holding them constant -- in this case at their average. The partial correlation shows how imports follow prices, for example, should they change and all other factors remain as they were. From Table 8 it can be observed that the simple correlation and the partial correlation coefficients of prices and imports are nearly the same which indicates that the imports followed the same trend in relation to the prices whether the other variables changed or not.

Plates III and IV illustrate the direct relationship between

### EXPLANATION OF PLATE III

Trends of per capita imports of cattle and beef and prices received by farmers for beef cattle per hundred pounds after adjustment with the wholesale price index. Solid line represents imports; broken line shows prices.

## PLATE III

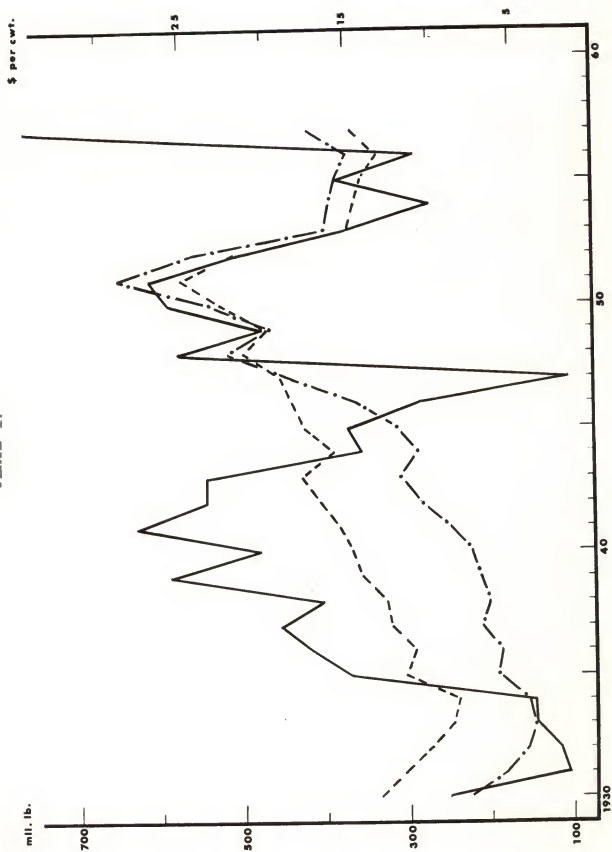




#### EXPLANATION OF PLATE IV

Trends of total imports of cattle and beef and prices received by farmers for beef cattle per hundred pounds, both with and without adjustment by the wholesale price index. Solid line represents total imports; broken line shows adjusted prices; and broken line with dots signifies actual, unadjusted prices.

PLATE IV



imports and prices. Plate III shows the per capita imports of beef as the solid line and the domestic prices adjusted with the wholesale price index as a broken line. It is particularly evident that since 1947, the per capita imports have closely associated with the trend of prices.

Plate IV represents total imports as a solid line, domestic prices adjusted with the wholesale index as the broken line and the actual unadjusted prices as a broken line with dots. As was the case with per capita imports, the total figures closely follow the price lines of the years after 1947.

While plus or minus one is a perfect correlation and the 0.46 of prices and imports may appear rather small, certain other factors such as embargoes, also alter imports which easily could cause severe changes in the import-price relation. Droughts in other countries might force a "dumping" of foreign cattle on the United States market even at a time when domestic prices were lower than in previous years. On the other hand, low supplies of cattle in foreign countries could pare the imports during a time of high prices. Such factors must also be considered when looking at a statistical analysis. In general, however, there has been a significant tie between imports and domestic prices.

A certain amount of the variation of the dependent variable can be explained, however, by regression analysis. The extent to which this variation is explained by regression is indicated by percentages, or in mathematical terms by  $1 - R^2$ , where  $R^2$  is the amount of variation accounted for by regression. In this study,

the  $R^2$  equalled 0.47441, or 47.4 percent of the variation in imports; the  $1 - R^2$  was 0.52559. Or in other words, 52.6 percent of the variation in imports was unexplained by linear relationships of the variables considered in this analysis.

Much of the remainder of the variation which was left unexplained by the regression analysis undoubtedly results from conditions in the exporting countries outlined above.

Of the total  $R^2$  coefficient, the price variable provided the greatest single reduction in the variation of the dependent variable. The ties between price action and imports reduced the variation of the latter by 22 percent. The nearest other factor was the supply of beef which further reduced variation 13 percent. It should be remembered that the reduction data cited in Table 9 indicate how much the variation was reduced by adding that particular variable after the preceding ones; it does not become a basis for saying that a particular variable accounted for a certain percentage of the variation of the dependent variable. The reduction coefficient might be altered by changing the order of the variables in the problem. The order used in the regression analysis was so selected on the basis of the order of the simple correlation coefficients.

By adding the four independent variables of feed, pork, beef and mutton to the price variable, the  $R^2$  value was more than doubled, from 0.21543 to 0.47441. In other words, their addition fundamentally doubled the fraction of the variation of imports which can be explained by regression analysis. However,

the inclusion of these variables was not significant statistically because of the number of degrees of freedom which were lost and the remaining variation which was still unexplained.

Table 9. Reduction coefficients and  $1 - R^2$ .

Variable	Reduction	$1 - R^2$
Price	0.21543	0.78457
Feed supply	0.00934	0.77524
Pork supply	0.09052	0.68472
Beef production	0.13372	0.55100
Mutton supply	0.02541	0.52559

Perhaps of major interest was the value of the partial regression coefficient (beta or  $b$ ) which shows the average change in the dependent variable per unit increase in the independent variable, i.e., what happens to imports as the other variables increase. Using a standard  $t$ -test with 17 degrees of freedom at the five percent rejection level, the hypothesis that beta equals zero was accepted in all cases but that of the price variable. At the five percent rejection level, any  $t$  of more than 2.110 was significant. The value of  $t$  was calculated in the analysis by use of the standard partial regression coefficient ( $b^*$ ) and the standard deviation of  $b^*$  (see Table 10). The same value of  $t$  would have been received, however, by using the  $b$  with its standard deviation.

The  $b$  value for the price variable, which indicates the change in imports per unit change in prices, was 0.19536. This coefficient means that when prices change by 10 percent, imports will tend to shift in the same direction by nearly 2 percent. Thus, the value of  $b$  of about 0.2 represents what might be termed

"the coefficient of price elasticity of imports."

Table 10. Regression coefficients, standard deviations and values of t.

Variable	b	b'	s <sub>p</sub>	t
Price	0.19536	0.69267	0.32817	2.11071
Feed supply	-3.96122	0.58400	0.32642	1.78908
Pork supply	-0.06307	-0.34596	0.19788	1.74832
Beef prod.	-0.03504	-0.37853	0.31320	1.20859
Mutton supply	0.43433	0.43796	0.48309	0.90659

#### Effect of Imports on U.S. Prices

Coefficients of elasticity offer a method of estimating the effect of volume of imports on prices. Again per capita data were used to eliminate changes in demand because of population changes.

As explained earlier, the coefficients of elasticity used in this study were -0.84 at the farm level and -0.79 at the retail level. Fox explained the difference between the two as follows:

Elasticities of demand at the farm level with respect to total supply or production are greater than the elasticities derived from domestic consumption, (i.e., at the retail level) as the effects of changes in production on prices received by farmers are softened by adjustments in foreign trade and in stocks.<sup>1</sup>

It has long been recognized that farm prices fluctuate more violently than retail prices because of the presence of fixed costs or charges in the marketing system.<sup>2</sup>

Determining what beef prices might have been without the

<sup>1</sup> Karl Fox, The Analysis of Demand for Farm Products, op. cit., p.4.

<sup>2</sup> Karl Fox, "Factors Affecting Farm Income, Farm Prices and Food Consumption," op. cit., p.73.



foreign supply involved subtracting per capita imports of beef from the total per capita supply in order to arrive at the base figure, i.e., domestic supply. This was the same data used in the regression analysis as the beef production variable. Imports then represented the change in quantity, and when divided by the domestic supply yielded the percentage change in quantity. Filling this data into the formula of elasticity given above, it was a simple matter of algebra and arithmetic to calculate the percentage change in prices caused by the imports. With the negative coefficients of elasticity, the percentage change in price would naturally be in the opposite direction, from the change in quantity. Since imports, considered above, are always a non-negative quantity, the effect on price is always negative. (It would be zero if imports were zero.)

By subtracting the percentage change in price from 100, it was possible to obtain what percentage of the potential price was represented by the actual price. From this point, it required division to calculate what the prospective price would have been without imports.

Two sets of calculations were made at each the farm and retail levels: one for actual prices and one for prices adjusted with the wholesale index.

The initial calculations of the percentage of the price received by farmers of the potential price, i.e., without imports, are given in Table 11. Listed are the per capita domestic production, the imports of beef as a percentage of production and the

percentage change in price caused by the imports.

Table 11. Calculations of percentage that prices received by farmers were of their potential prices.

Year	Production	Imp. as % of prod.	% change in price	% price is of potential
1957	91.61	4.86	5.79	94.21
1956	96.91	1.77	2.11	97.89
1955	92.30	2.52	3.00	97.00
1954	91.72	1.81	2.15	97.85
1953	88.91	2.63	3.13	96.87
1952	70.20	4.57	5.44	94.56
1951	64.62	6.13	7.30	92.70
1950	70.56	5.48	6.52	93.48
1949	72.17	4.41	5.25	94.75
1948	71.68	5.48	6.52	93.48
1947	84.78	0.85	1.01	98.99
1946	78.51	2.56	3.05	96.95
1945	85.10	3.11	3.70	96.30
1944	79.79	3.22	3.83	96.17
1943	70.17	5.66	6.74	93.26
1942	72.88	5.52	6.57	93.43
1941	66.52	7.10	8.45	91.55
1940	60.10	6.04	7.19	92.81
1939	58.89	7.61	9.06	90.94
1938	59.89	5.18	6.17	93.83
1937	61.21	5.75	6.85	93.15
1936	67.63	4.81	5.73	94.27
1935	62.54	4.65	5.54	94.46
1934	76.40	1.52	1.81	98.19
1933	58.48	1.97	2.35	97.65
1932	53.05	1.71	2.04	97.96
1931	55.39	1.46	1.74	98.26
1930	54.56	3.74	4.45	95.55

Calculating the probable difference between the actual price and what it would have been without imports showed an average difference for the 23 years of 1930-57 (omitting 1942-46) of 66 cents per hundred pounds. Including all 28 years, the difference was 65 cents. The extreme was \$2.26 in 1951 when imports were 6.13 percent of production, while the low was 7 cents per hundred pounds in 1934.

When adjusted with the wholesale price index, the differential for 23 years was 80 cents a hundredweight and for 28 years was 81 cents. In this case the extreme was \$1.96 in 1951 and the low was 15 cents in 1934.

The annual effect of imports on United States prices is shown in Table 12. Figure 1, Plate V, shows the percentage imports have been of the domestic supply from 1930 to 1957.

Table 12. Differences between prices received by farmers and probable prices without imports.

Year	-- Actual prices --			:	-- Adjusted prices --		
	Bef. Imp.	Aft. Imp. <sup>1</sup>	Diff.		Bef. Imp.	Aft. Imp.	Diff.
1957	18.25	17.20	1.05	:	15.51	14.62	0.89
1956	15.22	14.90	0.32	:	13.32	13.04	0.28
1955	16.08	15.60	0.48	:	14.52	14.09	0.43
1954	16.35	16.00	0.35	:	14.81	14.50	0.31
1953	16.82	16.30	0.52	:	15.27	14.80	0.47
1952	25.69	24.30	1.39	:	23.02	21.77	1.25
1951	30.96	28.70	2.26	:	26.96	25.00	1.96
1950	24.92	23.30	1.62	:	24.17	22.60	1.57
1949	20.89	19.80	1.09	:	21.06	19.96	1.10
1948	23.74	22.20	1.54	:	22.74	21.26	1.48
1947	18.58	18.40	0.18	:	19.28	19.09	0.19
1946	14.95	14.50	0.45	:	18.99	18.42	0.57
1945	12.56	12.10	0.46	:	18.26	17.59	0.67
1944	11.23	10.80	0.43	:	16.61	15.98	0.63
1943	12.76	11.90	0.86	:	19.04	17.76	1.28
1942	11.45	10.70	0.75	:	17.84	16.67	1.17
1941	9.63	8.82	0.81	:	16.96	15.53	1.43
1940	8.14	7.56	0.58	:	15.93	14.79	1.14
1939	7.85	7.14	0.71	:	15.66	14.25	1.41
1938	6.97	6.54	0.43	:	13.64	12.80	0.84
1937	7.51	7.00	0.51	:	13.39	12.48	0.91
1936	6.17	5.82	0.35	:	11.75	11.08	0.67
1935	6.39	6.04	0.35	:	12.30	11.62	0.68
1934	4.20	4.13	0.07	:	8.63	8.48	0.15
1933	3.84	3.75	0.09	:	8.97	8.76	0.21
1932	4.34	4.25	0.09	:	10.31	10.10	0.21
1931	5.62	5.53	0.09	:	11.87	11.67	0.20
1930	8.06	7.71	0.35	:	14.37	13.74	0.63
Ave.			0.65	:			0.81

<sup>1</sup> Livestock and Meat Statistics 1957, op. cit., p.248.

EXPLANATION OF PLATE V

Fig. 1. Percentage that imports have been of the domestic beef supply.

Fig. 2. Percentage that imports have been of domestic beef consumption.

## PLATE V

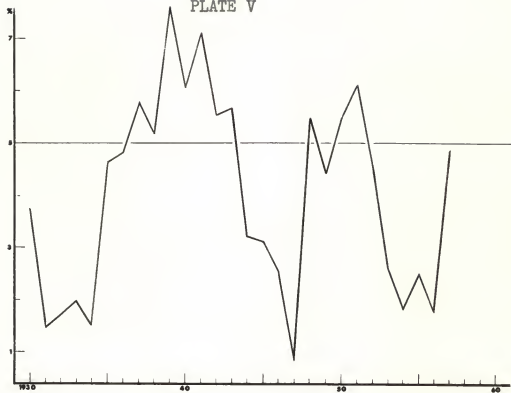


Fig. 1.

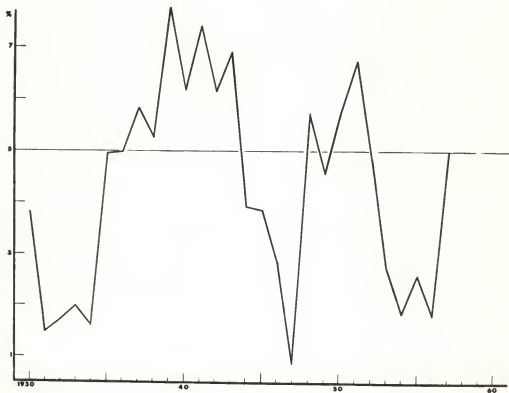


Fig. 2.

Similar calculations were made at the retail level. Figure 2, Plate V, and Table 13 indicate the percentage imports have been of domestic per capita consumption. Table 13 lists the calculation of the percentage the actual price was of its potential level.

Table 13. Calculations of percentage that retail prices were of their potential levels.

Year	Beef-veal consumption	Imp. as % of consump.	% change in price	% price is of potential
1957	88.85	5.00	6.33	93.67
1956	93.18	1.84	2.33	97.67
1955	89.07	2.61	3.30	96.70
1954	88.44	1.87	2.37	97.63
1953	84.76	2.76	3.49	96.51
1952	66.19	4.84	6.13	93.87
1951	58.74	6.74	8.53	91.47
1950	67.53	5.73	7.25	92.75
1949	69.62	4.56	5.77	94.23
1948	68.67	5.72	7.24	92.76
1947	79.68	0.90	1.14	98.86
1946	69.59	2.88	3.65	95.35
1945	68.65	3.86	4.89	95.11
1944	65.43	3.92	4.96	95.04
1943	57.53	6.90	8.73	91.27
1942	65.38	6.14	7.77	92.23
1941	63.78	7.40	9.37	90.63
1940	58.67	6.18	7.82	92.18
1939	57.82	7.74	9.80	90.20
1938	58.90	5.26	6.66	93.34
1937	60.28	5.83	7.38	92.62
1936	65.15	4.98	6.30	93.70
1935	58.79	4.94	6.25	93.75
1934	72.04	1.61	2.04	97.96
1933	57.45	2.00	2.53	97.47
1932	52.39	1.73	2.19	97.81
1931	54.39	1.48	1.87	98.13
1930	53.26	3.83	4.85	95.15

It was determined (Table 14) that the average difference in the actual price from its potential level for the 23 years was 2.83 cents a pound and for the 28 years, 2.74 cents a pound. Here the extreme was 8.20 cents a pound, again in 1951, and the low was



0.50 cents a pound in 1934.

After adjustment with the wholesale index, the 23-year average difference was 3.57 cents and the 28-year difference, 3.54 cents. The adjusted high was 7.20 cents in 1951 and the low was 0.70 cents in 1947. The year-to-year data are shown in Table 14.

Table 14. Differences between retail prices and probable prices without imports, cents per pound.

Year	-- Actual prices --			Diff.	-- Adjusted prices --		
	Bef. Imp.	Aft. Imp. <sup>1</sup>	Diff.		Bef. Imp.	Aft. Imp.	Diff.
1957	75.4	70.6	4.8	65.1	60.0	5.1	
1956	67.6	66.0	1.6	59.1	57.7	1.4	
1955	69.8	67.5	2.3	63.1	61.0	2.1	
1954	70.2	68.5	1.7	63.6	62.1	1.5	
1953	71.6	69.1	2.5	65.1	62.8	2.3	
1952	92.3	86.6	5.7	82.7	77.6	5.1	
1951	96.4	88.2	8.2	84.0	76.8	7.2	
1950	81.3	75.4	5.9	78.8	73.1	5.7	
1949	72.6	68.4	4.2	73.2	69.0	4.2	
1948	81.2	75.3	5.9	77.7	72.1	5.6	
1947	62.5	61.8	0.7	64.8	64.1	0.7	
1946	44.1	42.5	1.6	56.0	54.0	2.0	
1945	35.2	33.5	1.7	51.2	48.7	2.5	
1944	36.0	34.2	1.8	53.2	50.6	2.6	
1943	39.7	36.2	3.5	59.2	54.0	5.2	
1942	37.9	35.0	2.9	59.1	54.5	4.6	
1941	34.8	31.5	3.3	61.2	55.5	5.7	
1940	32.0	29.5	2.5	62.6	57.7	4.9	
1939	32.7	29.5	3.2	65.3	58.9	6.4	
1938	30.7	28.7	2.0	60.2	56.2	4.0	
1937	35.1	32.5	2.6	62.5	57.9	4.6	
1936	30.5	28.6	1.9	58.1	54.5	3.6	
1935	32.5	30.5	2.0	62.6	58.7	3.9	
1934	23.8	23.3	0.5	48.8	47.8	1.0	
1933	22.1	21.5	0.6	51.5	50.2	1.3	
1932	25.5	24.9	0.6	60.4	59.1	1.3	
1931	30.6	30.0	0.6	64.5	63.3	1.2	
1930	38.0	36.2	1.8	67.8	64.5	3.3	
Ave.			2.7			3.5	

<sup>1</sup> *Ibid.*, p.271.

Figure 1, Plate VI, shows the wholesale index adjusted prices received by farmers for beef cattle as a solid line and the potential prices before imports as the broken line. Figure 2 of the same plate shows the retail prices, also adjusted with the wholesale index, as the solid line and the prices without imports as the broken line. The size of the absolute differential was generally the greatest when prices were at a peak.

How much these differentials mean to farmers during a period of one year can be seen by the following illustration: In 1957 the total production without imports was 15,620,200,000 pounds. With a price difference that year of \$1.05 per hundred pounds, the total gap between prices before imports and prices after imports was \$154 million. At the wholesale index adjusted price level, the total differential was approximately \$139 million.

The results just explained, involving the use of regression analysis and calculations through use of elasticities, indicate that more information about import-price relationships could be obtained through the use of simultaneous equations. This study was directed at an initial step of finding the relationships between imports and various factors in the United States which could logically be assumed to exert some influence on such imports. An attempt was also made to determine what effect, if any, imports had made on prices. It is hoped that the results of this study will be of some aid in additional research on this subject.

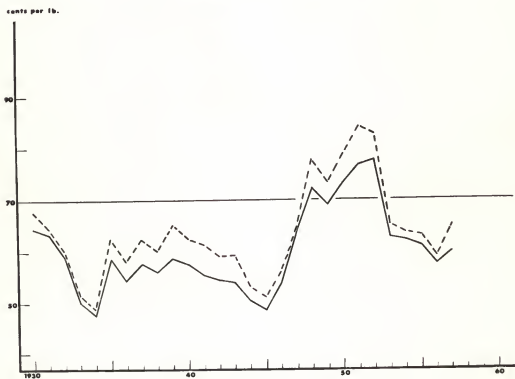
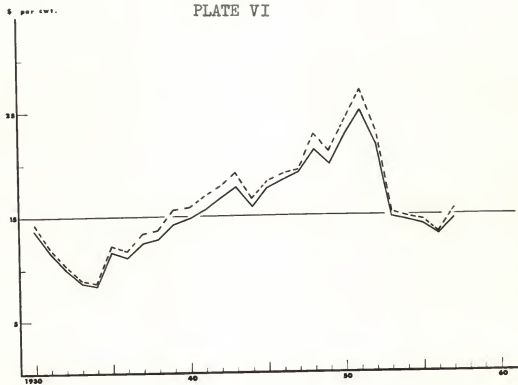
#### COMMENTS

Imports of live animals and meat have posed a problem for

#### EXPLANATION OF PLATE VI

- Fig. 1. Prices received by farmers for beef cattle per hundred pounds adjusted with the wholesale index before and after imports of beef and cattle. Solid line represents prices received; broken line indicates the potential prices without imports.
- Fig. 2. Retail prices of beef adjusted with the wholesale price index before and after imports of beef and cattle. Solid line shows prices paid by consumers; broken line shows potential prices without imports.

## PLATE VI



cattlemen in the past and likely will continue to do so. Naturally any additional quantities of beef placed on the market regardless of their source will have the distasteful effect to the producer of lowering the revenue he will obtain from his own product. The producers hardly can be expected to find favor with such a situation.

It is evident from the preceding analysis that a close relation exists between domestic conditions and the amount of imports entering the United States. These imports have had varying effects on the prices, and undoubtedly have exerted a greater influence on the market during particular seasons of the year than during others, although this was not examined in this study.

Recognizing the effect of the movements of foreign beef into the United States, however, is much easier than concluding the situation warrants action, or, upon finding such action is needed, determining what type of action should be taken. To a large measure, one's conclusions about the importation of any commodity, not just cattle, depend upon his beliefs about the objectives of the economic system. If, one concludes the economic system should provide stability of a nation's income and employment, he would contend some type of action to offset the impact of imports is needed. But if he should assume the Classical economic thought that the system should offer efficiency through marketing, then he would likely turn a cold shoulder toward any type of restrictions on imports.

Cattlemen in the past have been highly sensitive and antago-

nistic to governmental production regulation, as compared with the grain producing sector of agriculture. However, it would seem logical that any attempt to alter the importation of cattle and beef will have to rely on Federal action of some sort, whether tariffs, quotas or some other device.

Some economists would lean more toward a strong, stable domestic industry supported by tariffs when needed to promote domestic expansion of an industry. The reasoning behind such a proposal is that tariffs protect the competitive position of domestically produced goods against foreign products. Consumers, rather than pay prices for foreign goods which have been increased by tariffs, will substitute domestic goods and thus favorably affect domestic income and employment.

While the tendency of imports has been to level out the ups and downs of the cattle price trends, a protective tariff would in effect mean additional income to the farmers by adding to the cost of the foreign producer. It would mean that domestic prices would have to increase by an amount equal to or greater than the tariff before foreign producers would sell the same quantity of beef on the United States market that he had been selling before the tariff. Unless the price did increase by this amount, he would by-pass the United States market for a more profitable field, and the decline in supply in this country would mean higher prices for American producers. However, imports would still serve as a "leveling out" agent during times of extreme price highs or lows.

Such a position calls for regulation of part of the market



system by government, which to economists reared in the Classical mode of thinking is not desirable. Even the Classical economists, however, generally have conceded that a tariff will aid the protected industry, but their major argument has been that "any advantage thus gained would be offset by a corresponding contraction of employment in the export industries," according to Hinshaw.<sup>1</sup>

Lord Keynes, a strong proponent of governmental investment and governmental use of monetary policies originally assumed the above opinion; however, in later years he reversed his position -- a reversal which he readily admitted -- in favor of such governmental regulation. In 1931, Keynes saw tariffs as a possible method of helping to restore equilibrium between the balance of trade and foreign investment.

The application of this remedy in present circumstances would probably not result either in a diminution of our exports to an extent equal to the diminution of imports, or in a diminution of home investment, but in some increase of foreign investment, which increase would be mainly a net gain to the wealth of the community.<sup>2</sup>

It may be that the attainment of equilibrium in accordance with our traditional principles would be the best solution -- if we could get it. But if social and political forces stand in the way of our getting it, then it will be better to reach equilibrium by such a device as differential terms for home investment relatively to foreign investment, and even, perhaps, such a falling off from grace as differential terms for home-produced goods relatively to foreign-produced goods, than to suffer indefinitely the business losses and unemployment which disequilibrium means. Of the two types of devices indicated above, I much prefer that of differential rates for home and foreign lending to that of

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<sup>1</sup> Randall Hinshaw, "Keynesian Commercial Policy," The New Economics, p.316.

<sup>2</sup> John M. Keynes, A Treatise on Money, Vol. II, p.186.

differential prices for home and foreign goods; for I believe that there is a much greater scope for this device without risking injurious reactions in other directions, and, in some cases indeed, with positive social advantage. But I am coming round to the view that there is also room for applying usefully some method of establishing differential prices for home and foreign goods.<sup>1</sup>

Edminster concluded in 1926, before Keynes had altered his views, that the tariff on cattle at that time was directed toward a more stable industry. He reasoned that the restrictions on cattle imports resulted from ". . . the desire to stimulate agriculture in order to maintain a balanced economic and social life for the nation."<sup>2</sup>

Consumers, on the other hand, might conclude free trade would result in more of the produce and, hence, a lower price. This is basically the contention of the Classical school of thought with its foundation of free competition and non-government intervention. While such a system may provide a higher degree of efficiency and lower prices than that advocated by Keynes and his followers, it lacks the stability of the latter.

Curiously enough, when Adam Smith wrote the Wealth of Nations, which has become a classic in economics, England was pondering the same problem facing United States cattlemen today -- imports of cattle.

Smith's comments about England's problem, while nearly 200 years old, expound the theory of efficiency in a free competitive

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1 Ibid., p.189.

2 Edminster, op. cit., p.258.

system. He wrote:

Thus the prohibition of importing either live cattle or salt provisions from foreign countries secures to the graziers of Great Britain the monopoly of the home market for butcher's meat.<sup>1</sup>

If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry employed in a way in which we have some advantage.<sup>2</sup>

For, he continued, an industry is not "employed to the greatest advantage when it is thus directed towards an object which it can buy cheaper than it can make."<sup>3</sup> Smith said that the limiting of foreign trade in reality was restricting the population and growth of a country to what the "rude produce of its own soil can maintain."<sup>4</sup>

Smith concluded:

The price of monopoly is upon every occasion the highest which can be got. The natural price, or the price of free competition, on the contrary, is the lowest which can be taken, not upon every occasion indeed, but for any considerable time together. The one is upon every occasion the highest which can be squeezed out of the buyers, or which, it is supposed, they will consent to give: The other is the lowest which the sellers can commonly afford to take, and at the same time continue their business.<sup>5</sup>

Whether one accepts Keynes' beliefs about the use of tariffs, or whether he follows the thinking of Adam Smith and the Classicists, it must be admitted that regulation of imports also has its

1 Adam Smith, An Inquiry into the Nature and Causes of the Wealth of Nations, p.420.

2 Ibid., p.424.

3 loc. cit.

4 Ibid., p.429.

5 Ibid., p.61.

diplomatic problems. Under the General Agreement on Tariffs and Trade, the United States pared its import duties for friendly countries in return for certain similar concessions on the part of the foreign nations. Increasing the United States tariffs would in all likelihood mean similar action against American made goods by the foreign competitors.

Then too, there is a problem of international relations.

F.E. Mollin recognized such a problem in 1956 when he wrote:

Many people have advocated that embargoes should be placed against such imports during this emergency, but this is not practical in a world where distances have been shortened by modern inventions, and where there is a constant pressure for improved relations not only with our near-by neighbors, but with the countries even in the far corners of the world.<sup>1</sup>

Also of major importance in the future will be changes in population. Increased population projected during the next few decades will undoubtedly increase demand for all food products. Beef will be no exception. Part of the additional requirements likely will be met with domestically produced animals, but a portion of the new needs may have to come from other sources.

#### SUMMARY AND CONCLUSION

For some time there has been considerable controversy over imports of cattle and beef into the United States, but little has been offered in the way of research work to establish what, if

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<sup>1</sup> F.E. Mollin, "The Changing International Trade Picture," American Cattle Producer, July 1956, 38 (2): 17.

any relations exist between imports and the domestic market and what effect, if any, such imports have exerted on the market.

In this study, it was found that a relationship does exist between foreign trade and the United States market. Of the various domestic factors which could logically be assumed to possibly affect imports, prices received by United States farmers for beef cattle registered the highest correlation, 0.46. Multiple regression analysis indicated that imports have a response of 0.195, or nearly 0.2, to price changes, meaning that if prices change 10 percent, imports will be altered in the same direction by about 2 percent.

The correlation coefficients of the other factors -- feed, beef, pork and mutton supplies -- were all too small to assume that any strong ties exist between these factors and imports.

Through the use of elasticities, it would appear that the imports of beef and live animals from 1930 to 1957, omitting the war years, had reduced the hundredweight price received by farmers an average of 66 cents for actual prices and 80 cents for prices adjusted with the wholesale price index. On the retail level, the differentials between the prices with and without imports were \$2.83 a hundred pounds (2.83 cents a pound) for actual prices and \$3.54 a hundred pounds (3.54 cents a pound) for prices adjusted with the wholesale index.

It would appear that the response of foreign trade to domestic prices is not considerable, but it is also evident that prices received by farmers have been restricted by the size of the imports.



Imports still offer considerable room for additional research. A breakdown of imports to determine the impact on prices in a given season of the year is needed. Results of this study indicated that additional work is needed in establishing a more definite result about the effect of imports on prices. An answer to the latter problem could possibly be achieved through the use of simultaneous equations. It was the objective of this study, however, to take an initial step and determine what relationships existed between imports and the five independent variables and what impact the imports had on domestic prices. It is hoped that the answers obtained in this study will help pave the way for additional research work.

Although imports of beef have limited the price received by farmers for their cattle, they have also served to "level out" the cyclical troughs and peaks of the price pattern. During times of high prices, imports have increased, thus limiting the price increases; when prices have fallen, the imports have been slack, thus holding prices above the level they might have been if imports had remained at a constant level.

One's conclusions about the nature of the import situation -- whether it poses a problem or not -- will depend upon his considered objectives of the economic system. A belief that the system should hold the nation's economy stable would lead to a conclusion that imports should be restricted. On the other hand, free competition between foreign and domestic beef would perhaps afford the most efficient system and the lowest consumer prices.



## ACKNOWLEDGMENTS

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THE IMPACT OF FOREIGN TRADE OF CATTLE  
ON THE U.S. BEEF INDUSTRY

by

SAMUEL HERSCHEL LOGAN

B.S., Kansas State University  
of Agriculture and Applied Science, 1956

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AN ABSTRACT OF A THESIS

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requirements for the degree

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OF AGRICULTURE AND APPLIED SCIENCE

1959

The matter of imports of foreign cattle and beef and their effect on the domestic industry have been the subject of considerable controversy for some time; however, little research work has been offered to indicate the relation imports have with the domestic industry and the effect the incoming livestock and dressed meat have on United States prices. It was the purpose of this study to establish the importance of these imports of cattle and beef to United States beef producers and consumers.

Statistical analysis was used for the most part in studying the import-price relationships, but any work with mere calculations tends to overlook intangible items, such as human behavior or expectations of the future. From statistical analysis, however, estimates can be made of future trends, given a certain set of conditions. Common sense then becomes the basis of applying the statistical work to future events under differing conditions.

The United States was a net exporter of cattle and beef until the middle 1920s. Since that time the country has imported more cattle and beef than it has exported. Modern refrigerated transportation facilities have fostered rapid development of foreign trade in dressed meat, making beef and veal the major part of the combined imports of cattle and beef.

Through the use of multiple regression analysis, it was determined that of the various domestic factors apparently affecting imports, the prices received by United States farmers for beef cattle registered the highest correlation, 0.46, with imports. The analysis further indicated that the imports have a response



of about 0.2 to price changes, meaning that a 10 percent change in prices is associated with a 2 percent change in the same direction in the amount of imports.

By the use of price elasticities of demand, the study showed that imports of beef and live animals from 1930-57, with the war years 1942-46 omitted, reduced the price received by farmers an average of 66 cents per hundred pounds. For prices adjusted with the wholesale price index, the average reduction was 80 cents per hundred pounds. Retail differentials were 2.83 cents a pound and 3.54 cents a pound respectively (or \$2.83 and \$3.54 per hundred pounds).

Whether or not these figures are considered harmful to the domestic industry would depend upon one's considered objectives of the economic system -- stability or efficiency. If one thinks that the economic system should possess primarily stability, then he would likely conclude the imports should be restricted in some manner. However, if he should favor efficiency in the economic system, he could conclude that free competition would be the better method by giving lower prices for the consumer.

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