

butter before using it on the table, the usual mix containing about equal proportions of the two products.

Almost 80 per cent of the families colored the margarine; 26 per cent re-

ported they would buy more margarine if it were colored; and 33 per cent reported they would pay more for colored margarine.

## Conclusions

Before World War II, consumer buying habits were characterized by preference for butter and strong resistance to the purchase of margarine. The marked changes since then in the consumption pattern were initiated because of conditions existing during the war and have continued because of the high prices of butter relative to those of margarine and the improvement in the quality of margarine.

About 39 per cent of the families included in this study used margarine in 1952. A similar study in 1938 revealed that only 4 per cent of the families used this product. The marked change in these proportions was strong evidence that resistance to margarine has weakened. Also, once margarine was fitted into the consumption pattern the chances were about even that its use would continue as long as butter and margarine price relationships remained about the same.

There were many families, however, who preferred to buy butter only and would continue to do so even though the price of butter was relatively high. There were also families who would not shift back completely from margarine to butter even though the price of butter were to decline sharply. In the case of most families the decision to buy one or the other product rested largely upon the price level of butter, or the price differential between butter and margarine.

Families with higher incomes used more butter and less margarine per consuming unit on the average than families with lower incomes. The differences in the average consumption rates, however, were due mainly to the increase in the proportion of families using butter and the decrease in the proportion of families using margarine. A decline in the price of butter very likely would result in an increase in the proportion of families purchasing butter only and in particular, those families with lower incomes.

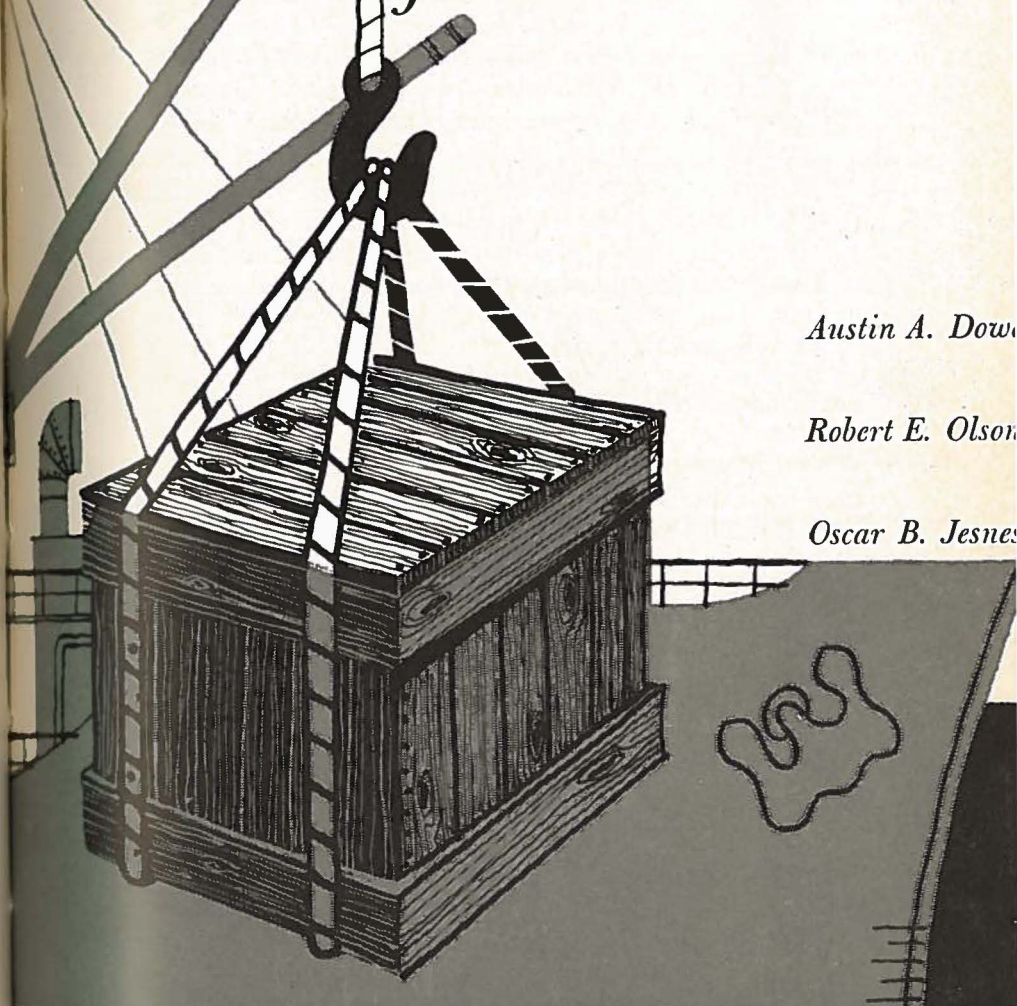
Butter and margarine prices did not change much in 1952 or early 1953. If butter price remained at levels prevailing during the forepart of 1953, there would be little prospect for an easing of the competitive situation. In fact, it is generally believed that the situation has become more intensified. Further, the situation would become even more so, should the general level of consumer incomes drop and butter prices remain at government support levels.

The proportion of families purchasing margarine has been influenced by state laws which prohibit the sale of colored margarine and which levy a tax of 10 cents a pound on all margarine sold which contains less than 60 per cent animal fat. The repeal of either of these laws would further enhance the market position of margarine.

# The EXPORT MARKET

for Pork and Lard

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## THE EXPORT MARKET

for

### *Pork and Lard*

Austin A. Dowell, Robert E. Olson, and Oscar B. Jesness

**H**OGS HAVE been one of the most important sources of cash income for Minnesota farmers for many years. During the decade 1940-49, hogs ranked first, dairy products second, cattle and calves third, and poultry products and eggs fourth (table 1). The income from hogs has varied from approximately 20 to 25 per cent of total cash receipts<sup>1</sup> from the sale of products by Minnesota farmers since shortly after World War I. Since the middle 1920's, livestock and livestock products, including hogs, have accounted for about three-fourths of the total cash receipts.

<sup>1</sup> Cash receipts, which is the estimated cash income from the sale of farm products, is used here instead of gross income, which includes the value of home consumption, since it is desired to measure the relative importance of farm commodities entering into commercial trade.

**Table 1. Proportion of Cash Receipts Derived from the Sale of Specified Farm Commodities, Minnesota, Five-Year Averages, 1910-49, Annual 1950 and 1951\***

Years	Hogs	Dairy products	Cattle and calves	Poultry and eggs†	Sheep, lambs, and wool	Other live-stock and livestock products‡	Total		Livestock, livestock products, and crops
							Livestock and livestock products	Crops§	
							per cent		
1910-14	14.3	21.0	10.5	5.9	.8	—	52.5	47.5	100.0
1915-19	19.1	17.9	14.0	6.2	.8	—	58.0	42.0	100.0
1920-24	21.0	25.4	11.2	9.5	.9	—	68.0	32.0	100.0
1925-29	23.4	26.4	13.2	9.8	1.2	.1	74.1	25.9	100.0
1930-34	21.2	29.1	14.7	11.0	2.0	.4	78.4	21.6	100.0
1935-39	19.9	26.1	16.1	10.5	2.7	.5	75.8	24.2	100.0
1940-44	25.3	21.6	15.0	14.6	2.2	.5	79.2	20.8	100.0
1945-49	21.0	19.7	15.1	14.7	1.4	.5	72.4	27.6	100.0
1950	19.7	17.4	21.3	11.4	1.4	.3	71.5	28.5	100.0
1951	21.4	18.1	21.3	13.8	1.6	.4	76.6	23.4	100.0

\* Source:

1910-24—Rex W. Cox, Warren C. Waite, and W. B. Garver. *Income and Expenditures of Minnesota Agriculture*. Minn. Agr. Expt. Sta. Bul. 366:9, 1943.

1925-43—*Cash Receipts from Farming by States and Commodities Calendar Year 1924-44*. Bur. Agr. Econ., USDA, pp. 53-55, January 1946.

1944-49—*Minnesota Agricultural Statistics 1948-49*. State, Federal Crop and Livestock Reporting Service, p. 8, 1949.

1949—*The Farm Income Situation*. Bur. Agr. Econ., USDA, p. 22, June 1951.

1950-51—*The Farm Income Situation*. Bur. Agr. Econ., USDA, p. 20, June-July 1952.

† Includes chickens, eggs, and turkeys and beginning in 1939 ducks, geese, guineas, pigeons, quail, and pheasants.

‡ Beginning 1925 includes horses, mules, mohair, honey, beeswax, and bees.

§ Includes wheat, corn, oats, barley, rye, flax, potatoes, and hay and beginning in 1925 includes all crops

Table 2. Proportion of Cash Receipts Derived from the Sale of Specified Farm Commodities, United States, Five-Year Averages, 1910-49, Annual 1950 and 1951\*

Years	Cattle and calves	Dairy products	Hogs	Poultry and eggs†	Sheep, lambs, and wool	Other live-stock and livestock products‡	Total		Livestock, livestock products, and crops
							Livestock and livestock products	Crops	
							per cent		
1910-14	15.2	10.6	11.4	8.1	2.6	1.7	49.6	50.4	100.0
1915-19	14.6	9.9	12.7	7.1	2.5	1.1	47.9	52.1	100.0
1920-24	11.4	13.7	10.9	9.3	2.4	.5	48.2	51.8	100.0
1925-29	12.7	15.3	11.9	10.0	2.8	.4	53.1	46.9	100.0
1930-34	12.8	19.0	10.7	10.8	2.9	.3	56.5	43.5	100.0
1935-39	14.7	17.7	10.8	10.2	3.2	.7	57.3	42.7	100.0
1940-44	14.1	15.4	13.5	11.8	2.7	.4	57.9	42.1	100.0
1945-49	16.4	14.2	12.1	10.9	1.8	.4	55.8	44.2	100.0
1950	20.1	13.1	11.2	10.0	1.8	.2	56.4	43.6	100.0
1951	21.3	13.2	12.0	11.2	2.1	.2	60.0	40.0	100.0

\* Source: *The Farm Income Situation*. Bur. Agr. Econ., USDA. July-September 1951. p. 21-23, and August-September 1952. pp. 36-37.

† Includes broilers, chickens, turkeys, eggs, ducks, geese, guineas, pigeons, quail, pheasants, and turkey hatching eggs.

‡ Includes horses, mules, mohair, honey, beeswax, and bees.

During 1950 and 1951 Minnesota ranked fifth in the nation in the number of hogs marketed. Hogs are raised on three out of every five farms in the state.<sup>2</sup> The 5.5 million hogs marketed by Minnesota farmers during 1951 weighed 1.4 billion pounds before slaughter.<sup>3</sup> This was slightly more than 7 per cent of the liveweight of all hogs marketed in the United States. These hogs produced about 775 million pounds of pork and 200 million pounds of lard.

Hogs are an important source of cash income throughout the Corn Belt and

in limited areas elsewhere. Nationally, hogs rank third among farm commodities as a source of cash income (table 2). During recent years cattle and calves have ranked first and dairy products second. Since 1910 the income from hogs has varied from a little less than 11 per cent to more than 13 per cent of the total cash receipts of farmers of the United States. The long-time average, exclusive of war periods, has been a little over 11 per cent, but it was considerably higher during each of the two World Wars.

## Prospects for Hog Production

THE UNITED STATES has not reached its limit in hog production. For the period of 1929-33, an average of approximately 80 million spring and fall pigs were saved and a little over 11 billion pounds of pork and lard were produced annually. Expansion since then shows that this was not the limit

of this country's capacity to produce. An all-time peak was reached in 1943 when nearly 122 million pigs were saved and over 16 billion pounds of pork and lard were produced (figures 2 and 3). Table 3 indicates the resources available and the volume which can be produced.

<sup>2</sup> Preliminary 1950 Census of Agriculture. Bureau of the Census.

<sup>3</sup> Meat Animals, Farm Production and Income, 1950-51. Bur. Agr. Econ., USDA. April 1952.

Comparing earlier production with the current situation indicates we can produce about 30 per cent more hogs than we could 20 years ago even with a significant decrease in corn acreage.

Less than 1 per cent of the corn acreage was planted to hybrid corn in 1934. By 1952 over 95 per cent of the corn acreage in the North Central States was planted to hybrid seed. This change has increased acre yields by 20 per cent or more. Increased use of fertilizers, spacing corn plants for optimum population, and more timely cultural operations made possible by power machinery have increased production. These and other developments have made it possible to produce more corn on fewer acres.

The decline in horses and mules has released corn and other grains for hog feeding and other uses. Improved breeding, sanitation, and feeding also have helped increase hog production.

Hog production has kept pace with population growth, and this output will probably continue to keep up with population growth. Many recent innovations have not been fully exploited,

Table 3. Estimated Current Capacity to Produce Pork and Lard in the United States

Item	Unit	Quantity
		millions
Corn harvested*	acres	89
Corn production*	bushels	3,037
Corn available for hogs†	bushels	1,275
Total feed available for hogs	feed units‡	103,213
Pigs saved	head	98
Hogs slaughtered	head	85
Pork produced	pounds	11,855
Lard produced	pounds	2,798
Pork and lard produced	pounds	14,653

\* Average 1942-51.

† About 42 per cent of total corn produced. About half of the corn produced in the Corn Belt is fed to hogs.

‡ One feed unit is the equivalent of one pound of corn. Corn accounts for about 69 per cent of the feed units fed to hogs. See R. D. Jennings, *Consumption of Feed by Livestock 1909-1947*. USDA Cir. 836:13, 25. December 1949.

and new developments in swine genetics, nutrition, sanitation, and marketing can be expected. Thus the market available, export and domestic, will be an important factor in determining the importance of hogs among farm enterprises in the United States. This increases the interest of farmers in ways and means of expanding and improving the market.

## United States Exports of Pork and Lard

THE UNITED STATES has been a net exporter of hog products since colonial days. Exports have been chiefly pork and lard rather than live hogs. Imports have been largely specialty products, and they have been relatively unimportant.

Exports of pork and lard from the United States from 1850 to 1951 are shown in figure 1. Some general tendencies common to both products are apparent. There has been a tendency for exports of both pork and lard to rise and fall together. Exports of each, except for lard during World War I, have increased sharply during major wars and declined rapidly shortly

thereafter. Exports of pork have fluctuated much more violently than exports of lard.

Closer examination, however, reveals some significant differences. The overall trends of exports for both pork and lard were sharply upward from 1870 to 1898. Thereafter the trend in pork exports was sharply downward, while lard exports were fairly well maintained. Exports of pork exceeded exports of lard most of the time from 1850 to 1909, while exports of lard exceeded exports of pork most of the time from 1909 to 1951 except during wars. In 1951 exports of pork were the lowest since 1869—except for one year

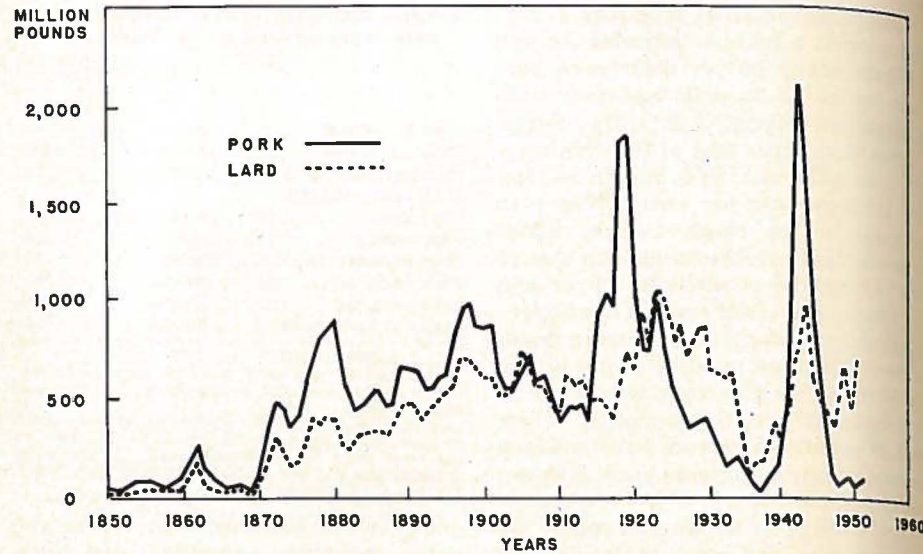


Fig. 1. Exports of pork and lard, United States, 1850-1951.

during the prolonged drouth of the 1930's—while exports of lard were approximately the same as they were in 1898.

The relationship between the production and export of pork for 1900 to 1951 is shown in figure 2. The bulge in exports during each of the two World

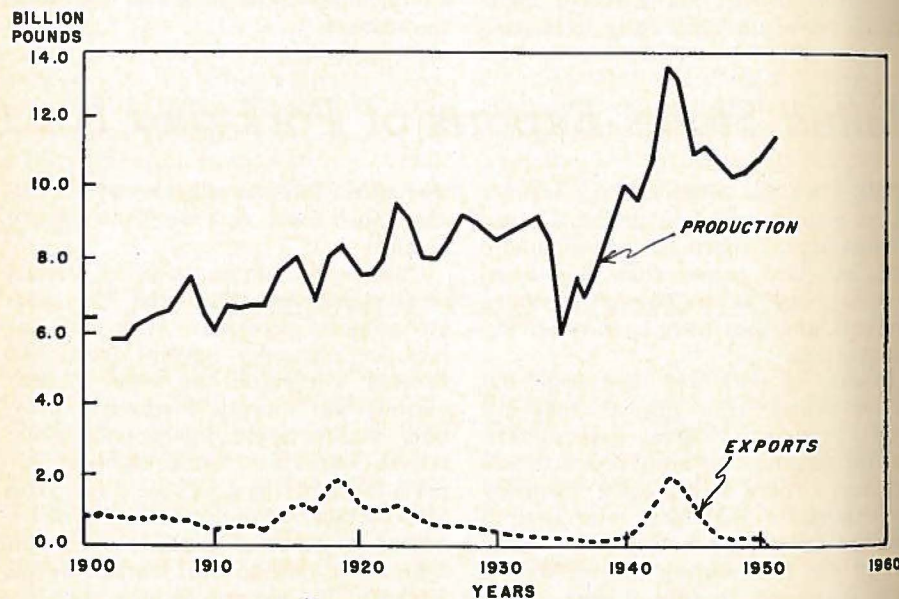


Fig. 2. Pork production from total slaughter and net exports, United States, 1900-1951.

Wars is apparent. In 1919 pork exports amounted to 1.9 billion pounds, or over 22 per cent of production. In 1943 pork exports reached an all-time high of 2.1 billion pounds, or over 15 per cent of the record production of that year.

Except for the two World War periods, pork exports have declined in importance since 1900. Pork exports averaged about 700 million pounds, or 11 per cent of production, for the five-year period 1900-04. This compares with an average of 90 million pounds, or less than 1 per cent of production, for the five-year period 1947-51.

Domestic consumption is the difference between pork production and exports. Per capita consumption averaged 69.3 pounds during 1947-51 compared with 69.6 pounds during 1900-04. In other words, the large increase in pork production, together with some decline in exports, has enabled domestic consumers to eat as much pork per capita today as at the beginning of the century.

Lard production and exports for the

period 1900-1951 are shown in figure 3.

The production trends for lard and pork (figures 2 and 3) are quite similar. The trends of each have been sharply upward, and both reflect the cycles in hog production. In each case production dropped sharply during the prolonged drouths of the 1930's and reached new peaks in 1943. These similarities are to be expected as pork and lard are joint products.

However, there are some significant differences between lard exports and lard production and pork exports and pork production. First, a much larger proportion of the lard than the pork has been exported. Second, there is a much closer relationship between lard production and exports than between pork production and exports. Third, lard exports have changed little, averaging 525 million pounds during 1947-51 compared with 564 million pounds during 1900-04. While the volume of lard exports has been well maintained, the proportion exported has declined considerably. About 35 per cent of the

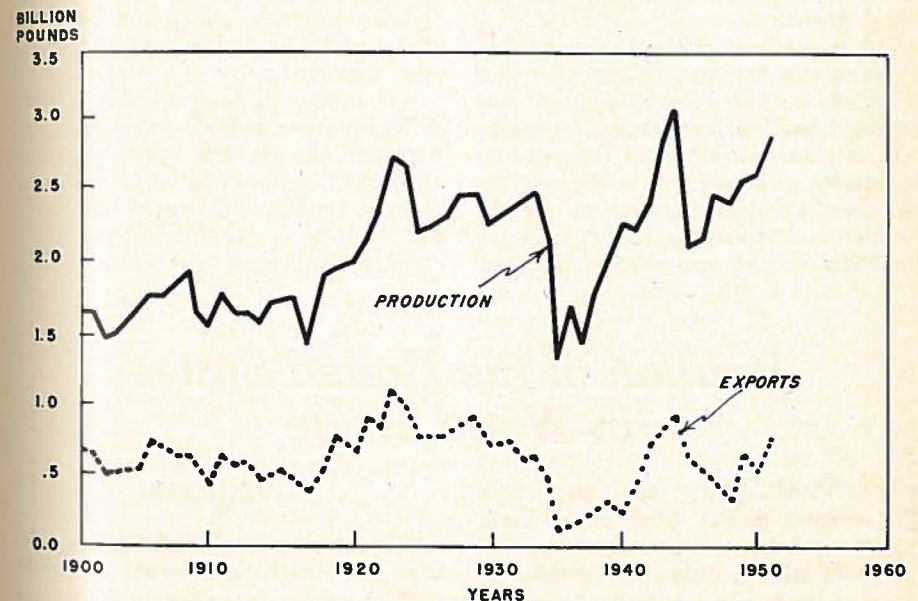


Fig. 3. Lard production from total slaughter and exports, United States, 1900-1951.

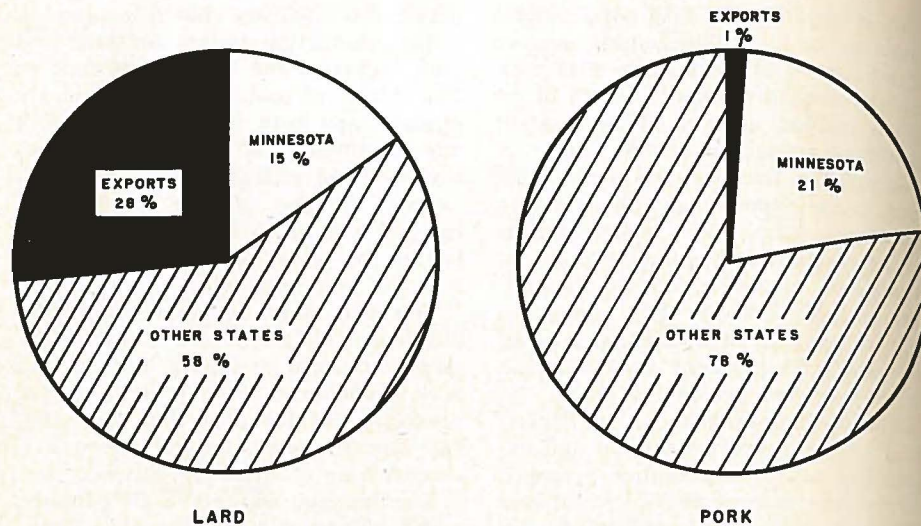


Fig. 4. Proportions of pork and lard produced from marketings of Minnesota hogs that are consumed in Minnesota, in other states, and exported, 1950.

lard produced was exported during 1900-04 compared with about 20 per cent during 1947-51. The relative decline in exports was due to the increase in domestic demand as a result of population growth.

The importance of the export market to Minnesota farmers in 1950 is shown in figure 4. For this purpose it was assumed that the per capita consumption of pork and lard was the same in Minnesota as in the rest of the country and that the same proportion of the Minnesota surplus was exported as for the other surplus hog producing states.

On this basis about 21 per cent of the pork and 15 per cent of the lard produced in Minnesota in 1950 were consumed in the state, 78 per cent of the pork and 58 per cent of the lard were consumed in other states, and 1 per cent of the pork and 28 per cent of the lard were exported.

Hog producers then do have a stake in maintaining export outlets for lard. Although exports of pork have declined until they are a relatively small part of total production, export outlets for pork will be important as long as the country remains on a net export basis.

## Position of the United States in World Trade

**H**OG PRODUCTS enter the world market as live hogs, cured pork, fresh and frozen pork, specialty products, and lard. A discussion of some of these products is given in the following pages.

### LIVE HOGS

The international movement in live hogs for slaughter is relatively unimportant except in a few limited areas. During the period 1934-38, an average

of about two million hogs moved between countries. More than half of this movement was between European countries. The chief exporters in order of importance were Yugoslavia, Poland, Rumania, Hungary, and Denmark. The principal importing countries were Austria, Germany, and Czechoslovakia.<sup>4</sup> Live hogs also were shipped from Ireland and from the continent to the United Kingdom.

This trade in live hogs was largely destroyed during World War II. Since then recovery has been relatively slow. In 1949 the number of hogs reported moving between countries was about 500,000 head and more than half of these were imported by Hong Kong

Table 5. Net Imports of Pork (Excluding Lard) in Specified Countries, Carcass Weight Basis, Average 1934-38 and Annual 1950-51\*

Leading importing countries	Average 1934-38	1950†	1951‡
	million pounds		
United Kingdom	1,004‡	872	982
Cuba	7	22	25
Italy	7	4	6
Austria	6	3	4
France	6	\$	\$
Belgium	3	\$	5
West Germany		208	77
Sweden	\$	10	7
United States	\$	\$	51

\* Source: Data from Office of Foreign Agricultural Relations, USDA.

† Preliminary.

‡ 1936-38 average.

\$ Net exporter.

|| Not available.

Table 4. Net Exports of Pork (Excluding Lard) by Specified Countries, Carcass Weight Basis, Average 1934-38 and Annual 1950-51\*

Leading exporting countries	Average 1934-38	1950†	1951‡
	million pounds		
Denmark	428‡	408	577§
Canada	172‡	79	33
Poland	102		106¶
Netherlands	80	65	103
Ireland	68	9	4
New Zealand	61	22	20**
United States	53‡	34	††
Argentina	52	23	30
Australia	29	29	24
Sweden	24‡	††	††
Hungary	16		
Yugoslavia	16		2
Brazil	6	---	1
Rumania	6		
Bulgaria	5		
Belgium	††	47	††
France	††	41	81

\* Source: Data from Office of Foreign Agricultural Relations, USDA.

† Preliminary.

‡ 1935-39 average.

§ Includes carcass weight equivalent of live animal exports.

|| Not available.

¶ Estimated—based on imports into receiving countries reporting imports by origin.

\*\* Partially estimated.

†† Net importer.

from the Asiatic Mainland. The movement of slaughter hogs into or out of the United States is unimportant.

### PORK

During the period 1934-38 (table 4), Denmark ranked first with 428 million pounds, Canada second with 172 million pounds, Poland ranked third, Ireland fourth, New Zealand fifth, and the United States sixth. The relatively small exports from the United States during that period were largely due to the severe drouths in the Western Corn Belt which greatly reduced the supply of corn and other feeds. Nevertheless, the trend in pork exports from the United States had been downward for many years (figure 1).

The United Kingdom was the leading importer of pork before the war, taking about 84 per cent of total world exports during 1934-38 (tables 5, 8, and 9). Relatively small amounts were imported during this period by Germany, Cuba, Italy, Austria, France, and Belgium.

During the war, hog numbers de-

<sup>4</sup> Yearbook of Food and Agricultural Statistics, 1950. Food and Agr. Org. of United Nations. Pt. 2, 4:125-127. 1950.



Table 10. United States Exports of Lard to Principal Importing Countries, Average 1920-24 and 1935-39, Annual 1947-51\*

Country	1920-24†	1935-39	1947	1948	1949‡	1950‡	1951‡
	million pounds						
Germany	240.0	2.5	17.0	58.9	118.7	126.5	31.5
United Kingdom	212.1	95.7	24.4	§	70.3	§	231.5
Netherlands	70.9	.2	2.2	§	10.1	33.5	48.3
Cuba	70.5	39.9	75.3	70.4	126.5	138.8	145.6
Belgium¶	49.7	2.5	19.0	12.8	12.5	2.2	4.1
Italy	29.3	.7	39.4	2.5	7.2	2.2	2.1
Canada¶	12.4	2.1	14.6	.4	15.0	13.8	12.9
Austria	**	††	32.7	36.5	86.5	31.5	21.6
Other	117.8	22.1	156.1	90.3	166.9	117.6	190.9
Total	802.7	165.7	380.7	271.8	613.7	466.1	688.5

\* Source: 1920-24—USDA Yearbook of Agriculture 1925, p. 1143; 1935-39 to 1948—Foreign Crops and Markets, Office of Foreign Agricultural Relations, USDA, 62:189, February 19, 1951. Original data in short tons converted to pounds. 1949-51—Foreign Crops and Markets, Office of Foreign Agricultural Relations, USDA, 64:155, February 25, 1952. Original data in short tons converted to pounds.

† Year ending June 30.

‡ Preliminary.

§ Less than 100,000 pounds.

¶ Includes Luxembourg after 1935.

¶ Includes Newfoundland and Labrador.

\*\* Not available separately.

†† Included with Germany.

a reduced foreign demand as a result of the world-wide depression, and the withdrawal of Germany from the market. The European share of United States lard exports fell to less than two-thirds of the total during the period 1935-39.

During and immediately following World War II large quantities of lard were again shipped to Europe. The bulk of these shipments were sent as grants by the United States Government. During the war, shipments to Europe were limited largely to the United Kingdom and Western Europe, but after the war large quantities also were sent to Germany, Austria, and other countries urgently needing fats.

## Pork and Lard Export Problems

### PORK

A COUNTRY producing a surplus of pork needs to study carefully the character of the demand for hog products in importing countries. The United Kingdom is by far the most important importer of pork (table 5).

As European hog numbers increased after the war, shipments of lard to Europe declined. At the same time shipments of lard to countries in the western hemisphere increased. In 1950 the western hemisphere countries took nearly one-half and in 1951 over one-third of the United States total lard exports. Exports of lard to countries in the western hemisphere have increased, and these may be aided by substantial imports by the United States from these areas—providing these areas with means of buying products of this country. There has been a substantial decline in the relative importance of the European market as an outlet for United States lard since the 1920's.

During the nineteenth century, British consumers developed a strong preference for lean pork with a mild cure. Rising incomes helped to increase the preference for this kind of pork. "By 1900 the demand in the United Kingdom for mildly cured lean meat was

no longer limited to a wealthier class of buyers. Standards of living had improved considerably, and as pork from hogs of the bacon type was used more widely it came to be regarded by the working classes as less a luxury than a necessity."<sup>6</sup>

British consumers demanded lean, tender, meaty bacon with a mild cure which came from the best quality meat type hogs. Other grades of bacon sell at substantial discounts.

In the English meat trade, cured pork is called "bacon" while fresh pork is called "pork." Most of the bacon is cured in the form of Wiltshire sides, although relatively small amounts are cured as Cumberland sides, hams, and other cuts.

A Wiltshire side is a full side of a hog carcass after the head, feet, tail, backbone, leaf fat, kidneys, aitchbone, shoulder blade, and rib ends have been

removed. It includes the ham, full side, and shoulder all in one piece.

Prior to World War II about two-thirds of all pork produced in the United Kingdom was consumed as fresh pork and one-third as cured pork.<sup>6</sup> This allocation of domestic supplies enabled the United Kingdom to meet about 85 per cent of her fresh pork requirements, but only about 35 to 40 per cent of her bacon requirements.<sup>7</sup> Bacon, in the form of Wiltshire sides, accounted for about three-fourths of all pork imports, with cured hams and a small amount of chilled or frozen pork accounting for most of the remaining one-fourth.

During the war hog production in the United Kingdom declined greatly, and at the same time the supply of bacon from Denmark, Holland, and other European countries was cut off. To meet the urgent demand for bacon

<sup>5</sup> Hogs and Hog Products, U.S. Tariff Comm. Rpt. 143:125, Series 2, 1941.

<sup>6</sup> Viscount Astor and B. Seebokm Rowentree, *British Agriculture, the Principles of Future Policy*, pp. 220-222. Longmans, Green and Co., London, 1938.

<sup>7</sup> Based on conference with Major F. Willans, Secretary, Pigs Committee, United Farmers' Union of England and Wales, April 21, 1950.

Table 11. United States Exports of Lard to Principal Areas, Average 1920-24 and 1935-39, Annual 1947-51\*

	1920-24†	1935-39	1947	1948	1949	1950‡	1951‡
	million pounds						
Europe§	671.9	105.7	226.0	162.2	370.6	222.9	432.0
North America	¶	52.0	128.8	95.5	193.9	209.1	222.1
South America	¶	7.8	22.2	13.6	47.2	22.9	24.1
Western Hemisphere	¶	59.8	151.0	109.1	241.1	232.0	246.2
Other	130.8	.2	3.7	.5	2.0	11.2	10.3
Total	802.7	165.7	380.7	271.8	613.7	466.1	688.5
	per cent						
Europe	83.7	63.8	59.4	59.7	60.4	47.8	62.7
North America	¶	31.4	33.8	35.1	31.6	44.9	32.3
South America	¶	4.7	5.9	5.0	7.7	4.9	3.5
Western Hemisphere	¶	36.1	39.7	40.1	39.3	49.8	35.8
Other	16.3	.1	.9	.2	.3	2.4	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

\* Source: 1920-24—USDA Yearbook of Agriculture 1925, p. 1143; 1935-39 to 1948—Foreign Crops and Markets, Office of Foreign Agricultural Relations, USDA, 62:189, February 19, 1951. Original data in short tons converted to pounds. 1949-51—Foreign Crops and Markets, Office of Foreign Agricultural Relations, USDA, 64:155, February 25, 1952. Original data in short tons converted to pounds.

† Year ending July 30.

‡ Preliminary.

§ Excluding U.S.S.R.

¶ Included with Other.

it was necessary to channel a much larger proportion of the limited domestic supply of hogs into the packing plants to be cured into Wiltshire sides. Rigid rationing of both fresh and cured pork also was necessary to insure more equal distribution among consumers.

Following the war, hog numbers in the United Kingdom and in Western Europe increased slowly at first, then more rapidly until production approached prewar in 1951. Although imports of cured and fresh pork in 1950 were slightly less than prewar (table 5), total consumption of pork and bacon and the proportions of each domestically produced and imported probably will return to the prewar level in the near future.<sup>8</sup>

The importance of Wiltshire sides in the import trade of the United Kingdom makes it necessary for surplus pork producing countries wishing to enter this market to study the various steps they must take to produce and deliver high quality Wiltshires.

#### British Processing Method

The British method of processing hog carcasses into Wiltshire sides differs considerably from processing methods in American packing plants.

First, the entire carcass from which Wiltshire sides are to be made is singed on the rail line just after it comes out of the dehairing machine.

The singeing apparatus consists of a large hollow clay-brick lined cylinder which has the appearance of being suspended from the rail line. The hollow cylinder is large enough to accommodate the full carcass as it hangs from the rail. It is divided lengthwise into two halves which can be moved out to open and back to close by means of a lever. As the cylinder opens, a carcass that has just been singed moves out along the rail and one that is to be

singed moves in and the cylinder closes again.

The singeing is done by heat from a gas or oil flame at the base of the cylinder. Each carcass is subject to this intense heat, or as the Europeans say, it is "singed" for 15 to 20 seconds. After the carcass has been singed it is scraped by hand or by machine and hand to remove the blackened surface. The skin then presents an attractive nut-brown appearance.

Singeing is supposed to (1) make the skin almost impervious to moisture and prevent the growth or development of "slime," (2) tighten the skin and give a smooth hard surface which adds to the appearance of the carcass and facilitates slicing in the slicing machine, (3) give a slight flavor which is desirable, and (4) remove fine hairs about the head, ears, feet, and other places which have been missed by the mechanical dehairer.

Second, the viscera are removed and the carcass weighed, as the producer is paid on the basis of carcass weight rather than liveweight as in the United States. Then the back is split and the backbone and tail removed. After the back is split so that the thickness of fat along the back can be determined, the carcass is graded. The leaf fat and kidneys are then removed and the carcass moved to the chill room for 6 to 12 hours before being dressed into Wiltshire sides.

After being processed into Wiltshire sides, the sides are then ready for curing, or "pickling" as the British call it. Brine is pumped, under pressure of 80-100 pounds per square inch, into each side through about 36 punctures, and a small tea cup of salt is put in the shoulder blade pocket. The sides are then put in curing vats with the flesh side up and salt sprinkled lightly on each carcass.

The vats vary in size. A fairly typical

<sup>8</sup> Based on conferences with government officials, meat packers, wholesale meat dealers, and others, April, May, and September, 1950.

size is 11 feet 6 inches long, 10 feet wide, and 5 feet 6 inches deep. Such a vat will hold about 400 sides of the desired Wiltshire weight. The sides are piled one on top of the other. When the vat is full it is covered with a batten (a cover which is clamped down to hold sides in place) and brine pumped in until the battens are covered. The sides are left in the brine or pickle for five or six days, then removed from the vat and placed in a cool room to cure for five or six days. They are then smoked with hardwood sawdust for 48 hours. In some cases the smoking is done at the packing plant or bacon factory, while in others it is done by the wholesaler.

#### British Grading System

All slaughter hogs in the United Kingdom are sold on a carcass basis. Consequently, grade specifications are expressed in terms of hog carcasses instead of live hogs. Specifications for different weights and grades of carcasses are modified from time to time in the light of experience, the last major revision having been made in 1940. While this revision did not go into effect due to the war, it is regarded as the best that has been developed in the United Kingdom up to the present.

During the war the grading of carcasses was discontinued, and payment was made on carcass weight only. Grading began again, on a modified basis, in 1950. Plans call for a gradual return to the 1940 specifications. Consequently, it is necessary to examine the 1940 carcass weight and grade schedule to ascertain the British idea of a first grade bacon carcass.

Carcasses suitable for highest grade Wiltshire sides must meet the grade and weight requirements for Grade A—Class I (table 12). To fall in this class, a carcass must weigh 140 to 170 pounds.

The thickness of fat at the middle of the back must not be less than 12/16 inch nor more than 1 3/16 inches. In addition, either the thickness of fat over the shoulder must be under 2 inches or the thickness of fat over the loin must be under 1 3/16 inches.

Certain other requirements also must be met. For example, the fat must be firm and white, and carcasses from sows, pregnant gilts, stags, ridglings, diseased or injured pigs, and pigs that are malformed or emaciated are not eligible. Although grading is based largely on definite objective standards, subjective factors are also considered.

Marketing at the proper carcass weight is not as simple as it may seem because it is not possible to estimate accurately the dressing yields of individual live hogs. Dressing yields of hogs that look alike and have the same liveweight vary greatly. For example, "Well-fed pigs of good type should, unless transported long distances, yield 74 per cent of carcass to liveweight. Calculated on fasted liveweights the killing percentages of pigs handled under contract, according to producers' figures, have varied from approximately 69 per cent to approximately 78 per cent."<sup>9</sup>

To be reasonably sure that carcasses will fall within the 140 to 170 pound weight range, producers are advised to market their hogs at from 200 to 220 pounds liveweight. A 200 pound hog dressing only 70 per cent will produce a 140 pound carcass, while a 220 pound hog dressing out as much as 77 per cent will produce a 170 pound carcass.

Carcass weight is defined as the weight of the entire carcass, minus blood, hair, and viscera, after the animal heat has departed. Since the weighing is usually done on the rail line as soon as the viscera are removed, it is necessary to reduce the actual warm weight to the approximate

<sup>9</sup> Alex Calder. *The Bacon Pig—A Guide to Producers Under the Pigs Marketing Scheme*. Pigs Marketing Board Pamph. p. 6. 1937.



Table 12. Classes and Grades of Hog Carcasses, United Kingdom, 1940

Grades	Class I—Wiltshire Dead weight 7 score* to 8 score 10 pounds	Class II (tolerance class only) Dead weight 8 score 11 pounds to 9 score	Class III—Midland Dead weight 9 score 1 pound to 11 score
	inches	inches	inches
<b>GRADE A</b>			
Middle of back ..... max.	1 3/16	1 5/16	-----
min.	12/16	14/16	-----
and either			
Shoulder ..... max.	2	2 2/16	2 4/16
or			
Loin ..... max.	1 3/16	1 5/16	and
and			
Belly ..... min.	No minimum belly measurement for Class I or Class II in Grade A		2
<b>GRADE B</b>			
Middle of back ..... max.	1 6/16	1 8/16	-----
min.	12/16	14/16	-----
and either			
Shoulder ..... max.	2 5/32	2 9/32	2 12/16
or			
Loin ..... max.	1 6/16	1 8/16	and
and			
Belly ..... min.	No minimum belly measurement for Class I or Class II in Grade B		1 10/16
<b>GRADE C</b>			
Middle of back ..... max.	1 8/16	1 10/16	(No grade C for Class III)
min.	12/16	14/16	
and either			
Shoulder ..... max.	2 5/16	2 7/16	
or	1 8/16	1 10/16	
Loin ..... max.			
<b>GRADE L</b>	Any pig which has less than the minimum middle of back measurement		Any pig which has a shoulder fat measure- ment of less than 1 1/2 inches
<b>GRADE F</b>	Any pig which fails to grade C because measurements exceed maximum		Any pig which has a shoulder fat measure- ment of more than 2 12/16 inches
<b>GRADE DB</b>	No Grade DB for Class I or Class II		Any pig which has a belly measurement of less than 1 10/16 inches.

\* One score is 20 pounds.

Exceptions to the above:

1. When a pig in Class I or Class II is Grade A on the middle of the back and Grade A at one other point on the back but is one or more grades below Grade B on the remaining point of the back, it shall be a Grade B pig so far as back measurements are concerned.

2. When a pig in Class I or Class II is Grade B on the middle of the back and is either Grade A or Grade B at one other point on the back but is one or more grades below Grade C on the remaining point on the back it shall be a Grade C pig so far as back measurements are concerned.

Provided that:

1. Every pig, when graded, shall be deemed to be within the highest grade applicable to its measurements.

2. If a pig is graded with its skin off the fat measurement at the shoulder and the middle of the back and the rump muscle shall be reduced by 3/16 inch and the belly measurement by 1/8 inch.

3. No pig shall be within any class or grade if it is ascertained at or before the time of grading that such pig:

- a. Has not firm white fat, or
- b. Shows fishy flavor or seedy cut, or
- c. In the case of a male pig was not castrated within 12 weeks after birth, or
- d. Is a rig pig, sow, or pregnant pig, or in the case of a gilt, is not a maiden gilt, or
- e. Is suffering from any disease or injury which must have been reasonably apparent at the time of despatch from the producer's premises which renders it or any portion of it unsuitable for the manufacture of bacon, or
- f. Is malformed or emaciated.

weight when cool. To accomplish this a schedule of discounts is made for carcasses of varying weights. The 1950 schedule called for a deduction of 2 pounds for carcasses weighing not over 112 pounds, 3 pounds for those from 113 to 143 pounds, 4 pounds for those from 144 to 189 pounds, and on up to a maximum of 11 pounds shrinkage for carcasses weighing over 400 pounds.<sup>10</sup>

If the United States wishes to compete successfully with other countries for the British bacon trade, it will be necessary to produce and deliver the kind of product British consumers want. It is apparent that this would necessitate making some significant changes in production, marketing, and processing methods. This will be discussed more fully in a later section.

### LARD AND FAT CUTS

During recent years a serious problem has developed with respect to mar-

kets for lard. The combined domestic and foreign demand for this product has been such that the total United States output could be moved only at relatively low prices. The weakened price position of lard is shown both by a decline in the price of lard relative to the price of live hogs and by a decline in the price of lard relative to prices of lean pork cuts.

The relationship between the price of lard and price of hogs for the period 1905-1951 is shown in figure 5. For this diagram the first step was to divide the average wholesale price per 100 pounds of prime steam lard in tierces at Chicago during a given year by the average price per 100 pounds liveweight of all slaughter hogs at Chicago during the same year. The next step was to multiply this quotient by 100 to give the percentage the price of lard was of the price of hogs that year. The same calculations were made for each year from 1905-1951.

<sup>10</sup> Fat Pigs—Prices and Conditions of Purchase. Leaflet, Ministry of Food—Meat, Livestock and Pigs Control. p. 2, 12 ed. June 1950.

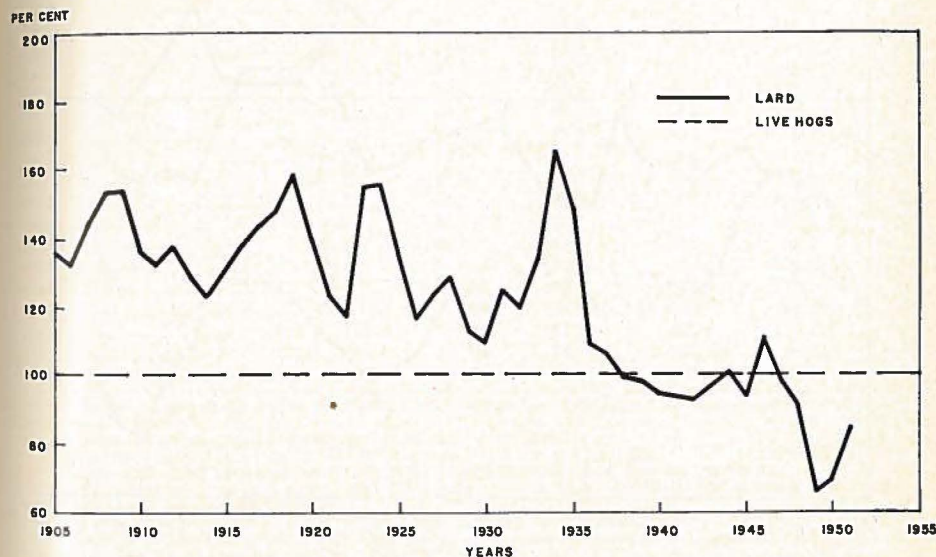


Fig. 5. Relationship of the price of prime steam lard in tierces to the price of live hogs at Chicago, 1905-1951.

It will be observed that the price of lard was above the price of hogs each year from 1905 to 1937 but below the price of hogs in all but two years from 1938 to 1951. Closer examination reveals little evidence of a downward trend in lard prices from 1905 to about 1925. The price of lard varied from about 120 per cent to 160 per cent of the price of live hogs during this period.

However, a sharp decline took place from 1925 to 1950. This downward trend was reversed temporarily during the early 1930's, with the price of lard reaching a peak of over 165 per cent of the price of hogs in 1934. In 1949 and 1950 the price of lard was only about 70 per cent of the price of live hogs or only about half as high relative to live hog prices as during 1905-1925. In 1951 the price of lard was about 85 per cent

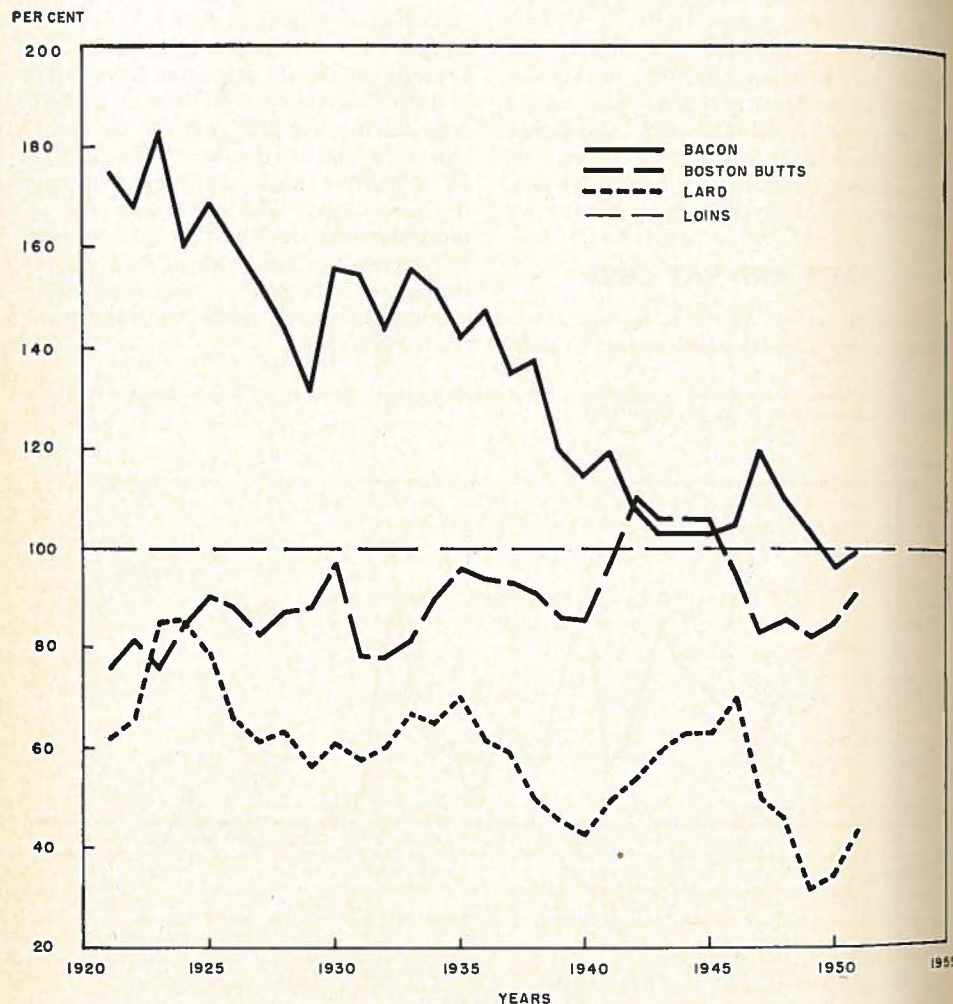


Fig. 6. Relationship of prices of specified wholesale pork cuts and lard to the price of pork loins at Chicago, 1920-1951.

of the price of live hogs.

The relationship between the price of lard and prices of fresh pork loins, fresh Boston butts, and cured bacon for the period 1921-1951 is shown in figure 6. For this diagram the average wholesale price of fresh pork loins for a given year was divided into the average wholesale price of each of the other products for the same year and the percentages calculated in the same manner as for lard and live hogs for figure 5.

Some general trends are apparent.

First, the price of lard has declined relative to the price of the lean pork cuts—loins and Boston butts.

Second, the price of cured bacon, which is a fat cut but relatively high in price, has declined sharply relative to prices of the lean cuts. The price of bacon declined from around 170 per cent of the price of loins in 1921 and 1922 to slightly less than 100 per cent in 1950 and 1951.

Table 13. Relationship of Wholesale Cut Prices to the Price of Loins at Chicago, 1920-1950\* (loin price† = 100)

Year	Hams‡	Shoulders§	Lard	Fatbacks¶	Bacon**	Boston butts††
1920	##	72.4	##	##	##	84.8
1921	99.4	64.8	61.7	56.1	175.7	75.6
1922	109.2	69.4	65.8	62.1	168.3	81.5
1923	105.8	66.4	84.8	73.8	182.8	76.1
1924	96.5	67.2	85.3	77.4	160.1	84.9
1925	99.8	72.8	79.0	83.6	168.6	90.3
1926	99.4	71.4	66.0	65.9	161.3	88.8
1927	94.7	66.6	61.6	60.4	153.3	83.4
1928	89.9	71.4	63.4	62.5	143.9	86.9
1929	92.8	70.0	56.5	55.4	131.4	87.9
1930	108.7	78.1	61.1	63.0	155.5	96.4
1931	82.6	63.9	57.4	55.3	154.6	79.4
1932	85.7	64.8	59.8	53.7	143.9	78.4
1933	97.8	64.6	67.0	60.8	155.9	80.9
1934	101.0	74.2	65.3	67.5	152.1	90.0
1935	88.5	79.4	69.7	71.4	142.6	95.8
1936	98.2	78.8	61.7	57.7	147.7	93.5
1937	86.4	77.4	58.8	65.6	135.7	92.7
1938	92.7	75.3	50.2	46.2	137.4	90.8
1939	95.1	73.7	45.5	40.6	120.1	86.3
1940	91.1	72.0	43.3	50.6	115.0	85.6
1941	100.2	84.4	50.1	46.5	119.6	97.3
1942	96.2	97.5	54.4	46.5	107.9	109.9
1943	94.0	94.7	59.6	50.0	103.1	106.2
1944	91.9	93.9	62.8	50.5	103.0	106.2
1945	91.9	93.9	62.8	50.5	103.0	106.2
1946	89.9	81.8	70.1	55.7	104.6	94.6
1947	95.9	##	50.3	40.9	119.5	82.7
1948	93.7	##	45.9	40.4	110.4	86.0
1949	##	##	31.9	29.7	103.9	82.4
1950§§	##	##	34.4	30.4	98.9	84.9
1951§§	##	##	43.6	33.3	99.5	91.3

\* Source: Data from USDA, Production and Marketing Administration and Bureau of Agricultural Economics.

† Loins 10-12 pounds; bladeless included since July 1940.

‡ Green hams 12-16 pounds, 1921-1926; green hams 10-14, 1927-1948.

§ Green skinned shoulder New York style 1920, June 1928; 8-12 pounds 1928-1946.

|| Prime steam lard in tierces, 1921-1940; prime steam lard in one pound cartons 1941-1950. Pure lard 1920-1926; refined lard 1927-1950.

¶ Dry salt fatbacks 12-14 pounds, 1921-1940; 16-20 pounds, 1941-1950.

\*\* Fancy bacon 6-8 pounds, 1921-1926; number one bacon smoked 6-8 pounds, 1927; number one bacon, smoked, dry cured 6-8 pounds, 1928-1950.

†† Green Boston butts, 1920-June 1928; 4-8 pounds, July 1928-1950.

## Comparable quotation not available.

§§ Computed from simple average of monthly prices.

Third, prices of the two lean cuts were closer together during most of the period than prices of any of the other products. Although the price of loins was above the price of Boston butts most of the time, there was a tendency for the spread to narrow—that is, for the price of Boston butts to rise relative to the price of loins.

The situation was much the same with respect to prices of other wholesale pork cuts. For example, prices of hams and shoulders tended to follow prices of other lean cuts rather than the price of lard (table 13). Prices of other fat cuts, such as fatbacks, tended to follow the price of lard rather than the price of lean cuts.

The decline in the price of lard in relation to the price of lean pork cuts is of concern to hog producers because lard now contributes less to the value of a hog carcass than formerly. This raises the question whether or not some of the feed and other farm resources that are used to produce lard are being put to their best use.

What are the causes for this downward trend in pork values? Some of the reasons for this shift are as follows:

1. The increasing competition from vegetable fats and oils.
2. The failure of hog producers to produce hogs with less lard.
3. A weakened demand for American lard in the United Kingdom and Western Europe.

Table 14. Disappearance of Food Fats and Oils, Fat Content Basis, United States, Five-Year Average 1935 to 1949, Annual 1950 and 1951\*

Food fats and oils	Amount					Proportion of total				
	1935-39	1940-44	1945-49	1950	1951	1935-39	1940-44	1945-49	1950	1951
	million pounds					per cent				
Lard	1,424	1,787	1,753	1,856	1,894	24.5	29.4	29.2	26.7	29.0
Shortening	1,519	1,315	1,405	1,675	1,389	26.2	21.6	23.4	24.1	21.3
Butter	1,747	1,657	1,266	1,327	1,222	30.1	27.2	21.1	19.1	18.7
Edible oils	814	990	995	1,338	1,179	14.0	16.3	16.6	19.2	18.0
Margarine	302	332	575	757	839	5.2	5.5	9.6	10.9	13.0
All food fats and oils	5,806	6,081	5,994	6,953	6,523	100.0	100.0	100.0	100.0	100.0

\* Source: *Fats and Oils Situation*. Bur. Agr. Econ., USDA. July 1951. p. 17, and July-August 1952. p. 14.

In the United States lard is utilized almost entirely as a food fat. More lard was used than butterfat, shortening, or other food fats in each period shown in table 14 except 1935-39. At that time lard supplies were reduced greatly because of the drouth (table 14).

Lard (not including lard used in shortening or hydrogenated lard classified as shortening) made up 29 per cent of all food fats and oils during 1945-49 and 27 per cent in 1950. Shortenings ranked second, butter third, edible oils fourth, and margarine fifth.

The per capita consumption of lard in the United States has been nearly constant over a long period (table 15). For the past 50 years the consumption of lard, including rendered pork fat but excluding lard used in shortening and in nonfood products, has averaged 12.4 pounds per person per year. Consumption has varied within two pounds of the average in all but four years of this period.

Although the per capita consumption of lard has remained steady, lard has been facing increasing competition from other edible fats and oils, all of which are substitutes subject to technical and price limitations. Butter and margarine ordinarily are priced high in relation to the price of lard (table 16) and are generally used as spreads rather than for frying or baking. Edible oils compete with lard to some extent.

Table 15. Per Capita Domestic Disappearance of Food Fats and Oils, Fat Content Basis, United States, 1931-1951\*

Year	Butter excluding use in margarine (fat content)	Lard used directly as such	Margarine (fat content)	pounds			All food fats (fat content)
				Shortening	Edible oils		
1931	14.5	13.5	1.5	9.3	4.8	43.6	
1932	14.6	14.3	1.3	7.5	4.5	42.2	
1933	14.3	13.9	1.6	7.5	5.2	42.5	
1934	14.5	12.9	1.7	9.4	5.2	43.9	
1935	13.8	9.5	2.4	12.0	5.4	43.1	
1936	13.2	11.2	2.5	12.3	5.7	44.8	
1937	13.2	11.5	2.5	12.3	6.3	44.7	
1938	13.2	11.0	2.4	11.5	6.8	44.9	
1939	13.9	12.6	1.8	10.6	7.2	46.2	
1940	13.6	14.3	1.9	8.9	7.5	46.2	
1941	13.1	13.7	2.2	10.4	8.3	47.7	
1942	13.2	12.8	2.2	9.5	7.7	45.4	
1943	10.5	12.7	3.0	9.7	6.5	42.3	
1944	10.7	12.3	2.9	9.8	6.5	42.2	
1945	9.3	11.4	3.1	9.9	6.1	39.9	
1946	8.5	11.5	3.1	10.0	6.2	39.4	
1947	9.0	12.5	4.0	9.2	6.9	41.7	
1948	8.1	12.6	4.9	9.6	7.2	42.5	
1949	8.5	11.7	4.6	9.6	7.8	42.3	
1950	8.7	12.2	5.0	11.0	8.8	45.6	
1951	7.9	12.2	5.4	9.0	7.6	42.0	

\* Source: *Fats and Oils Situation*. Bur. Agr. Econ., USDA. July-August 1952.

The chief competition, however, comes from shortening, a group of products consisting primarily of vegetable oils. The products now labeled "shortening" were formerly classed as "lard compounds" or "lard substitutes."

Shortenings sell at retail for a higher price than lard (table 16). While they lack the "shortening power" of lard, they are satisfactory in this respect and they possess many characteristics desired by many Americans. Shortenings (including hydrogenated lard) stay firm at room temperatures, keep for a considerable period without refrigeration, are white in color, are free of tastes and odors characteristic of lard, have a higher smoke point than lard, and mix well with other ingredients including water.

The kinds and proportions of the several fats and oils used in the manufac-

ture of shortening vary greatly. For example, during the five-year period 1937-41 the fats and oils entering into shortening were divided as follows: cottonseed oil 67.6 per cent, soybean oil 12.0 per cent, other vegetable oils 12.5 per cent, lard 1.1 per cent, and other animal and marine fats and oils 6.8 per cent.

However, increasing proportions of soybean oil and lard are being used in shortening. For example, during 1950 the proportions were soybean oil 49.2 per cent, cottonseed oil 32.1 per cent, lard 10.0 per cent, other vegetable fats and oils 6.9 per cent, and other animal and marine fats 1.8 per cent.<sup>11</sup> Cottonseed oil supplies were reduced in 1950 because of a small cotton crop, but apparently much of the cottonseed oil has been shifted to the production of margarine. In 1950 about 170 million

<sup>11</sup> *Fats and Oils Situation*. Bur. Agr. Econ., USDA. July 1951.

Table 16. Wholesale Price Per Pound of Selected Fats and Oils at Specified Markets, Annual Averages, 1931-51\*

Year	Butter, 92-score creamery, Chicago	Margarine, white, 1-pound cartons, Chicago	Shortening containing animal fat, 1-pound cartons, Chicago	Cotton- seed oil, refined, drums, New York	Soybean oil, refined, drums, New York	Lard, refined, 1-pound cartons, Chicago	Tallow, inedible No. 1, Chicago
1930	35.3	19.0	11.3	—	11.0	12.0	5.6
1931	27.0	14.0	8.8	—	7.6	9.0	3.4
1932	20.1	11.2	5.9	—	4.9	6.2	2.7
1933	20.8	10.2	6.8	—	7.4	6.4	3.0
1934	24.8	9.8	8.6	—	8.2	8.8	3.8
1935	28.8	15.1	13.1	12.6	10.6	15.1	6.2
1936	32.0	15.3	12.2	12.0	9.8	12.2	5.8
1937	33.2	15.6	12.4	11.5	10.9	12.7	7.5
1938	27.1	14.6	10.2	9.6	8.4	9.2	5.0
1939	25.4	13.3	9.3	8.8	7.4	7.5	5.1
1940	28.7	11.8	9.1	8.4	7.2	6.4	4.1
1941	33.8	13.3	13.8	12.8	11.7	10.1	7.8
1942	39.5	15.1	17.0	16.7	14.9	14.5	8.8
1943	44.0	16.4	17.0	16.2	14.9	15.6	8.4
1944	41.5	16.5	17.0	16.2	15.1	15.6	8.4
1945	42.3	16.5	17.0	16.4	15.4	15.6	8.4
1946	61.9	23.5	21.1	20.3	19.1	23.6	10.9
1947	70.6	37.2	32.2	33.0	29.1	25.6	18.4
1948	75.2	37.7	33.7	33.5	28.3	24.4	14.4
1949	61.1	26.7	24.4	18.2	15.8	15.1	5.5
1950	61.7	27.9	25.5	22.1	18.5	15.7	7.6
1951	69.2	31.8	31.8	26.4	22.8	20.4	10.6

\* Source: *Fats and Oils Situation*. Bur. Agr. Econ., USDA. pp. 20-26, February-March 1951; and pp. 35-36, February-March 1952.

pounds of lard were made into shortening. This is equivalent to 8.8 per cent of the lard consumed in the United States that year.

In the domestic market the price of lard varies closely with the price of the principal ingredients of shortenings, chiefly cottonseed oil and soybean oil. At times the price of lard has been so low that some of it has been used in soap manufacture. This takes place when the price of lard approaches the price of inedible tallow, an important ingredient of soap. However, this is not common. Consequently the future price of lard is likely to fluctuate between the prices of cottonseed oil and soybean oil on the one hand and inedible tallow on the other. That is, the price of inedible tallow acts as a floor and the

prices of cottonseed and soybean oils act as a ceiling to lard prices.

The consumption of lard as lard tends to vary inversely with income.<sup>12</sup> Lard consumption is highest among low income groups and shortening tends to be substituted for lard as the income level rises. Consequently, a rise in the income level of the population is not likely to improve the competitive position of lard. To maintain per capita consumption of lard under such conditions, it would be necessary to convert a higher proportion of the lard into shortening. And if lard is to be used extensively in shortening, it will have to meet the competition of cottonseed oil and soybean oil.

It costs more to produce lard through the round-about process of growing

<sup>12</sup> *Fats and Oils Consumed by City Families*. Commodity Summary No. 2, Bur. of Human Nutr. and Home Econ., USDA. August 1949.  
<sup>13</sup> *Consumption of Food in the United States 1909-48*. USDA Misc. Pub. 691:142. Bur. Agr. Econ. 1949.

feed, feeding this to hogs to produce fat, and then converting the fat into lard than it does to produce oils directly from oil bearing seeds. Furthermore, the production of some oils, especially soybean oil, has been increasing. Consequently, it seems probable that lard will face increasing rather than decreasing competition from other fats and oils in the future.

In spite of the decline in the relative price of lard, large quantities continue to pour into the market. This suggests that the supply of lard is not very sensitive to its price.

This situation arises for several reasons. It is due in part to the nature of the hog enterprise. It is not possible to produce a first grade hog carcass without producing some lard. Pork and lard are joint products. However, this does not mean that lard and pork are always produced in the same proportions. The amount of lard produced from a given number of hogs varies with the type of hogs, kind of feed, method of feeding, weight at time of marketing, and proportion of fat rendered into lard.

Some types or strains of hogs produce a higher proportion of lean to fat than others when fed under similar conditions and marketed at the same age. That is why some are classified as bacon type and others as lard type hogs. The yield of lard per 100 pounds live hog is higher in the United States than in Western Europe, Canada, and other countries where the bacon type hog is produced. On the whole the hogs produced in the United States tend to be shorter, thicker, and fatter than typical bacon hogs.

The kind and amount of feed also influence the proportion of lean to fat on the finished hogs. Pigs that are stunted when small and later fattened for market are shorter and thicker with a higher proportion of fat to lean at

time of slaughtering than pigs that are well fed from the time they are born. Well balanced rations tend to produce carcasses with a higher proportion of lean to fat than rations lacking in proteins and other ingredients.

The same hogs will produce a higher proportion of fat to lean if marketed at heavy weights than if marketed at light weights. That is why the yield of lard per 100 pounds live hog is higher during periods when the corn-hog price ratio is especially favorable to hog producers than when it is unfavorable. It is not possible for most farmers to increase the number of pigs in a few days or weeks, but they can and do feed those on hand to heavier weights. In the long run, of course, if the corn-hog price relationship continues to be favorable they will breed more sows and raise more pigs.

Hogs produced in Western Europe and Canada for the exacting British bacon trade are marketed at somewhat lighter weights than in the United States. This, as well as the difference in type of hogs raised and feeds used, tends to reduce the amount of lard per 100 pounds live hog as compared with this country.

The amount of lard produced from a given supply of hogs also varies with the proportion of the fat rendered into lard. This may vary from 5 to 20 per cent.<sup>13</sup> When the price of fatbacks is low in relation to the price of lard, more fatbacks will be rendered into lard than if the reverse is true. With the price of lean cuts high in relation to the price of lard, the amount of fat left on the lean cuts is limited only by consumer resistance to the excess fat. The closer the trimming of lean cuts the greater the quantity of lard that is produced.

Another important reason the supply of lard is not more sensitive to the

<sup>13</sup> *Consumption of Food in the United States, 1909-48*. USDA Misc. Pub. 691:39. Bur. Agr. Econ. 1949.

price of lard is that the hog market in the United States fails to reflect adequately consumer preferences back to hog producers. In this country hogs are commonly sold in groups or lots by liveweight. All lots in the same weight range usually bring about the same price per 100 pounds liveweight on a given day at any given market.

This is the situation even though individual hogs in the same lot and different lots of hogs in the same weight range vary considerably in carcass yield, proportion of high value lean cuts to low value fat cuts, and actual cut-out value.<sup>14</sup> Since all hogs in the same weight group sell at the same price, farmers do not know that hogs with excess fat are being carried along by those with a higher proportion of the desired lean cuts.

Lard has met with increased competition from vegetable oils in Europe as well as elsewhere; another important reason for the decline in demand for United States lard in the United Kingdom and Western Europe is the lack of dollar exchange, i.e., the means with which to buy American goods. This problem has been eased for the time being by our foreign aid programs, but its permanent solution lies in restoration of trade. This is important to American hog producers, particularly because of the need for a market for lard.

### THE EXCHANGE PROBLEM

All trade is an exchange of goods and services. Money is a very convenient go-between in carrying on buying and selling within a given country. Few persons seek to obtain money for its own sake. They want money because it provides the means of acquiring goods and services either now or in the future.

International trade likewise is an exchange of goods and services, but because there is no international currency as such, settlement has to be made much more directly by trading goods and services for goods and services. This does not mean that it is necessary to barter one specific lot of goods being exported for another specific lot of goods being imported. What it does mean is that broadly speaking over a period of time, the exports and imports of a given country (everything included) must balance. Exports pay for imports and vice versa.

There has been widespread confusion over the term "dollar shortage," which has appeared frequently in discussions of international trade, particularly since World War II. Many make the error of assuming that the dollar shortage is the same as a shortage of money. The dollar shortage does not refer to shortage of money in general but of a particular kind of money, namely dollars which can be used for buying goods in the United States.

Exporters of American goods want payment in dollars or in currencies which are readily converted into dollars. They cannot pay the producers of most goods in pounds, francs, marks, or lira. An American hog producer would reject payment in British pounds unless he could get dollars or their equivalent in goods for them.

Means of payment for goods imported from other countries are referred to as "foreign exchange." Foreign exchange is acquired in various ways. Exporting to a given country yields foreign exchange, or means of purchase in that country. Performance of services such as shipping, insurance, and the like is another source. The extension of credit and making outright grants or gifts also provide foreign exchange.

<sup>14</sup> Gerald Engelman, Austin A. Dowell, and Robert E. Olson. *Relative Accuracy of Pricing Butcher Hogs on Foot and by Carcass Weight and Grade*. Minn. Agr. Expt. Sta. Tech. Bul. 206. 1953.

This nation adopted the lend-lease program during the war as a method of overcoming lack of dollar exchange on the part of friendly nations. Under this program, war materials, food, and other essentials were supplied our allies without immediate payment or the creation of a formal debt. The costs were assumed by this nation, and payment to American producers came from the United States Treasury. Since the end of the war, similar aid has been provided through the European Aid Program and the Mutual Security Program.

The reason for these postwar programs has been the need for supplies from the United States in excess of dollar exchange available to other countries. It has represented a sharing by us in the restoration of war-torn countries and in rebuilding the strength of the free world. The aid has not consisted of exporting actual currency but of exporting goods for which payment has been made from funds appropriated for this purpose. The aid, in short, represents goods for which we do not receive goods in repayment.

A program of grants of the magnitude of recent years cannot be permanent. As this aid tapers off, other ways of meeting the exchange needs must be found. One of these ways takes the form of an outflow of American capital for investment in or loan to other countries. While they are being made, such investments and loans will provide means for making purchases in this country.

Another way is that of increasing the imports of goods and services into the United States to provide payment for our exports. It may be noted in this connection that travel by Americans abroad is in effect a form of import which provides dollar exchange for other countries. If dollar exchange is not available to other nations, their purchases here will have to be curtailed with corresponding loss of foreign markets for agricultural and other commodities produced in the United States. The latter solution, which will be the one used if no other way is developed, will mean the loss of important market outlets by Americans now producing for export.

## Possible Solutions of Export Problems

THE PORK and lard export problems might be attacked in various ways. One obvious approach would be to reduce production to domestic requirements. Another approach would be to encourage the removal of restrictions to world trade so that other countries could obtain sufficient foreign exchange to buy American pork and lard. Still another approach might be to bring about whatever changes in breeding, feeding, marketing, and processing methods that may be required to meet the competition of other exporting countries. The most effective attack on the problem might include some combination of these or other suggestions.

### REDUCING PRODUCTION

To bring the production of pork and lard in line with domestic demand would not be as simple as it may at first appear. Pork exports have declined until they have become relatively unimportant in terms of total production during recent years. Nevertheless, some pork continues to seek outlets abroad. Hog production has tended to keep pace with population growth, and indications are that this situation is likely to continue for some time to come.

What is more important, lard exports have not declined as much as pork exports. The United States has continued

to be the leading world exporter of lard. Even if hog production were reduced to a point where pork exports were eliminated completely, there would remain a large surplus of lard seeking export outlets. The amount of lard might be reduced by changing the type of the hogs and by marketing at lighter weights. Nevertheless, the lard problem would not be solved in this way, at least it would not be solved completely for some time to come, because pork and lard are joint products.

### REDUCING TRADE BARRIERS

Trade within the United States is carried on relatively freely. Minnesota pork, butter, eggs, wheat, iron ore, and other products move to markets in other states without having to pass through customs offices. International trade, however, is restricted by tariff duties, exchange controls, and a host of other curbs.

Some of these are intended to restrict the imports of certain products that compete with domestic products. That is a major purpose of the import duties of the United States. Countries with limited foreign exchange may establish controls to protect their monetary systems and to direct the use of available foreign exchange into selected lines.

To the extent that international trade restrictions are effective they reduce international trade and increase economic self-sufficiency of nations involved. But they interfere with the most efficient use of productive resources and hence tend to reduce rather than raise the ability to satisfy wants and improve levels of living.

Wars interfere with normal trading and trade restrictions are an aftermath. Political and national considerations play important roles at times. The extreme in trade restriction may be found in a country under a dictatorship which involves strict control over all economic activities.

The height of trade restrictions in modern times was reached following World War I and the severe world-wide depression starting in the late 1920's. The United States took part in this program by the enactment of a tariff act in 1930 which raised import duties on many products.

The enactment of the reciprocal trade agreements act in 1934 marked a modest reversal in international trade policy of the United States. The initial act was for a three-year period, but the program has continued under repeated renewals and extensions. Agreements have been made with a number of nations under which there have been exchanges of trade concessions. Since World War II this country has participated in several conferences with a number of other nations involving a lowering of trade barriers and an expansion of international trade.

In its participation in economic recovery and restoration in Western Europe since World War II, the United States has urged upon the nations involved the development of better trade relations. Other nations have in turn reminded the United States that an important part of overcoming the problems of shortage of dollar exchange lies in increasing their exports to us. In this way they may earn the means of paying for the goods which they buy from us.

Clearly the question of our trade policy is an inseparable part of our international policy. The latter is of major importance to us and the rest of the world because of the importance of effective international cooperation in the world today. Americans need to view their interests in international trade from a broad rather than a narrow standpoint. Every American is interested in the way in which international trade may contribute to more effective world cooperation.

Producers for the export market clearly have an interest in that market

being kept open by an adequate flow of imports to provide payment.

Producers for the domestic market may assume that they have no interest in the export market and may concern themselves with competition from imports. However, if exports fall off there is likely to be increased competition for the domestic market as producers for export shift to production for sale here at home.

### PRODUCING TO MEET FOREIGN DEMAND

The most obvious way to meet world competition is to determine just what is wanted and then proceed to produce and deliver the kind of product desired. Consequently the first step in our study was to determine the character of the demand for pork and lard in the most important importing country — the United Kingdom.

#### British Appraisal

American bacon tends to be too fat and the cure too harsh to satisfy the exacting British trade. American hams, on the other hand, are quite satisfactory to British consumers if from light-weight hogs. And the United States has been Britain's principal source of lard for many years.

Imports of pork from Europe were cut off during World War II so that the United Kingdom had to rely largely on the United States and Canada. The greater part of the imports came from the United States.

Considerable time is required to move pork products from the United States to British consumers. The products must be moved from the place of slaughter to the seacoast, then by ship to British docks, and finally through the British wholesale and retail markets to consumers. Shortage of ships, delays en route due to enemy submarines, and additional delays within the

United Kingdom occasioned by the rationing program called for a stronger cure than usual to prevent spoilage.

The demand for pork and fats was so urgent during and for some time after the war that emphasis was placed largely on quantity. Relatively little consideration was given to quality. Much of the pork and bacon was extremely fat. This combination of excessively fat pork and an unusually strong cure did not add to the prestige of the American product on the British market.

During 1950 a considerable number of British people were interviewed by the senior author of this bulletin to obtain their opinions on pork and lard imported from various countries. Those interviewed included wholesale meat dealers on the Smithfield Market, London; officials of slaughterhouses and bacon factories in or near London and Birmingham, England, and Aberdeen, Scotland; farm organization leaders; government officials; college and experiment station workers; retail merchants; and consumers. Each was asked to rank in order of preference the bacon received from the principal suppliers—Denmark, the Netherlands, Sweden, Poland, Canada, and the United States. The bacon from the United States is in the form of side bacon while that from the other countries is in the form of Wiltshire sides.

Without exception Danish bacon was placed first, followed by the Netherlands, Sweden, and Canada, but there was considerable difference of opinion as to which should be placed second, third, and fourth. Bacon from Poland was ranked fifth and bacon from the United States was ranked sixth by a wide margin.

It is probable that the extremely unfavorable reaction to American bacon was due in part to the low quality product shipped during and for some time following the war. It was much too fat and the cure too strong to be

acceptable to British consumers except under unusual conditions. The British bacon ration was so small at the time of these interviews that consumers were extremely critical of bacon with excess fat. Even though opinions may have been colored considerably by recent experience, all of those interviewed believed that pre-World War II bacon from the United States ranked considerably below that from other important exporting countries.

American hams shipped to the United Kingdom before World War II were quite satisfactory providing they were from lightweight hogs and providing the excess exterior fat had been removed before curing. Heavy hams were not popular because even if the excess exterior fat was removed they usually carried too much fat around the ham bone and among the muscle fibers to meet British requirements.

When asked about the acceptability of American lard, the typical reply was "It's as good as any." As the leading exporter of lard, the United States is in a position to insure a fairly dependable supply and a uniform product. A dependable supply is an important consideration, as most of the lard consumed in the United Kingdom must be imported.

### How Others Meet Demand

After determining the kind of hog products desired by British consumers, the next step was to study how some of the leading exporting countries tried to meet this demand. This part of the study included an examination of production, marketing, and processing methods in some of the Scandinavian countries and in Western Europe.

Most of the hogs in all of these countries are of the bacon type, and practically all are white in color. In several of these countries hogs are sold by car-

cass weight and grade instead of by liveweight as in the United States.

The British were practically unanimous in the belief that the Danes were doing the best all-around job of breeding, feeding, and marketing hogs of any of the exporting countries. The survey made in connection with this study led to the conclusion that this opinion is well founded.

The Danish methods have been so successful that they have been adopted in part or in full in the Netherlands, Sweden, Norway, United Kingdom, Canada, and a few other countries. Some of these countries, especially the Netherlands and Canada, have made rapid strides and are competing vigorously with the Danes for the British market.

**Denmark**—Since production, marketing, and processing methods are much the same in all of these overseas countries, it will not be necessary to deal with each country separately. A brief statement of Danish methods will be adequate.

Denmark shifted from export of grains to export of animal products late in the nineteenth century.<sup>15</sup> Before making this shift, the Danes made a careful survey of British pork requirements and preferences and then developed a coordinated program aimed at meeting this demand.

For many years hog production has been a major enterprise in practically all parts of Denmark. About 30 per cent of the gross farm income came from hogs before World War II. At that time about 80 per cent of the pork was exported to England in the form of Wiltshire sides. Hog production declined sharply during the war but was back almost to the prewar level by 1950.

Most hogs raised in Denmark are of the Danish Landrace breed. There are relatively few Large White Yorkshires.

The Landrace has been improved steadily over the last half century by breeding and pig testing as well as marketing programs. All these have been aimed at meeting the requirements of the exacting British trade for high quality bacon.

Body length has been increased, backfat thickness reduced, weight of hams increased, and weight of shoulders reduced. To make this work even more effective, three modern pig testing stations, one in each of the three provinces, were built during 1950. Marketing by carcass weight and grade has been another important factor in the improvement in type and quality of the Danish hog.

In 1950 there were 62 cooperative bacon factories and 19 other plants in Denmark, a country about one-fifth the size of Minnesota. In 1949 the cooperative plants handled over 88 per cent of all hogs slaughtered.

All farmers whose pigs are delivered to the cooperative bacon factories during a given week receive exactly the same price for carcasses of identical weight and grade regardless of location. The prices to be paid for carcasses of different weights and grades are determined weekly by a price committee of the cooperative slaughterhouses and published in the local papers. Substantial penalties apply to carcasses that are over or under the desired weight. The weekly prices need to be at levels which will lead to prompt clearance of supplies through foreign and domestic outlets.

Consumer demand for pork is reflected back to Danish hog producers through differential prices for different weights and grades of hog carcasses. Farmers respond by breeding the type of hog desired, by feeding in such a way as to produce a top quality product, and, finally, by marketing at the desired weight.

The Danish bacon factories make every effort to deliver only top quality

Wiltshire sides to the British market. Those selected for export must be uniform in length and depth, and they must fall within a narrow weight range. The plants maintain central laboratories to test the quality of the fat and lean and to insure uniformity between plants in the "pickle" or brine used in curing. Random inspection is maintained at dockside to insure uniformity in quality, weight, and cure.

Nearness to the market makes it possible for the Danes to use the mild cure preferred by British consumers. The Wiltshire sides are shipped in burlap bundles, with four sides to a bundle. They are not smoked in Denmark but smoked by the wholesale distributor after they have reached the United Kingdom.

The Danes have demonstrated the effectiveness of their carefully developed swine production, marketing, and processing program by capturing and holding first place among exporters of Wiltshire sides to the exacting British market.

The trend toward lean pork and bacon appears to be under way throughout the United Kingdom, the Scandinavian countries, and Western Europe. In all of these countries the demand for lean pork has been increasing relative to the demand for fat pork.

For example, in a study made in the United Kingdom in the late 1920's, it was found that "In recent years public taste has become more fastidious and taking the country right through, the popular demand is undoubtedly for lean pork . . . . In towns where for example the heavier loins of pork could be disposed of untrimmed a few years ago, it is now necessary to remove the rind and backfat or to accept a lower price per pound for the chops. It is true that in the North especially in some of the large Yorkshire and Lancashire towns the aversion to fat pork is not so marked as in the South, but in general, excessive fatness se-

<sup>15</sup> K. Skovgaard and Anton Pedersen. *Survey of Danish Agriculture*. National Danish FAO Committee. Copenhagen. 1946.

verely affects demand in all sections of the pig meat trade."<sup>16</sup>

This trend has continued so that the preference for lean pork now is about as pronounced in the manufacturing towns as in other towns and cities.<sup>17</sup>

**Netherlands**—Two breeds or strains of hogs, the Large White or Large Yorkshire and the Improved Netherlands Landrace, are kept in the Netherlands. The Large White is somewhat shorter, thicker, and fatter than the Landrace. It is used largely for the domestic trade and is concentrated in the west central part of the country where the large cities—Amsterdam, Rotterdam, The Hague, and Leiden—are located. The Netherlands Landrace predominates in the rest of the country. It has been developed chiefly to meet the requirements of the British market.

Two or three decades ago the Large White and the Netherlands Landrace differed considerably in the proportion of fat to lean they yielded at the time of slaughter. However, with the passing of time the domestic demand for lean pork increased. To meet this shift in demand, the Large White hog producers selected longer, leaner breeding stock.

Consequently, the difference in the carcasses produced by the two breeds is much less now than formerly. Indications are that this trend will continue.<sup>18</sup> That is to say, the demand for lean pork in the future is likely to be about as urgent in the Netherlands as in the United Kingdom.

The situation is much the same in Denmark, Sweden, and Norway as it is in the United Kingdom and the Netherlands. The trend is away from fat pork.

This trend, though less pronounced, is also under way in Western Germany, France, and other European countries.

#### Problems Involved

If the United States earnestly seeks a share of the British market for high grade bacon, it will be necessary to make some significant changes all along the line from the hog producer on the farm to the processor of the finished product.

American hogs tend to be too fat to meet the requirements of an exacting market. There is also wide variation in conformation and weight within lots as well as between lots at time of marketing. And processing methods have not been pointed toward the foreign market as is the case in some of the other exporting countries.

One often hears that there is a strong demand in the United States for all kinds of slaughter hogs: for barrows and gilts of all types, weights, and finish as well as for sows, boars, and stags. It is said that fatbacks are popular among certain consumers, fat bacon among others, and heavy fat hams or shoulders or loins among others. Certainly all kinds of hogs find a market at some price. But there seems to be a strong tendency for people generally to "eat higher on the hog" whenever incomes permit—that is, to show preference for better quality.

It is obvious that the hog industry is not aimed primarily at the production of sows, boars, or stags for the market place. These animals are unavoidable by-products of the entire hog enterprise, just as discarded dairy cows and dairy bulls are by-products of the dairy enterprise.

The primary objective of most hog producers in the United States is to produce barrows and gilts for market. These make up the bulk of the slaughter hogs of the country. They are commonly sold by liveweight in lots by weight groups.

All barrows and gilts in the same weight group bring about the same price per hundredweight at a given market on a given day. Only those with obvious defects such as pregnancy, emaciation, or extreme fill are commonly sold at substantial discounts. The result is that animals falling in the same weight group but differing greatly in the proportion of fat to lean and in dressing yield sell at about the same price per hundredweight.

This may not have been a serious matter when fat cuts and lard were in fairly strong demand, as during the early part of this century. But it becomes a very serious matter when the demand for fat cuts and lard declines sharply relative to the price of lean pork cuts—hams, loins, picnics, and butts—as it has during recent years.

It was formerly quite generally believed that a choice fat type grade hog should yield a carcass which had a "relatively large percentage" of fat cuts and a "proportionately small percentage" of lean cuts.<sup>19</sup> It was also quite generally believed that a choice meat type grade hog should yield a carcass which had a "moderately large percentage" of fat cuts and a "moderately small percentage" of lean cuts.<sup>20</sup> However, now it is generally recognized that such hogs carry too much low value lard and too little high value lean to grade choice.

The choice or first grade hog should be the most valuable hog, and the most valuable hog or the most valuable car-

cass is the one that will yield the highest proportion of high-value cuts, provided that satisfactory quality is maintained.

Under a marketing system which fails to reflect consumer preferences back to hog producers adequately, hog producers continue to breed, feed, and market hogs which carry too much low-value lard. Pork and bacon from such hogs are too fat to meet successfully the competition of Denmark, the Netherlands, Sweden, Canada, and other leading exporting countries.

If the United States wishes to meet this competition, it will be necessary to develop a marketing system which will make it possible for consumer preferences for lean cuts to be reflected back to hog producers. Hog producers then could adjust their breeding and feeding programs to meet this demand.

Countries which have been most successful in meeting competition for the British bacon trade employ the carcass method of sale. In some cases the shift has been made directly from sale by the head or by liveweight as in England and Denmark. In others it has followed an intermediate step involving sale by liveweight and grade or some hybrid between the on-foot and carcass methods as in North Ireland and Canada.

In all of these countries the view is strongly held that "As the ultimate value of a pig depends primarily on the weight and grade of the meat which it produces, it follows that the fairest basis on which to pay producers is by dead weight and carcass grading."<sup>21</sup>

If a serious effort is made to compete with other countries for a share of the British bacon market, American packers must dress top bacon hog carcasses in the form of Wiltshire sides,

<sup>16</sup> *The Pork and Bacon Grades*. Ministry of Agriculture and Fisheries, Economic Series No. 17:25. 1928.

<sup>17</sup> Based on conferences with Dr. Alex Calder, Director of Pig Supplies, Ministry of Food, Stanmore, England; other government officials; meat packers; and others, April-September 1950.

<sup>18</sup> Based on conferences with Dr. P. C. Labouchere, Director of Pig Testing Work, Ulrecht, Netherlands, and government officials, meat packers, and others, September, 1950.

<sup>19</sup> Don J. Slater. *Market Classes and Grades of Swine*. USDA Cir. 569:14. September 1940.

<sup>20</sup> *Ibid.*, p. 16.

<sup>21</sup> *Policy for Pigs*. Pigs Marketing Board. Penrhos College, Colwyn Bay, N. Wales, 3. December 1945.



give these carcasses the desired mild cure, and move them to British ports with as little delay as possible. Speedy delivery will be necessary if a harsh cure is to be avoided. This system would require some modification of packing house procedures and also the construction of tanks for pickling and space for curing the Wiltshire sides.

Because of the relatively small volume of pork exports, American packers may not feel justified in making the modifications in equipment and procedures necessary to produce Wiltshire sides. However, modifications in marketing methods with a view to encouraging the production of hogs with a high proportion of lean cuts should improve the domestic market as well as the foreign. If American farmers are to have an incentive to produce hogs with a high proportion of the preferred lean meat and with lower yield of lard, a more accurate way of reflecting consumer preferences in the prices paid farmers must be found. The University of Minnesota Agricultural Experiment Station in cooperation with other agricultural experiment stations in the North Central States and the United States Department of Agriculture has studied this problem.<sup>22</sup>

#### Probable Results of Shift

It seems reasonably certain that the total supply of lard would be reduced if the hog producers of the United States would produce meat type hogs instead of lard type hogs and then market them at relatively light weights. This would ease the pressure on the export market for lard. It probably would not eliminate lard exports completely, at least for some time, because

of the joint product relationship between pork and lard.

The shift from a lard type to a meat type hog also would have an important effect on the domestic demand for pork, especially if the hogs were marketed at light weights. Wholesale prices for pork cuts indicate a preference for lightweight over heavyweight hams, loins, picnics, butts, and bellies. And indications are that consumers prefer lean cuts to fat cuts even though the cuts are of identical weight. The shift in demand from fat pork to lean pork appears to be just as pronounced in the United States as in the United Kingdom.

It is a relatively simple matter to remove the excess exterior fat from the ham or loin of an over-fat hog, but it is not possible to remove the excess interior fat. A housewife who pays a first grade price for a defatted ham from an over-fat heavyweight hog naturally is keenly disappointed when the ham is opened on the kitchen table and found to contain an excessive amount of fat around the ham bone and among the muscle fibers.

The problem is much the same with picnic hams, butts, and loins. Even less can be done to improve the condition of overfat bacon. Excess exterior and interior fat tend to reduce the demand for pork both at home and abroad.

A shift from fat type to meat type lightweight hogs would result in an increase in the domestic demand for pork. It would also result in an increase in the domestic output of pork if the same amount of feed and other resources continued to be used for hog production. This may or may not lead

<sup>22</sup> Gerald Engelman, Austin A. Dowell, Evan F. Ferrin, and Philip A. Anderson. *Marketing Slaughter Hogs by Carcass Weight and Grade*. Minn. Agr. Expt. Sta. Tech. Bul. 187. April 1950. North Central Livestock Marketing Research Comm. *Objective Carcass Grade Standards for Slaughter Hogs*. Minn. Agr. Expt. Sta. Bul. 414. June 1952.

Gerald Engelman, Austin A. Dowell, and Robert E. Olson. *Relative Accuracy of Pricing Butcher Hogs on Foot and by Carcass Weight and Grade*. Minn. Agr. Expt. Sta. Tech. Bul. 208. 1953.

to an increased need for export outlets for pork and pork products since it cannot be determined whether the increase in supply would be more than the increase in domestic demand.

Regardless of the ultimate balance between domestic production and consumption of pork and pork products, a shift to leaner hogs would aid greatly in the solution of the lard problem.

## Summary

**H**OGS in recent years have produced from 20 to 25 per cent of the receipts of Minnesota farms from the sale of farm products. Nationally, hogs rank third among farm products as a source of cash income.

Hog production has been increasing over the years. The average for 1929-33 was approximately 80 million pigs raised and a little over 11 billion pounds of pork and lard produced. Over 98 million pigs and 14.6 billion pounds of pork and lard are representative of more recent output.

Factors which have contributed to this increase of about 30 per cent in approximately 20 years include:

1. The introduction and general use of hybrid seed corn.
2. The decline in number of horses and mules, which has released large amounts of corn and other grains for hog raising and other uses.
3. Improved sanitation.
4. More general use of needed proteins, minerals, and other protective feeds.
5. Improvements in the genetic makeup of breeding stock.

The increase in hog production since the middle 1930's has kept pace with population growth and indications are that this situation will continue for some time to come.

The United States has been a net exporter of hog products since colonial days. The over-all trends of exports for

both pork and lard were sharply upward from shortly after the Civil War to about the turn of the century. Thereafter the trend in pork exports was sharply downward, while lard exports were fairly well maintained. During the five year period 1900-04 pork exports averaged about 11 per cent of production while lard exports averaged about 35 per cent of production. During the five year period 1947-51 pork exports amounted to less than 1 per cent of production compared with about 20 per cent for lard.

The United Kingdom was the leading importer of pork before World War II, taking about 84 per cent of total world exports during 1934-38. Relatively small amounts were imported by Germany, Cuba, Italy, Austria, France, and Belgium.

The United Kingdom has continued to be the leading pork importer since the war. British imports consist largely of bacon in the form of Wiltshire sides with relatively small amounts of cured hams and other pork products. British consumers demand lean, tender, meaty bacon, which comes from the best quality lightweight meat type hogs. The trend away from fat pork to lean pork appears to be under way throughout Western Europe.

Denmark leads the world as an exporter of pork. In 1951 Poland ranked second and Netherlands third. Exports from the United States during recent years have been relatively unimportant.

The United States is the principal

lard exporting country, usually accounting for 80 per cent or more of the lard entering into world trade. Europe has been the most important outlet for surplus United States lard. At the height of the lard export trade in the 1920's about 84 per cent of total United States exports was taken by European countries, principally Germany and the United Kingdom. Some World War II exports of lard to Europe have declined and exports to Western Hemisphere countries have increased.

The Danes have done the best all-around job of breeding, feeding, marketing, and processing hogs for the export market. Danish methods have been so successful that they have been adopted in part or in full in the Netherlands, Sweden, Norway, United Kingdom, Canada, and in a few other countries. Some of these countries, especially the Netherlands, Canada, and Sweden, have made such rapid strides that they are now competing vigorously with the Danes for the British market.

American bacon tends to be too fat and the cure too harsh to satisfy the exacting British trade. American hams, on the other hand, are quite satisfactory to British consumers if from lightweight hogs, and American lard is considered to be the equal of that supplied by other countries.

If the United States earnestly seeks a share of the British market for high grade bacon it will be necessary to make some significant changes all along the line from the hog producer on the farm to the processor of the finished product. Farmers will need to produce meat type hogs and market them at relatively light weights.

To provide an incentive for farmers to produce hogs with a high proportion of high value lean meat and a low proportion of low value lard, the market needs to develop a more accurate method of reflecting preference for this type back to hog producers. Packers will need to dress top quality bacon

hog carcasses in the form of Wiltshire sides and then give these carcasses the desired mild cure and move them promptly to British ports. This will require some modification of packing house facilities and procedures for curing Wiltshire sides.

Improvement in the quality of pork produced in the United States is highly desirable whether it is destined for the domestic or the foreign market. Indications are that a shift from fat type to meat type lightweight hogs would result in an increase in the domestic demand for pork. Whether the increase in demand would be sufficient to eliminate entirely the need for export outlets for pork and pork products cannot be determined at this time.

During recent years a serious problem has developed with respect to markets for lard. Some of the most important causal factors appear to be as follows: 1. Increasing competition from vegetable fats and oils. 2. Failure of hog producers to bring about a reduction in the amount of lard on the hogs they bring to the market place. 3. Weakening of the demand for American lard on the part of the United Kingdom and Western Europe.

A shift from fat type to meat type lightweight hogs would reduce the output of lard and ease the pressure on the export market for this product. It probably would not eliminate lard exports completely. Because of the joint-product relationship between pork and lard, it is likely that lard would continue to be produced in excess of domestic requirements. Since the United States is the major source of supply, it is likely that lard deficit countries would continue to purchase some lard from the United States.

The reduction or removal of restrictions to world trade also would aid in the solution of pork and lard export problems.

It is clear that hog producers of the United States have a stake in main-

taining export outlets for lard because lard production will continue to exceed domestic requirements by a considerable margin, at least for some time

to come. These hog producers will continue to be interested in export outlets for pork as long as the country remains on a net-export basis.

