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# **The U.S. Sheep Industry**

Richard Stillman  
Terry Crawford  
Lorna Aldrich

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### **Abstract**

The U.S. sheep inventory declined from 49 million head in 1942 to 9 million in 1989. Lamb imports have also declined and, in relation to U.S. production, are not seen as a major cause of the sheep industry's problems. Production has declined despite positive returns to producers. Government payments under the wool program provide an important source of income for the sheep industry. In recent years, the industry, including the marketing sector, has stabilized. Imports have followed the downward trend in domestic production and respond counter-cyclically to domestic price fluctuations. A major challenge to the industry is to expand consumption of lamb, a relatively expensive red meat. This study, prepared in accordance with section 4508 of the Omnibus Trade and Competitiveness Act of 1988, focuses on production of lamb and lamb products, returns in the sheep industry, demand and marketing trends for lamb, and lamb imports, both live and product.

**Keywords:** Sheep, lamb, mutton, imports, consumption, wool, sheep, cost of production.

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## Summary

This report assesses the state of the U.S. sheep industry. It responds to section 4508 of the Omnibus Trade and Competitiveness Act of 1988, which requires the Secretary of Agriculture to submit to Congress a report on the market for lamb meat products. As required by the act, this report discusses the condition of:

- o Production of lamb and lamb products.
- o Costs and returns in the sheep industry.
- o Demand and marketing trends for lamb.
- o Imports of both live lambs and lamb meat products.

Lamb prices dropped in April 1988 from the March highs, which was counter to normal seasonal patterns. The major cause of the decline in the slaughter lamb prices was an increase in domestic production in March due to increased slaughter and record heavy slaughter weights. Production in March 1988 was 34 million pounds, compared with slightly under 28 million pounds in April 1987, the comparable Easter/Passover period.

The sheep industry has developed two distinctive enterprises: stock sheep production and lamb feeding. Stock sheep producers manage grazing flocks on pasture and range forage; frequently these producers use arid land with few alternative uses. Lambs are fed grain to finish them for slaughter. Approximately 65 percent of the lambs slaughtered go through feedlots (2). 1/

Inventory data on stock sheep began in 1867 when there were approximately 45 million head of sheep. The inventory peaked in 1942 at 49 million head and declined until 1979. The inventory appears to be stabilizing and re-entering a typical livestock cycle, which previously was masked by the longer term downward trend in the sheep industry. Since 1986, inventories appear to be expanding in response to increased returns. The stock sheep inventory is expected to cycle in the 8- to 10-million-head range over the next few years.

Returns to the U.S. sheep industry have consistently been better than those to the cattle industry. Part of the reason for these relatively higher returns has been a government program supporting the prices received for domestic wool production. In 1987, 17 percent of stock sheep receipts came from government payments.

Because of their high susceptibility to disease and predators, sheep require well-developed management skills. Sheep and lamb death losses are much higher than those for other livestock. Death losses of sheep and lambs in 1987 were 12 percent of beginning inventory. As a result, sheep production requires more labor per animal unit than cattle enterprises.

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1/ Underscored numbers in parentheses are listed in the References.

Sheep producers have historically competed with beef cattle producers for many of the same resources to operate their enterprises: grazing land, labor, water, and marketing and transportation facilities. The higher returns to sheep than cattle, while sheep numbers have declined, indicate that higher returns to management are required to retain resources in sheep production.

Lamb and mutton production has declined since 1945, following the decline in sheep numbers. Lamb production has fallen less than inventories because of a trend toward heavier slaughter weights, reflecting genetic improvements and a larger proportion marketed as fed lambs.

As the number of sheep and lambs slaughtered has declined, the infrastructure of the sheep industry has consolidated. Higher costs result if marketing activities are handled by low-volume, less cost-efficient units, or if the area of procurement and distribution covered by these units increases. Higher procurement and transportation costs are generally borne by producers as the distance between sheep-raising areas and slaughter plants increases.

Like beef and pork consumption, lamb and mutton consumption as a percentage of total meat and poultry consumption has been declining because increases in meat and poultry consumption have come from poultry. Lamb consumption has declined to less than 1 percent of red meat consumption and only 0.6 percent of total meat and poultry consumption.

The industry's challenge is to attract new consumers of a relatively expensive red meat when red meats are losing their market share to poultry due to lower relative prices. Gains for the lamb industry depend on increasing the consumer base. Even though lamb has been sold in the United States for many years, it is unfamiliar to many consumers. In a marketing context, lamb should be approached as a new or specialty product.

The United States imports both sheep meat and live animals. Live animal imports have never been large, and the United States has been a net exporter of live animals. However, the United States has been a net importer of lamb meat and mutton. Lamb and mutton imports have been declining since 1960, along with domestic production and consumption.

Consumption of lamb was 1.2 pounds per capita in 1988, less than 0.6 percent of meat consumption. Small-scale production and distribution tend to increase the costs as the infrastructure shrinks. These higher processing costs are generally borne by both consumers and producers. Imports and production of lamb have declined since 1960, indicating that the biggest problem with the domestic market is the lack of a consumer base. Producers' returns have been consistently positive in recent years, and marketing facilities and plants have been adjusted to gain scale economies for a declining industry. The sheep industry is showing signs of stabilizing or even modest growth.

# The U.S. Sheep Industry

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## Introduction

Concern arose over conditions in the U.S. sheep industry in 1988 because lamb prices were much lower during the usual late spring price peaks than in 1987. At the same time, a shipment of live lambs from New Zealand entered U.S. marketing channels. These events led to questions about the influence of imports on conditions in the U.S. sheep industry. In this report, we assess the state of the U.S. sheep industry. We respond to section 4508 of the Omnibus Trade and Competitiveness Act of 1988 which requires the Secretary of Agriculture to submit a report to Congress on the market for lamb meat products. As required by the act, we discuss the following conditions:

- o Production of lamb and lamb products.
- o Costs and returns in the sheep industry.
- o Demand and marketing trends for lamb.
- o Imports of both live lambs and lamb meat products.

We take a broad view of the sheep industry, emphasizing long-term trends, costs and receipts to stock sheep and lamb feeding enterprises, livestock cycles, and seasonal price patterns. Such a perspective helps distinguish the basic forces influencing conditions in the industry from one-time events that, while temporarily disruptive, are not likely to recur. We focus on the reasons for the decline in the sheep inventory, as opposed to the subsequent decline in slaughter facilities.

We conclude that imports have been countercyclical, but declining along with domestic inventories and production; that returns have generally been higher than in the competing cow-calf industries; and that the major challenge to the U.S. sheep industry is to expand consumption of a relatively expensive red meat. The issue of red meat consumption goes beyond lamb, as poultry is capturing market shares from all red meats through lower relative prices.

## Sheep Production Practices

The sheep industry has developed two distinctive enterprises: stock sheep production and lamb feeding. Stock sheep producers manage grazing flocks on pasture and range forage; these producers frequently use arid land with few alternative uses.

Stock sheep producers sell lambs that are either slaughtered or placed in feedlots. In 1987, 31 percent of the stock sheep receipts came from slaughter lambs and 33 percent from feeder lambs. Wool, an important coproduct, accounted for 27 percent of stock sheep receipts, and cull ewes accounted for the remainder.

Feeder lambs are raised on forage until they reach around 80 pounds and then are usually placed in a dry lot for grain feeding. Feedlot-finished lambs have grown as a percentage of lambs slaughtered, due to the cost efficiency of grain feeding versus range finishing.

### **Stock Sheep**

Stock sheep, mature ewes and rams, and their intended replacements in the breeding flock are the productive capital of the sheep industry.

#### **Inventory Trends**

Inventory data on stock sheep began in 1867 when there were approximately 45 million head (fig. 1). From 1867 to 1942, the number of stock sheep varied from a peak of 51 million head in 1884 to a low of 33 million in 1923. The inventory peaked a second time in 1942 at 49 million head. Producers liquidated their herds during 1942-50, and stock sheep numbers declined an unprecedented 47 percent. Inventories then remained stable during the 1950's. During a liquidation in the 1960's, inventories dropped another 40 percent, to 17 million head. The decline continued through the 1970's, reaching a low of 10.8 million head in 1979.

As the inventory now begins to stabilize, it appears to be re-entering a typical livestock cycle, which had been masked by the long-term downward trend in the sheep industry. The sheep inventory began to expand after 1979 and reached a peak in 1982 of 11.4 million head (fig. 2). Then, primarily because of a drought that reduced the carrying capacity of ranges in the main producing areas during 1982-84, the inventory declined until 1986 when it reached a low of 8.5 million head. Another reversal occurred in 1986 and sheep inventories climbed to 9.2 million head by January 1, 1989. Inventories appear to be expanding in response to increased returns. The stock sheep inventory is expected to stay in the 8- to 10-million-head range over the next few years.

#### **Regional Location**

The ability of sheep to forage in an arid environment has determined the regional distribution of sheep in the United States. Sheep production is primarily located in the 17 Western States where few or no alternative enterprises are available (fig. 3).

Figure 1

### U.S. sheep inventory

Million head

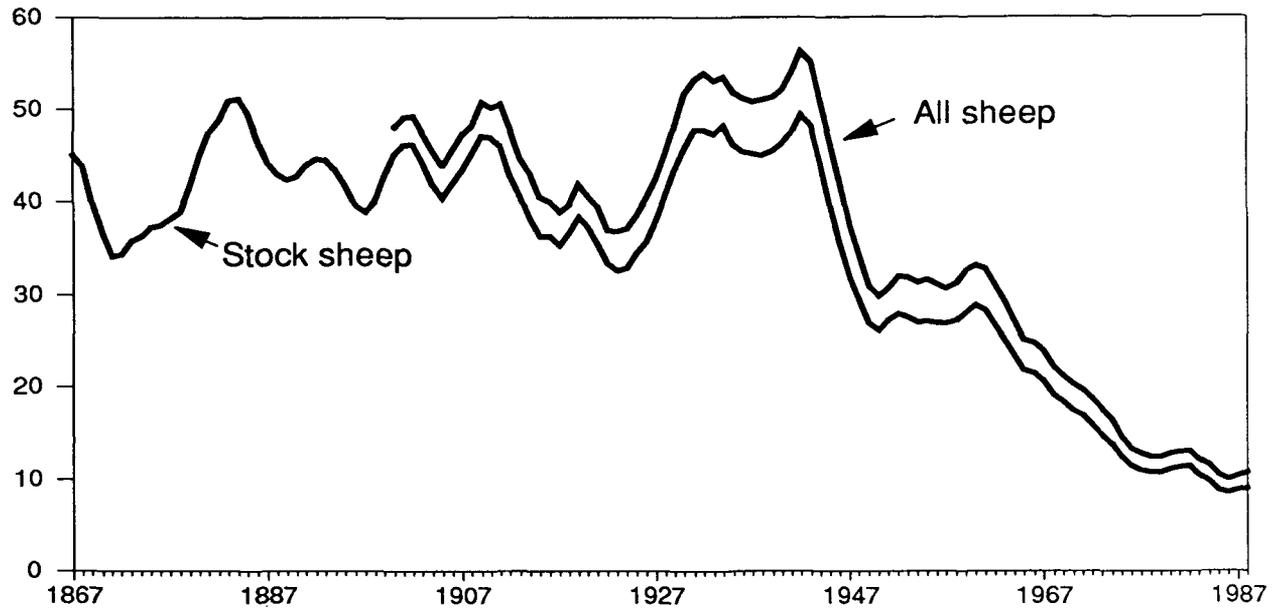
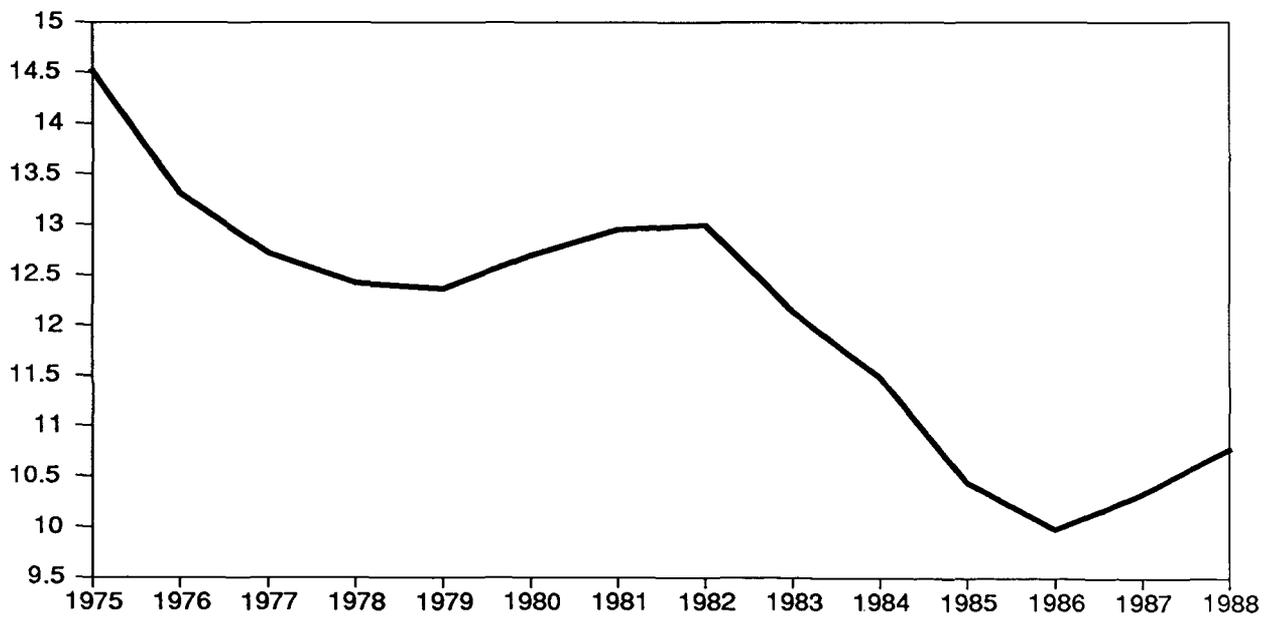


Figure 2

### U.S. all sheep inventory

Million head



Stock sheep, ruminants like beef cattle, are excellent foragers in an arid environment. About two-thirds of all sheep operations also raise cattle. Sheep eat a slightly different browse than cattle, but tend to compete with beef cattle production for labor and land resources. (A general way to compare the competition for range resources between sheep and cattle is a feed consuming animal unit (AU). An AU is defined as one cow or five sheep.)

In the West, many sheep operations use government grazing land, which is generally arid. About 30-40 percent of the sheep in the 17 Western States use either Bureau of Land Management or Forest Service land (13).

### **Production Problems**

Sheep and lambs are very susceptible to disease and predators. Therefore, sheep producers have had to acquire well developed management skills. Death losses are much higher for sheep and lambs than for other livestock. Death losses of sheep and lambs in 1987 were 1.2 million head (505,000 sheep and 731,000 lambs), 12 percent of beginning inventory. For cattle enterprises, death losses were only 4.7 percent, consisting of 1.7 million cattle and 3.1 million calves. There is little information available to allocate death losses among disease, predators, and other causes. Sheep are susceptible to parasites and generally have less resistance to disease and injury than other classes of livestock (9). As a result, sheep production requires more labor per animal unit than cattle production. In the past, resident aliens as well as domestic workers have furnished labor. The ability to attract and keep skilled sheep herders at a reasonable wage is frequently mentioned as a major challenge to the sheep industry.

### **Lambs on Feed**

Although the number of lambs on feed has been declining, the percentage of the sheep inventory on feed has grown. The American Sheep Producers Council estimates that 65 percent of all lambs slaughtered go through feedlots (2). The only information available on lamb feeding is a January 1 inventory number from the National Agricultural Statistics Service (NASS), U.S. Department of Agriculture (USDA). This does not reflect the volume of lambs that go through feedlots, but it gives an indication of the trends in lamb feeding.

Only 7 percent of the sheep inventory was on feed on January 1, 1989. The largest number of lambs on feed, 7 million head in 1943, was 14.4 percent of the inventory. In 1989, lambs on feed totaled 1.9 million head, accounting for 17 percent of the January 1 inventory of all sheep and lambs.

Lambs on feed are concentrated in the Great Plains and California. Costs will continue to encourage lamb feeding. In finishing animals, grain feeding generally costs less per pound of gain than range feeding.

## Costs and Returns in Sheep Production

Sheep producers compete with beef cattle producers for resources to operate their enterprises: grazing land, labor, water, and marketing and transportation facilities. Sheep production, which generally yields higher returns than cattle production, also requires more intensive use of labor and management. Higher returns to sheep operators than to cattle operators in the face of declining sheep numbers suggests that even higher returns to management are required to retain resources in sheep production.

### Trends in Cost of Production

Cash receipts to sheep producers per breeding ewe increased from \$26 in 1972 to \$73 in 1987 (table 1). This increase (180 percent) was slightly greater than the rate of inflation as measured by the consumer price index (172 percent). Cash receipts from beef cow-calf enterprises increased 123 percent during the same period, substantially less than the rate of inflation (table 2).

Total cash expenses increased from \$21 per ewe in 1972 to \$45 in 1987 (114 percent). Thus, cash receipts less cash expenses have increased sharply for sheep enterprises, from \$5 per ewe in 1972 to \$28 in 1987 (460 percent). Sheep enterprises have had positive receipts less cash expenses for 15 of the last 16 years (1972-87). Preliminary estimates for 1988 and forecasts for 1989 indicate that positive returns will continue. Again, sheep have done better per breeding animal than cattle, which have had positive returns in only 7 of the last 16 years (fig. 4).

Receipts for sheep enterprises come from sales of animals and wool and from government wool program payments (fig. 5). The share from each source, although varying from year to year, has on average remained the same. Receipts from animals (feeder lambs, slaughter lambs, and cull ewes) made up 72 percent of total receipts in 1972 and 73 percent in 1987. Wool sales accounted for 10 percent of receipts in both 1972 and 1987. Government payments (wool incentive and unshorn payment) dropped from 18 percent of receipts in 1972 to 17 percent in 1987. When meat prices were under pressure from drought-induced liquidation of the cattle and sheep herds in 1983, animals accounted for 66 percent of total cash receipts, wool for 14 percent, and government payments for 20 percent.

Cash expenses for sheep producers have not increased as fast as receipts because variable expenses (such as feed) have not kept pace with other costs. Feed, which was almost 40 percent of total cash expenses in 1972, dropped to 28 percent by 1987. Other variable cash expenses decreased from 40 percent in 1972 to 36 percent in 1987, while fixed cash expenses (general farm overhead, taxes, insurance, and interest) increased from 21 to 36 percent during the same period.

Figure 3

### Regional distribution of sheep inventory

Percent

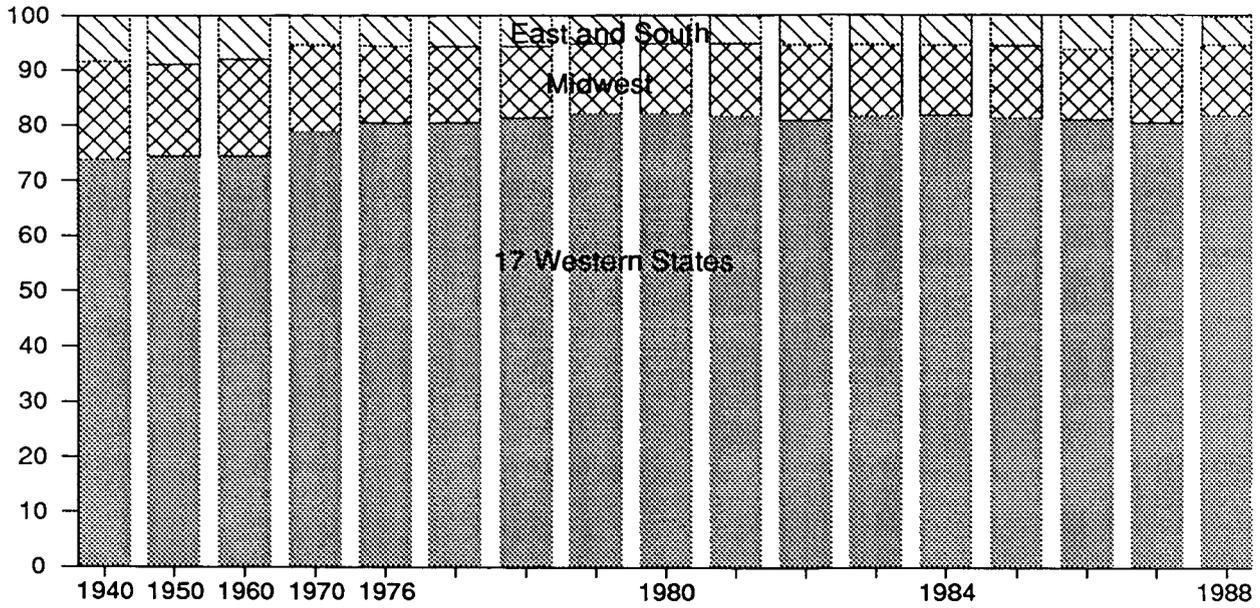
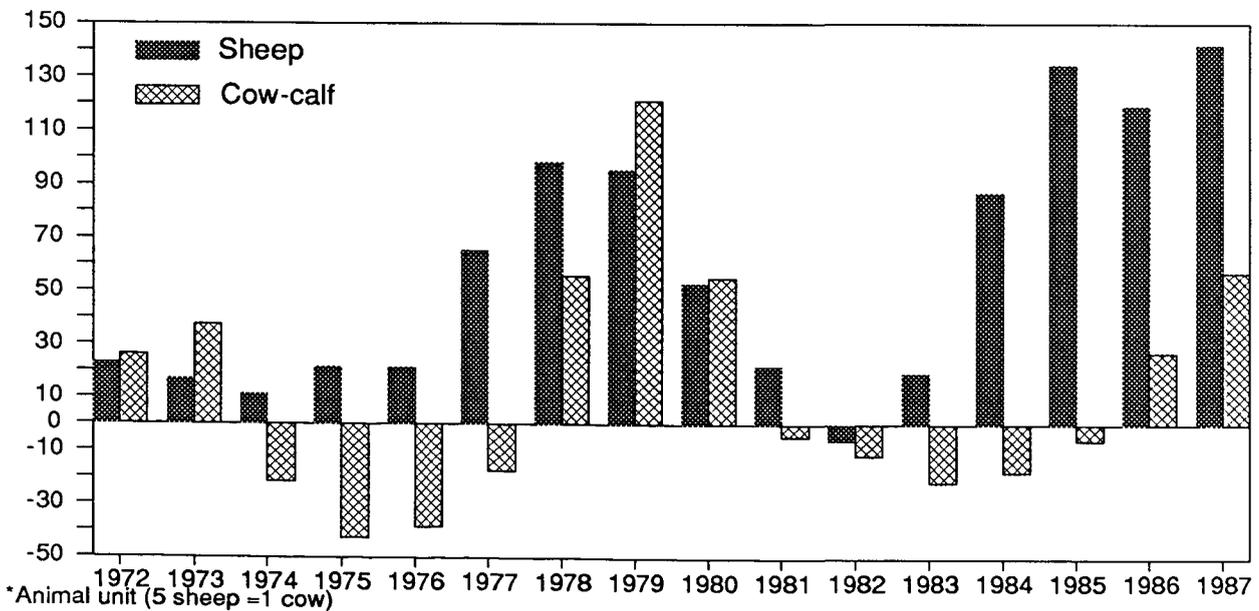


Figure 4

### Returns to U.S. sheep and cow-calf enterprises

Dollars per animal unit\*



\*Animal unit (5 sheep = 1 cow)

Table 1--U. S. sheep production costs and returns per ewe

| Item  | 1972           | 1973  | 1974  | 1975  | 1976  | 1977  |
|---|----------------|-------|-------|-------|-------|-------|
|   | <u>Dollars</u> |       |       |       |       |       |
| <b>Cash receipts:</b>                             |                |       |       |       |       |       |
| Slaughter lambs                                   | 9.85           | 12.00 | 13.00 | 14.53 | 15.65 | 17.46 |
| Feeder lambs                                      | 6.99           | 8.58  | 8.06  | 9.27  | 11.35 | 12.57 |
| Cull ewes   | 1.72           | 3.30  | 2.63  | 2.56  | 3.30  | 3.45  |
| Wool  | 2.60           | 6.15  | 4.39  | 3.32  | 4.88  | 5.35  |
| Wool payments <u>1/</u>                           | 3.88           | 0     | 1.35  | 2.86  | .66   | 2.83  |
| Unshorn lamb payments                             | .75            | 0     | .26   | .55   | .13   | .55   |
| Total   | 25.80          | 30.03 | 29.71 | 33.09 | 35.97 | 42.22 |
| <b>Cash expenses:</b>                             |                |       |       |       |       |       |
| <b>Feed--</b>                                     |                |       |       |       |       |       |
| Grain   | 1.11           | 1.79  | 2.77  | 2.56  | 2.36  | 1.92  |
| Protein supplements                               | 1.76           | 3.82  | 2.82  | 2.31  | 2.31  | 2.83  |
| Salt and minerals                                 | .13            | .14   | .15   | .17   | .19   | .21   |
| Hay   | 2.24           | 2.55  | 2.99  | 3.74  | 3.89  | 2.89  |
| Pasture   | 1.81           | 2.07  | 2.14  | 2.14  | 2.19  | 2.18  |
| Public grazing<br>(AUM) <u>2/</u>                 | 1.25           | 1.31  | 1.41  | 1.41  | 1.65  | .73   |
| Crop residues                                     | .05            | .05   | .05   | .05   | .05   | .05   |
| Total feed costs                                  | 8.34           | 11.74 | 12.34 | 12.39 | 12.64 | 10.82 |
| <b>Other--</b>                                    |                |       |       |       |       |       |
| Veterinary and<br>medicine                        | .60            | .62   | .59   | .62   | .59   | .61   |
| Livestock hauling                                 | .66            | .73   | .66   | .72   | .66   | .71   |
| Marketing   | .15            | .16   | .15   | .16   | .15   | .16   |
| Ram death loss                                    | .13            | .14   | .15   | .17   | .18   | .19   |
| Shearing and tagging                              | .58            | .62   | .68   | .75   | .79   | .84   |
| Fuel, lube, and<br>electricity                    | .50            | .53   | .74   | .82   | .87   | .93   |
| Machinery and<br>building repair                  | 2.57           | 2.62  | 2.82  | 2.98  | 2.87  | 1.22  |
| Hired labor                                       | 2.72           | 2.98  | 3.41  | 3.67  | 4.15  | 4.32  |
| Miscellaneous                                     | .44            | .47   | .52   | .57   | .60   | .64   |
| Total variable<br>expenses                        | 16.71          | 20.61 | 22.07 | 22.84 | 23.49 | 20.44 |
| General farm overhead                             | 1.05           | 1.42  | 1.27  | 1.41  | 1.67  | 1.94  |
| Taxes and insurance                               | .90            | .92   | .97   | 1.04  | 1.26  | 1.19  |
| Interest  | 2.53           | 3.68  | 3.16  | 3.52  | 5.32  | 5.64  |
| Total fixed expenses                              | 4.48           | 6.02  | 5.40  | 5.97  | 8.25  | 8.77  |
| Total cash<br>expenses                            | 21.18          | 26.63 | 27.47 | 28.81 | 31.74 | 29.21 |
| Receipts less<br>cash expenses                    | 4.61           | 3.40  | 2.24  | 4.29  | 4.23  | 13.01 |
| Capital replacement                               | 2.19           | 2.32  | 2.52  | 2.75  | 2.90  | 2.84  |
| Receipts less cash<br>expenses and<br>replacement | 2.42           | 1.08  | -.28  | 1.53  | 1.34  | 10.16 |

See footnotes at end of table.

Continued--

Table 1--U. S. sheep production costs and returns per  
ewe--Continued

| Item  | 1978           | 1979  | 1980  | 1981  | 1982  | 1983  |
|---|----------------|-------|-------|-------|-------|-------|
|   | <u>Dollars</u> |       |       |       |       |       |
| Cash receipts:                                    |                |       |       |       |       |       |
| Slaughter lambs                                   | 19.91          | 21.03 | 20.46 | 16.03 | 16.60 | 16.39 |
| Feeder lambs                                      | 17.72          | 18.41 | 15.74 | 13.30 | 13.49 | 12.30 |
| Cull ewes   | 4.70           | 5.52  | 3.55  | 3.43  | 3.05  | 2.17  |
| Wool  | 5.54           | 6.42  | 6.55  | 7.45  | 6.28  | 6.72  |
| Wool payments <u>1/</u>                           | 3.09           | 3.29  | 3.52  | 4.61  | 6.28  | 7.75  |
| Unshorn lamb payments                             | .66            | .71   | .76   | .88   | 1.50  | 1.56  |
| Total   | 51.62          | 55.37 | 50.58 | 45.70 | 47.20 | 46.89 |
| Cash expenses:                                    |                |       |       |       |       |       |
| Feed--  |                |       |       |       |       |       |
| Grain   | 1.99           | 2.24  | 2.56  | 2.13  | 2.14  | 2.38  |
| Protein supplements                               | 2.85           | 3.21  | 3.64  | 3.38  | 3.16  | 3.60  |
| Salt and minerals                                 | .23            | .26   | .32   | .35   | .37   | .38   |
| Hay   | 2.69           | 2.45  | 2.93  | 3.53  | 3.71  | 3.65  |
| Pasture   | 2.41           | 2.70  | 3.05  | 3.19  | 3.11  | 3.16  |
| Public grazing<br>(AUM) <u>2/</u>                 | .73            | .93   | 1.13  | 1.11  | .91   | .70   |
| Crop residues                                     | .05            | .04   | .05   | .06   | .05   | .06   |
| Total feed costs                                  | 10.95          | 11.84 | 13.68 | 13.75 | 13.45 | 13.93 |
| Other--   |                |       |       |       |       |       |
| Veterinary and<br>medicine                        | .66            | .73   | .83   | .91   | .98   | .99   |
| Livestock hauling                                 | .76            | .87   | 1.00  | 1.12  | 1.18  | 1.20  |
| Marketing   | .17            | .19   | .22   | .24   | .26   | .27   |
| Ram death loss                                    | .26            | .34   | .33   | .31   | .29   | .28   |
| Shearing and tagging                              | .90            | .98   | 1.06  | 1.14  | 1.18  | 1.21  |
| Fuel, lube, and<br>electricity                    | .98            | 1.28  | 1.75  | 1.98  | 1.93  | 1.82  |
| Machinery and<br>building repair                  | 1.32           | 1.45  | 1.59  | 1.74  | 2.19  | 2.29  |
| Hired labor                                       | 4.62           | 5.05  | 5.44  | 5.83  | 6.05  | 6.22  |
| Miscellaneous                                     | .69            | .77   | .87   | .96   | 1.02  | 1.04  |
| Total variable<br>expenses                        | 21.31          | 23.51 | 26.77 | 27.98 | 28.53 | 29.25 |
| General farm overhead                             | 2.54           | 3.08  | 3.21  | 3.22  | 4.47  | 2.86  |
| Taxes and insurance                               | 1.20           | 1.45  | 1.55  | 1.57  | 1.80  | 1.82  |
| Interest  | 6.93           | 8.25  | 8.49  | 8.52  | 13.59 | 9.10  |
| Total fixed expenses                              | 10.67          | 12.79 | 13.25 | 13.31 | 19.86 | 13.78 |
| Total cash expenses                               | 31.98          | 36.30 | 40.02 | 41.29 | 48.39 | 43.03 |
| Receipts less<br>cash expenses                    | 19.64          | 19.07 | 10.56 | 4.41  | -1.19 | 3.86  |
| Capital replacement                               | 3.89           | 4.90  | 5.12  | 5.69  | 6.58  | 6.95  |
| Receipts less cash<br>expenses and<br>replacement | 15.75          | 14.17 | 5.44  | -1.29 | -7.77 | -3.09 |

See footnotes at end of table.

Continued--

Table 1--U. S. sheep production costs and returns per  
ewe--Continued

| Item  | 1984           | 1985  | 1986  | 1987  |
|---|----------------|-------|-------|-------|
|   | <u>Dollars</u> |       |       |       |
| Cash receipts:                                    |                |       |       |       |
| Slaughter lambs                                   | 19.93          | 21.58 | 20.86 | 22.96 |
| Feeder lambs                                      | 15.02          | 18.48 | 18.76 | 24.02 |
| Cull ewes   | 3.20           | 6.06  | 5.97  | 6.18  |
| Wool  | 8.81           | 6.84  | 7.35  | 7.62  |
| Wool payments <u>1/</u>                           | 9.47           | 10.99 | 11.78 | 10.48 |
| Unshorn lamb payments                             | 1.81           | 2.21  | 2.40  | 1.79  |
| Total   | 58.24          | 66.16 | 67.12 | 73.05 |
| Cash expenses:                                    |                |       |       |       |
| Feed--  |                |       |       |       |
| Grain   | 2.52           | 2.01  | 1.60  | 1.19  |
| Protein supplements                               | 3.39           | 3.40  | 3.68  | 4.00  |
| Salt and minerals                                 | .38            | .40   | .40   | .40   |
| Hay   | 3.74           | 3.90  | 3.03  | 2.82  |
| Pasture   | 3.43           | 3.31  | 3.47  | 3.41  |
| Public grazing (AUM) <u>2/</u>                    | .71            | .67   | .68   | .67   |
| Crop residues                                     | .06            | .05   | .05   | .05   |
| Total feed costs                                  | 14.23          | 13.74 | 12.91 | 12.54 |
| Other--   |                |       |       |       |
| Veterinary and medicine                           | 1.04           | 1.05  | 1.08  | 1.11  |
| Livestock hauling                                 | 1.25           | 1.28  | 1.25  | 1.26  |
| Marketing   | .28            | .29   | .29   | .30   |
| Ram death loss                                    | .27            | .27   | .27   | .27   |
| Shearing and tagging                              | 1.23           | 1.24  | 1.29  | 1.34  |
| Fuel, lube, and electricity                       | 1.49           | 1.53  | 1.14  | 1.25  |
| Machinery and<br>building repair                  | 2.26           | 2.39  | 2.32  | 2.35  |
| Hired labor                                       | 6.34           | 6.49  | 6.73  | 6.98  |
| Miscellaneous                                     | 1.08           | 1.12  | 1.15  | 1.19  |
| Total variable expenses                           | 29.47          | 29.40 | 28.43 | 28.59 |
| General farm overhead                             | 3.74           | 3.25  | 5.03  | 5.50  |
| Taxes and insurance                               | 1.70           | 1.82  | 1.76  | 1.80  |
| Interest  | 5.99           | 4.80  | 8.05  | 8.77  |
| Total fixed expenses                              | 11.43          | 9.87  | 14.84 | 16.07 |
| Total cash expenses                               | 40.90          | 39.27 | 43.27 | 44.66 |
| Receipts less<br>cash expenses                    | 17.34          | 26.89 | 23.85 | 28.39 |
| Capital replacement                               | 7.38           | 7.61  | 7.49  | 7.79  |
| Receipts less cash<br>expenses and<br>replacement | 9.96           | 19.28 | 16.36 | 20.60 |

1/ Wool payments based on previous years marketing.

2/ Animal Unit Month.

Table 2--U.S. cow-calf production costs per cow

| Item  | 1972           | 1973   | 1974   | 1975   | 1976   | 1977   |
|---|----------------|--------|--------|--------|--------|--------|
|   | <u>Dollars</u> |        |        |        |        |        |
| Cash receipts:                              |                |        |        |        |        |        |
| Steer calves                                | 44.78          | 57.51  | 40.97  | 36.68  | 39.52  | 43.46  |
| Heifer calves                               | 26.50          | 34.04  | 24.25  | 21.71  | 23.38  | 25.72  |
| Yearling steers                             | 29.06          | 37.32  | 26.59  | 23.80  | 34.42  | 28.20  |
| Yearling heifers                            | 18.25          | 23.44  | 16.70  | 14.95  | 21.62  | 17.71  |
| Cull cows                                   | 21.80          | 22.11  | 18.24  | 21.89  | 15.79  | 31.82  |
| Total                                       | 140.39         | 174.42 | 126.75 | 119.01 | 34.73  | 146.91 |
| Cash expenses:                              |                |        |        |        |        |        |
| Feed --                                     |                |        |        |        |        |        |
| Grain                                       | 3.44           | 5.56   | 8.59   | 7.94   | 7.32   | 5.97   |
| Silage                                      | 1.34           | 2.16   | 3.34   | 3.09   | 2.85   | 2.32   |
| Protein supplements                         | 4.25           | 9.24   | 6.81   | 5.58   | 5.58   | 6.84   |
| Salt and minerals                           | 1.52           | 1.63   | 1.83   | 2.07   | 2.25   | 2.55   |
| Hay   | 27.13          | 31.00  | 36.28  | 45.38  | 47.21  | 35.03  |
| All pasture and private range               | 24.61          | 28.26  | 29.15  | 29.18  | 29.84  | 29.66  |
| Public grazing (AM and AUM) <u>1/</u>       | .63            | .73    | .93    | .93    | 1.37   | 1.37   |
| Crop residue                                | .06            | .06    | .06    | .06    | .06    | .07    |
| Total feed costs                            | 62.98          | 78.64  | 86.99  | 94.23  | 96.48  | 83.81  |
| Other--                                     |                |        |        |        |        |        |
| Veterinary and medicine                     | 3.85           | 4.01   | 3.82   | 3.98   | 3.79   | 3.94   |
| Livestock hauling                           | .95            | 1.04   | .95    | 1.03   | .94    | 1.02   |
| Marketing                                   | 2.48           | 2.63   | 2.46   | 2.61   | 2.44   | 2.59   |
| Custom feed mixing                          | .29            | .30    | .29    | .30    | .29    | .30    |
| Fuel, lube, and electricity                 | 5.52           | 5.83   | 8.08   | 9.00   | 9.52   | 10.23  |
| Machinery and building repair               | 9.34           | 9.88   | 12.05  | 13.81  | 12.58  | 13.54  |
| Hired labor                                 | 4.99           | 5.46   | 6.26   | 6.73   | 7.62   | 7.92   |
| Total variable expenses                     | 90.40          | 107.79 | 120.90 | 131.69 | 133.66 | 123.35 |
| General farm overhead                       | 4.10           | 5.55   | 4.96   | 5.53   | 6.54   | 7.59   |
| Taxes and insurance                         | 11.45          | 11.76  | 12.37  | 13.28  | 16.09  | 15.27  |
| Interest                                    | 8.13           | 11.82  | 10.15  | 11.29  | 17.08  | 18.10  |
| Total fixed expenses                        | 23.68          | 29.13  | 27.48  | 30.10  | 39.71  | 40.96  |
| Total cash expenses                         | 114.08         | 136.92 | 148.38 | 161.79 | 173.37 | 164.31 |
| Receipts less cash expenses                 | 26.31          | 37.50  | -21.63 | -42.76 | -38.64 | -17.40 |
| Capital replacement                         | 26.65          | 28.16  | 30.64  | 33.49  | 35.21  | 34.59  |
| Receipts less cash expenses and replacement | -.34           | 9.34   | -52.27 | -76.25 | -73.85 | -51.99 |

See footnotes at end of table.

Continued--

Table 2--U.S. cow-calf production costs per cow--Continued

| Item  | 1978           | 1979   | 1980   | 1981   | 1982   | 1983   |
|---|----------------|--------|--------|--------|--------|--------|
|   | <u>Dollars</u> |        |        |        |        |        |
| Cash receipts:                              |                |        |        |        |        |        |
| Steer calves                                | 77.16          | 103.94 | 90.02  | 74.86  | 74.22  | 74.62  |
| Heifer calves                               | 45.66          | 61.51  | 53.27  | 44.02  | 44.25  | 43.80  |
| Yearling steers                             | 48.34          | 83.37  | 78.40  | 67.72  | 64.73  | 61.23  |
| Yearling heifers                            | 30.36          | 52.36  | 49.24  | 44.08  | 42.19  | 38.89  |
| Cull cows                                   | 43.03          | 51.12  | 35.98  | 29.96  | 30.10  | 28.64  |
| Total                                       | 244.55         | 352.30 | 306.91 | 260.64 | 255.49 | 247.18 |
| Cash expenses:                              |                |        |        |        |        |        |
| Feed--                                      |                |        |        |        |        |        |
| Grain                                       | 6.56           | 7.78   | 10.12  | 9.42   | 8.31   | 10.70  |
| Silage                                      | 2.20           | 2.66   | 4.58   | 5.51   | 4.66   | 6.20   |
| Protein supplements                         | 9.21           | 12.34  | 17.28  | 18.21  | 17.26  | 18.13  |
| Salt and minerals                           | 2.60           | 2.65   | 2.13   | 2.41   | 2.40   | 2.52   |
| Hay   | 33.05          | 29.86  | 32.03  | 40.23  | 41.47  | 38.99  |
| All pasture and private range               | 30.84          | 34.15  | 35.81  | 37.40  | 39.02  | 36.45  |
| Public grazing (AM and AUM) <u>1/</u>       | 1.12           | 1.08   | .68    | .76    | .75    | .65    |
| Crop residue                                | .07            | .06    | .07    | .07    | .07    | .08    |
| Total feed costs                            | 85.65          | 90.58  | 102.70 | 114.01 | 113.94 | 113.72 |
| Other--                                     |                |        |        |        |        |        |
| Veterinary and medicine                     | 4.45           | 4.54   | 5.05   | 5.52   | 5.91   | 6.11   |
| Livestock hauling                           | 1.07           | 1.23   | 1.40   | 1.75   | 1.70   | 1.74   |
| Marketing                                   | 3.01           | 3.58   | 3.81   | 3.86   | 3.90   | 4.00   |
| Custom feed mixing                          | .34            | .38    | .42    | .44    | .49    | .47    |
| Fuel, lube, and electricity                 | 10.73          | 14.02  | 19.23  | 21.72  | 21.30  | 19.54  |
| Machinery and building repair               | 14.62          | 16.04  | 17.60  | 19.31  | 21.17  | 22.09  |
| Hired labor                                 | 9.00           | 10.46  | 11.72  | 13.41  | 13.02  | 13.48  |
| Total variable expenses                     | 128.87         | 140.83 | 161.93 | 180.02 | 181.43 | 181.15 |
| General farm overhead                       | 13.53          | 22.06  | 21.94  | 20.68  | 19.47  | 19.26  |
| Taxes and insurance                         | 16.15          | 19.82  | 20.52  | 19.62  | 20.87  | 23.43  |
| Interest                                    | 30.30          | 48.45  | 47.50  | 44.86  | 45.43  | 44.96  |
| Total fixed expenses                        | 59.98          | 90.33  | 89.96  | 85.16  | 85.77  | 87.65  |
| Total cash expenses                         | 188.85         | 231.16 | 251.89 | 265.18 | 267.20 | 268.80 |
| Receipts less cash expenses                 | 55.70          | 121.14 | 55.02  | -4.54  | -11.71 | -21.62 |
| Capital replacement                         | 37.39          | 46.74  | 54.19  | 59.22  | 62.88  | 64.28  |
| Receipts less cash expenses and replacement | 18.31          | 74.40  | .83    | -63.76 | -74.59 | -85.90 |

See footnotes at end of table.

Continued--

Table 2--U.S. cow-calf production costs per cow--Continued

| Item  | 1984           | 1985   | 1986   | 1987   |
|---|----------------|--------|--------|--------|
|   | <u>Dollars</u> |        |        |        |
| Cash receipts:                              |                |        |        |        |
| Steer calves                                | 76.37          | 77.71  | 78.17  | 86.79  |
| Heifer calves                               | 44.36          | 46.22  | 47.81  | 60.01  |
| Yearling steers                             | 65.89          | 61.52  | 66.70  | 84.11  |
| Yearling heifers                            | 41.47          | 40.30  | 43.96  | 47.72  |
| Cull cows                                   | 30.69          | 28.64  | 28.83  | 34.31  |
| Total                                       | 258.78         | 254.39 | 265.47 | 312.94 |
| Cash expenses:                              |                |        |        |        |
| Feed--                                      |                |        |        |        |
| Grain                                       | 11.20          | 9.39   | 7.31   | 5.94   |
| Silage                                      | 5.83           | 6.04   | 5.79   | 6.07   |
| Protein supplements                         | 18.69          | 16.00  | 16.73  | 17.65  |
| Salt and minerals                           | 2.62           | 2.69   | 2.67   | 2.69   |
| Hay   | 43.34          | 42.96  | 34.15  | 35.17  |
| All pasture and private range               | 39.30          | 36.44  | 36.23  | 39.78  |
| Public grazing (AM and AUM) <sup>1/</sup>   | .71            | .66    | .74    | .71    |
| Crop residue                                | .08            | .07    | .08    | .06    |
| Total feed costs                            | 121.77         | 114.25 | 103.70 | 108.07 |
| Other--                                     |                |        |        |        |
| Veterinary and medicine                     | 6.31           | 6.38   | 6.56   | 6.69   |
| Livestock hauling                           | 1.80           | 1.85   | 1.88   | 1.98   |
| Marketing                                   | 4.10           | 4.21   | 4.17   | 4.42   |
| Custom feed mixing                          | .48            | .49    | .49    | .28    |
| Fuel, lube, and electricity                 | 16.58          | 16.00  | 12.17  | 14.06  |
| Machinery and building repair               | 21.58          | 22.51  | 21.92  | 21.96  |
| Hired labor                                 | 13.72          | 13.98  | 14.07  | 15.01  |
| Total variable expenses                     | 186.34         | 179.67 | 164.96 | 172.47 |
| General farm overhead                       | 24.13          | 17.48  | 25.64  | 30.00  |
| Taxes and insurance                         | 19.54          | 19.04  | 10.47  | 9.77   |
| Interest                                    | 46.52          | 44.30  | 37.20  | 43.60  |
| Total fixed expenses                        | 90.19          | 80.82  | 73.31  | 83.37  |
| Total cash expenses                         | 276.53         | 260.49 | 238.27 | 255.84 |
| Receipts less cash expenses                 | -17.75         | -6.10  | 27.20  | 57.10  |
| Capital replacement                         | 64.46          | 64.53  | 74.20  | 75.58  |
| Receipts less cash expenses and replacement | -82.21         | -70.63 | -47.00 | -18.48 |

<sup>1/</sup> Animal Month and Animal Unit Month.

Labor is an exception to the general trend for variable expenses with an increase in cost share from 13 percent in 1972 to 16 percent in 1987. Variable labor costs for cattle increased from 6 to 9 percent during 1972-87. Labor has repeatedly been cited as a special problem in sheep production, in terms of skill required, working conditions, and availability of workers. The sheep industry in the past obtained special permission to bring in workers from other countries on a temporary basis.

Feed cost is the single largest cost item for sheep production even though it is declining in relative importance. Feed costs increased only 50 percent during 1972-87, while total costs doubled. Protein supplements account for a third of the feed costs, while hay and pasture each account for a fourth. The cost for using public grazing land, an important source of feed in the West, has declined due to reductions in grazing fees since 1980.

When longer run costs, such as capital replacement costs, are considered in addition to cash expenses, returns for ewes were positive for 12 of the 16 years since 1972. The 4 years with negative returns coincide with a drought in 1982 through 1984 and the liquidation phase of the cattle cycle. Sheep returns are sensitive to changes in the cattle cycle because of the lower prices associated with increased cattle sales. Droughts often cause both cattle and sheep producers to liquidate their inventories.

#### **Colorado Lamb Feeding Cost**

In addition to estimating long-term cost series for stock sheep, ERS also estimates a Colorado lamb feeding budget (based on a 1985 Colorado State University survey). This budget represents most of the lamb feeding in the Western States (table 3) (14). Over half of all lambs slaughtered are fattened in large commercial feedlots. Colorado is the leading lamb-feeding State with a fifth of all lamb feeding. Other major lamb-feeding States are California, Texas, and Wyoming.

Lambs are fed for a shorter time than cattle. Lamb purchases account for almost half of the cost, with feed cost the next largest at a fifth of total cost. Feeders adjust their bids for feeder lambs according to their cost structure and their expectations of slaughter lamb prices. Lower feed costs and smaller lamb supplies increase feeder lamb prices. Feeder lambs' cost accounted for 78 percent of total cost in 1988, compared with 76 percent in 1985. Overbidding for feeder lambs resulted in negative net margins in 1988.

#### **Lamb and Mutton Production**

Meat from sheep is called lamb or mutton, depending on the age of the animal. Lambs are generally slaughtered between 8 and 14 months of age. The Agricultural Marketing Service (AMS), USDA, sets grading standards for both lamb and mutton. Lamb is defined by the condition of the break-joint on the foreleg of the animal,

Table 3--Colorado lamb feeding budget, cost per head

| Item   | 1985                    | 1986   | 1987   | 1988   |
|--|-------------------------|--------|--------|--------|
|  | <u>Dollars per head</u> |        |        |        |
| Costs:   |                         |        |        |        |
| Feeder lamb (83 lbs)                           | 55.67                   | 59.96  | 71.45  | 70.47  |
| Feed--   |                         |        |        |        |
| Corn (3 bu)                                    | 7.96                    | 6.74   | 4.89   | 6.59   |
| Hay pellets (64 lbs)                           | 2.64                    | 2.65   | 2.76   | 3.42   |
| Protein supplement                             | .17                     | 2.03   | 2.18   | 3.00   |
| Feed additives                                 | 2.00                    | 1.98   | 1.94   | 1.96   |
| Total feed                                     | 12.76                   | 13.40  | 11.77  | 14.97  |
| Labor  | .60                     | .62    | .65    | .65    |
| Death loss                                     | 1.28                    | 1.38   | 1.64   | 1.62   |
| Veterinary and medicine                        | .37                     | .37    | .38    | .38    |
| Miscellaneous and indirect costs               | .78                     | .77    | .77    | .81    |
| Machine hire                                   | 1.61                    | 1.60   | 1.62   | 1.65   |
| Interest on operating capital                  | 1.45                    | 1.45   | 1.45   | 1.45   |
| Total costs                                    | 73.37                   | 78.17  | 88.10  | 90.38  |
| Selling price per cwt required to cover costs: |                         |        |        |        |
|  | <u>Dollars per cwt</u>  |        |        |        |
| Feed and feeder costs (121 lbs)                | 56.56                   | 60.63  | 68.78  | 70.61  |
| All costs (121 lbs)                            | 60.64                   | 64.60  | 72.81  | 74.69  |
| Feed costs per 100-lb gain                     | 33.58                   | 35.27  | 30.98  | 39.40  |
| Choice slaughter lambs, South St. Paul         | 67.22                   | 68.04  | 75.19  | 66.24  |
| Net margin                                     | 6.58                    | 3.44   | 2.38   | -8.46  |
| Prices:  |                         |        |        |        |
| Choice slaughter lambs, South St. Paul         | 67.22                   | 68.04  | 75.19  | 66.24  |
| Feeder lamb, choice, South St. Paul            | 67.08                   | 72.24  | 86.08  | 84.90  |
| Corn (\$/bu)                                   | 2.65                    | 2.25   | 1.63   | 2.20   |
| Alfalfa pellets (\$/ton)                       | 82.37                   | 82.88  | 86.36  | 106.98 |
| Soybean meal                                   |                         |        |        |        |
| 44 percent (\$/ton)                            | 129.25                  | 158.93 | 170.35 | 234.85 |
| Annual interest rate                           | 13.43                   | 11.15  | 9.98   | 10.58  |
|  | <u>1977 = 100</u>       |        |        |        |
| Index of prices:                               |                         |        |        |        |
| Farm labor                                     | 153.60                  | 158.25 | 166.00 | 166.00 |
| Prices paid by farmers                         | 163.60                  | 159.92 | 161.08 | 168.25 |
| Agricultural chemicals                         | 128.00                  | 126.83 | 124.25 | 125.33 |
| Tractors and self-propelled equipment          | 178.30                  | 174.33 | 173.33 | 178.50 |
| Other machinery                                | 183.20                  | 182.25 | 184.08 | 195.00 |
| Fuel and energy                                | 200.20                  | 171.25 | 158.25 | 164.00 |

in addition to the color and characteristics of the rib bones (roundness for lamb and flatness for mutton), and the characteristics of the lean meat. Mutton comes from any sheep that is too old to classify as lamb. Mutton accounts for about 5 percent of sheep meat produced.

### **Production Trends**

Lamb and mutton production has declined since 1945, following the decline in sheep inventories. Lamb production has fallen less than inventories because of a trend toward heavier slaughter weights, reflecting genetic improvements and a larger proportion marketed as fed lambs. This trend toward heavier weights was developed to offset costs by reducing the number of breeding ewes necessary to produce a pound of lamb and to take advantage of reasonable grain prices.

Since 1979, lamb meat production has appeared to be cycling in a typical livestock cycle (fig. 6). Lamb production dropped to 275 million pounds in 1979, then recovered to 350 million pounds in 1984, and dropped again in 1987 to 303 million pounds. This reduction resulted in the lowest per capita supplies on record in the United States. Production recovered to 315 million pounds in 1988, partly because of an increase in carcass weights of 3 pounds per animal. The cyclical turning point between 1987 and 1988 created a sharp contrast between high prices in 1987 and the drop in prices as production recovered in 1988.

### **Seasonality of Lamb Production**

Lamb production exhibits a distinct seasonal pattern with production higher in the spring and fall (fig. 7). Lamb slaughter is usually highest in March or April depending on the dates of the spring religious holidays. Mature sheep slaughter has a different pattern than that for lamb slaughter. These animals are culled after the weaning of the lambs in the early summer or in the fall.

### **Sheep and Lamb Marketing and Slaughter**

Of 127 firms reporting purchases of lambs for slaughter in 1988, 116 were single-plant firms and 11 were multiplant firms (39). Most of the sheep and lambs marketed (81.4 percent in 1987) were purchased directly through nonpublic markets, rather than terminal or auction markets (table 4). The concentration of the industry in the West, the increasing percentage of lambs in feedlots, and the distance between markets have fostered direct marketing. The areas that tend to have a large proportion of packer feeding also have the largest percentages of direct purchases (39).

The proportion of sheep and lambs valued on a grade and weight basis has been increasing (table 5). Payment on grade and weight basis is a method that pays the producer on the carcass weight of the animal rather than its liveweight. In 1987, 35.9 percent of

Figure 5

### U.S. stock sheep receipts, all sizes

Dollars per ewe

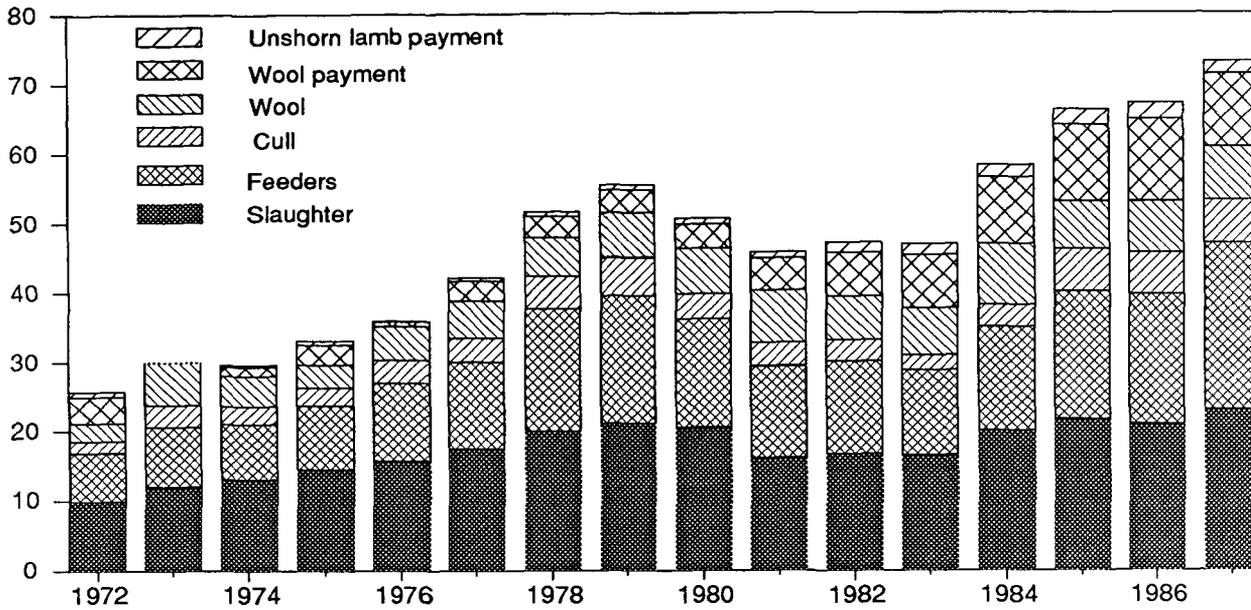


Figure 6

### U.S. commercial lamb production

Million pounds

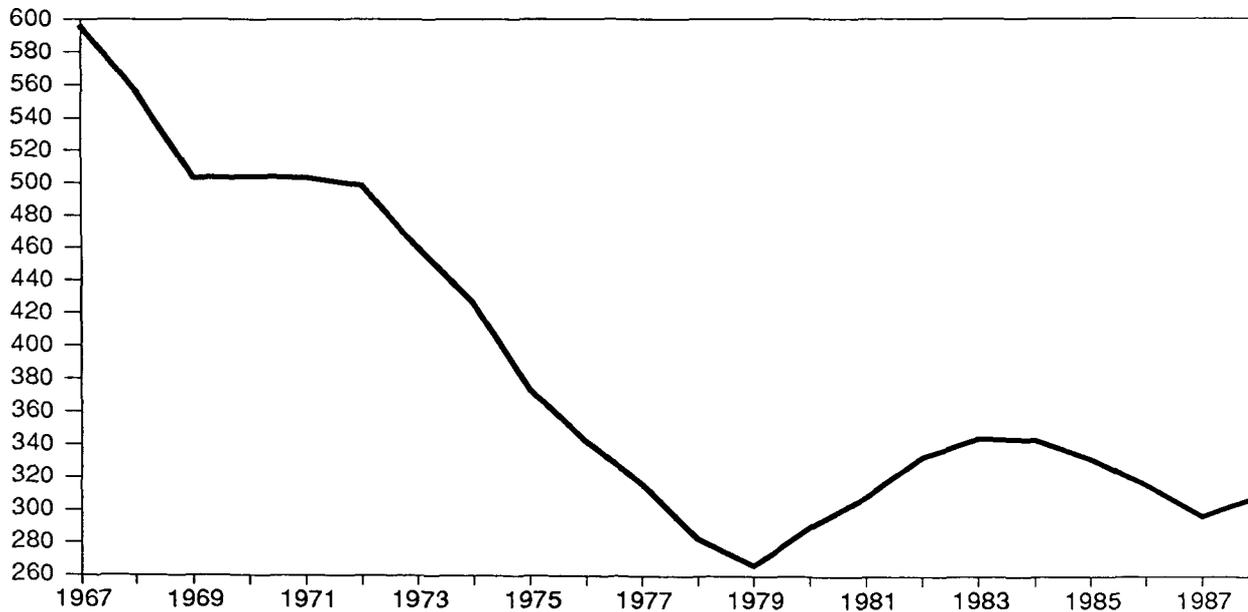


Table 4--Market outlets for sheep and lambs: Purchases by region and State of slaughter, reporting slaughter packers, 1987 <sup>1/</sup>

| State/region <sup>2/</sup>   | Nonpublic              | Terminal | Auction | Total <sup>3/</sup> | Nonpublic           | Terminal | Auction | Total |
|------------------------------|------------------------|----------|---------|---------------------|---------------------|----------|---------|-------|
|                              | ----- 1,000 head ----- |          |         |                     | ----- Percent ----- |          |         |       |
| New England                  | 3                      | 0        | 3       | 6                   | 50.0                | 0        | 50.0    | 100.0 |
| New York                     | 20                     | 0        | 29      | 48                  | 40.8                | 0        | 59.2    | 100.0 |
| New Jersey                   | 4/                     | 6        | 2       | 8                   | 1.9                 | 71.4     | 26.7    | 100.0 |
| Pennsylvania                 | 12                     | 4/       | 64      | 77                  | 16.1                | 0.4      | 83.5    | 100.0 |
| North Atlantic <sup>3/</sup> | 36                     | 6        | 98      | 139                 | 25.6                | 4.5      | 69.9    | 100.0 |
| Ohio                         | 3                      | 0        | 5       | 8                   | 33.3                | 0        | 66.7    | 100.0 |
| Indiana                      | 0                      | 0        | 0       | 0                   | 0.0                 | 0        | 100.0   | 100.0 |
| Illinois                     | 190                    | 105      | 6       | 301                 | 63.1                | 34.9     | 2.0     | 100.0 |
| Michigan                     | 10                     | 1        | 168     | 179                 | 5.6                 | 0.6      | 93.9    | 100.0 |
| Wisconsin                    | 0                      | 1        | 0       | 0                   | 100.0               | 0        | 0       | 100.0 |
| East North Central           | 203                    | 106      | 180     | 488                 | 41.5                | 21.7     | 36.8    | 100.0 |
| Minnesota                    | 201                    | 61       | 87      | 349                 | 57.7                | 17.4     | 24.8    | 100.0 |
| Iowa                         | 324                    | 49       | 93      | 463                 | 69.9                | 10.0     | 20.0    | 100.0 |
| Missouri                     | 4/                     | 2        | 10      | 12                  | 0.4                 | 15.6     | 84.1    | 100.0 |
| North Dakota                 | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| South Dakota                 | 72                     | 13       | 2       | 86                  | 83.5                | 14.6     | 1.9     | 100.0 |
| Nebraska                     | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Kansas                       | 360                    | 32       | 0       | 392                 | 91.8                | 8.2      | 0       | 100.0 |
| West North Central           | 957                    | 154      | 191     | 1,302               | 73.5                | 11.8     | 14.7    | 100.0 |
| Delaware                     | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Maryland                     | 0                      | 4/       | 14      | 14                  | 0                   | 1.8      | 98.2    | 100.0 |
| Virginia                     | 70                     | 0        | 69      | 140                 | 50.3                | 0        | 49.7    | 100.0 |
| West Virginia                | 0                      | 0        | 0       | 0                   | 43.5                | 0        | 56.5    | 100.0 |
| North Carolina               | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| South Carolina               | 0                      | 0        | 0       | 0                   | 100.0               | 0        | 0       | 100.0 |
| Georgia                      | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Florida                      | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 100.0 |
| South Atlantic               | 70                     | 4/       | 83      | 153                 | 45.8                | 0.2      | 54.0    | 100.0 |
| Kentucky                     | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Tennessee                    | 0                      | 0        | 4/      | 0                   | 0                   | 0        | 100.0   | 100.0 |
| Alabama                      | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Mississippi                  | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Arkansas                     | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Louisiana                    | 4/                     | 4/       | 4/      | 4/                  | 12.2                | 8.7      | 79.1    | 100.0 |
| South Central                | 4/                     | 4/       | 4/      | 4/                  | 11.8                | 8.4      | 79.7    | 100.0 |
| Oklahoma                     | 0                      | 0        | 4/      | 4/                  | 0                   | 0        | 100.0   | 100.0 |
| Texas                        | 536                    | 0        | 29      | 565                 | 94.9                | 0        | 5.1     | 100.0 |
| Southern Plains              | 536                    | 0        | 29      | 565                 | 94.9                | 0        | 5.1     | 100.0 |
| Montana                      | 4/                     | 0        | 4/      | 4/                  | 83.2                | 0        | 16.8    | 100.0 |
| Idaho                        | 2                      | 0        | 1       | 3                   | 76.1                | 0        | 23.9    | 100.0 |
| Wyoming                      | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Colorado                     | 1,126                  | 0        | 9       | 1,135               | 99.2                | 0        | 0.8     | 100.0 |
| New Mexico                   | 16                     | 0        | 13      | 29                  | 56.0                | 0        | 44.0    | 100.0 |
| Arizona                      | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Utah                         | 13                     | 0        | 4/      | 13                  | 99.4                | 0        | 0.6     | 100.0 |
| Mountain                     | 1,157                  | 0        | 23      | 1,180               | 98.1                | 0        | 1.9     | 100.0 |

See footnotes at end of table.

Continued--

Table 4--Market outlets for sheep and lambs: Purchases by region and State of slaughter, reporting slaughter packers, 1987 <sup>1/</sup>--Continued

| State/region <sup>2/</sup> | Nonpublic              | Terminal | Auction | Total <sup>3/</sup> | Nonpublic           | Terminal | Auction | Total |
|----------------------------|------------------------|----------|---------|---------------------|---------------------|----------|---------|-------|
|                            | ----- 1,000 head ----- |          |         |                     | ----- Percent ----- |          |         |       |
| Washington                 | 150                    | 0        | 4       | 155                 | 97.1                | 0        | 2.9     | 100.0 |
| Oregon                     | 1                      | 0        | 4/      | 1                   | 93.2                | 0        | 6.8     | 100.0 |
| California                 | 829                    | 0        | 24      | 853                 | 97.2                | 0        | 2.8     | 100.0 |
| Pacific                    | 980                    | 0        | 28      | 1,008               | 97.2                | 0        | 2.8     | 100.0 |
| 48 States                  | 3,939                  | 266      | 631     | 4,837               | 81.4                | 5.5      | 13.1    | 100.0 |
| Alaska                     | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| Hawaii                     | 0                      | 0        | 0       | 0                   | 0                   | 0        | 0       | 0     |
| United States              | 3,939                  | 266      | 631     | 4,837               | 81.4                | 5.5      | 13.1    | 100.0 |

<sup>1/</sup> Includes all purchases of livestock except from terminals and auctions. Nonpublic outlets are terminals that have more than one marketing agency selling on commission; auctions have only one.

<sup>2/</sup> Location of slaughter, but not necessarily the origin of livestock.

<sup>3/</sup> Totals may not add due to rounding.

<sup>4/</sup> Less than 500 head.

Source: (35).

the sheep and lambs slaughtered was purchased on a grade and weight basis.

As the number of sheep and lambs slaughtered has declined, the infrastructure of the sheep industry has consolidated. Higher marketing costs result if marketing activities are handled by low-volume, less cost-efficient units, or if the area of procurement and distribution covered by these units increases. Higher procurement and transportation costs are generally borne by producers as the distance between sheep-raising areas and slaughter plants increases. These costs have helped encourage the feeding industry to locate slaughter plants in the feeding areas.

Another effect of the reduced volume in the sheep industry is the trend toward a few large plants slaughtering most of the sheep and lambs. The percentage of sheep and lambs slaughtered in large plants has not changed significantly during the present lamb cycle. In 1987, 95 percent of the lambs were slaughtered in plants of 10,000 head or more, compared with 97 percent in 1979. However, the number of plants slaughtering 10,000 head or more has declined from 26 to 22, even though total slaughter increased slightly (table 6).

As market concentration increases, the number of bidders for lambs is reduced. The increasing concentration has raised concerns in the industry. The effect of the reduction in slaughtering plants and the control of slaughter by fewer packers is dampened by the ease of entry into this activity. The increase in the number of plants slaughtering lambs between 1979 and 1983 indicates that entry into lamb slaughter is not that difficult. However, many of the smaller plants, which can increase slaughter quickly, are not full-time lamb-slaughtering

Table 5--Grade and weight purchases of sheep and lambs

| Year | Grade and weight                      | Total | Grade and weight as share of total |
|------|---------------------------------------|-------|------------------------------------|
|      | - - - - - <u>1,000 head</u> - - - - - |       | <u>Percent</u>                     |
| 1974 | 771                                   | 8,868 | 8.7                                |
| 1975 | 820                                   | 7,835 | 10.5                               |
| 1976 | 623                                   | 6,795 | 9.2                                |
| 1977 | 527                                   | 6,069 | 8.7                                |
| 1978 | 517                                   | 5,106 | 10.1                               |
| 1979 | 1,179                                 | 4,916 | 24.0                               |
| 1980 | 1,542                                 | 5,452 | 28.3                               |
| 1981 | 1,028                                 | 5,448 | 18.9                               |
| 1982 | 1,643                                 | 5,677 | 28.9                               |
| 1983 | 1,760                                 | 6,007 | 29.3                               |
| 1984 | 1,377                                 | 6,482 | 21.2                               |
| 1985 | 2,192                                 | 5,909 | 37.1                               |
| 1986 | 2,413                                 | 5,089 | 47.4                               |
| 1987 | 1,737                                 | 4,827 | 35.9                               |

Source: (35).

Table 6--Sheep and lamb slaughter by plant size

| Plant size (head) | 1979          |                   | 1983          |                   | 1987          |                   |
|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
|                   | Plants        | Total             | Plants        | Total             | Plants        | Total             |
|                   | <u>Number</u> | <u>1,000 head</u> | <u>Number</u> | <u>1,000 head</u> | <u>Number</u> | <u>1,000 head</u> |
| Under 100         | 617           | 15.1              | 692           | 19.4              | 653           | 17.1              |
| 100-999           | 163           | 44.0              | 247           | 68.7              | 171           | 50.0              |
| 1,000-9,999       | 29            | 103.4             | 46            | 138.7             | 60            | 171.3             |
| 10,000 or more    | 26            | 4,733.2           | 31            | 6,185.1           | 22            | 4,763.5           |
| Total             | 835           | 4,895.6           | 1,016         | 6,412.0           | 906           | 5,001.9           |

Source: (32).

plants and are likely higher cost slaughterers. As lamb slaughter declined during 1983-87, many plant operators found it unprofitable to remain in business and closed.

### **Lamb Prices**

The Bureau of Labor Statistics (BLS) ceased publishing lamb and veal retail prices in 1981. Lamb prices were combined with mutton, organ meats, and game and reported as "other meats." The combination of high-value products (lamb and game) with low-value products (organ meats, such as liver, kidneys, and tripe) hampers demand analysis for retail lamb. This development coincides with a period when lamb and mutton production and consumption have stabilized, following a long period of decline that makes results of previous demand studies questionable.

### **Wholesale Prices**

The wholesale price per hundred weight (cwt) for lamb carcasses has generally been higher than for other meats (fig. 8). This reflects the increasing specialty nature of lamb. As per capita consumption declined, the wholesale price of lamb has continued to increase, both in nominal levels and relative to other meats (fig. 9).

### **Seasonality in Prices**

Wholesale carcass prices tend to increase during the period of peak lamb demand, which is in the winter and the early spring. Prices generally peak in May, then fall after the heavy Easter/Passover demand period and continue downward through summer and fall, bottoming in November. The cycle starts again in December, with holiday demand for lamb (fig. 10).

Wholesale cut prices exhibit a slightly different pattern, reflecting seasonal demand for leg of lamb. Wholesale leg prices peak in March, around the time of the spring religious holidays and drop off rapidly during the next several months. Leg prices also rebound during December, because of the December religious holidays. Leg prices help hold up the carcass price as production peaks in the spring. Prices of other cuts (chuck, loin, and rack) do not appear to have a significant seasonal pattern.

### **Live Lamb Prices**

Prices of slaughter lambs reflect the final demand for the lamb product and, therefore, follow wholesale price patterns. The final demand encompasses retail and hotel, restaurant, and institutional levels.

The seasonal index for both slaughter and feeder lambs, indicates that prices peak in April (fig. 11). Slaughter prices are at their lowest in November.

Figure 7

### Seasonal patterns in lamb slaughter, 1983-88

Index

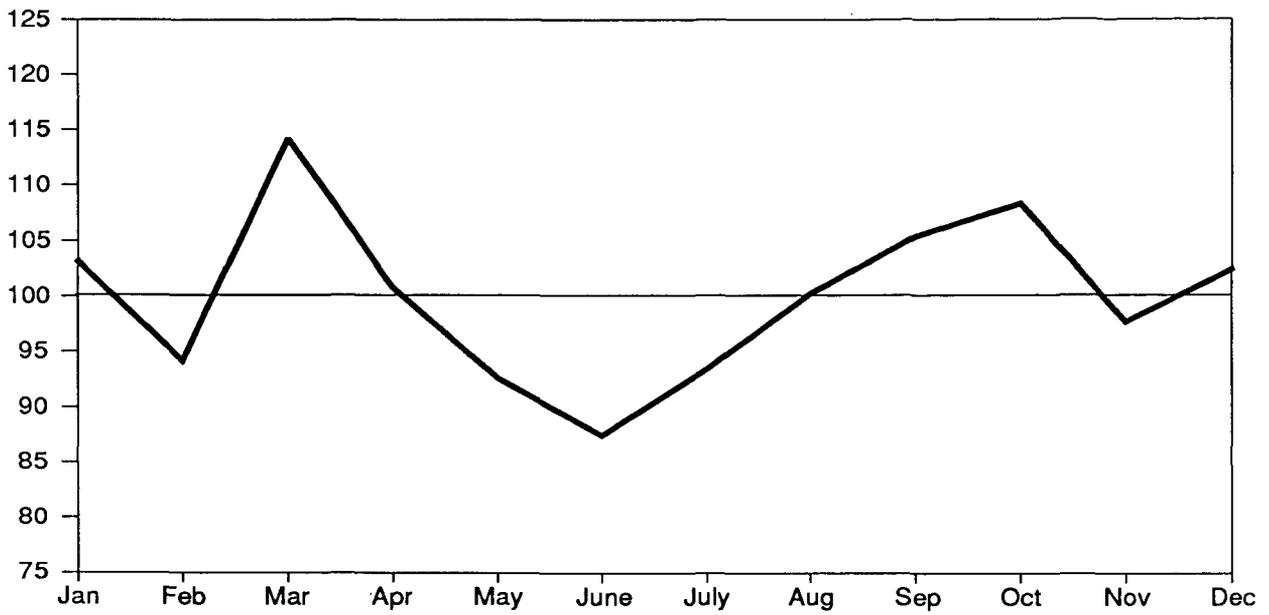


Figure 8

### Wholesale prices of lamb and major meats

Dollars per cwt

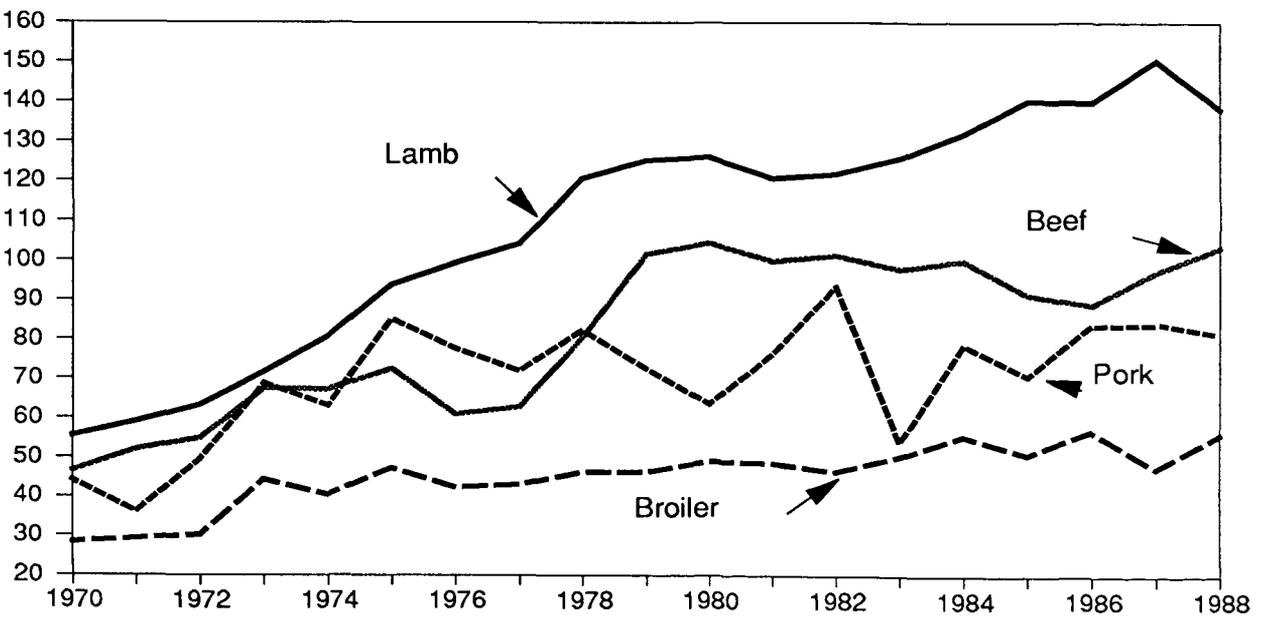


Figure 9

### Wholesale lamb prices relative to selected meats

Percent

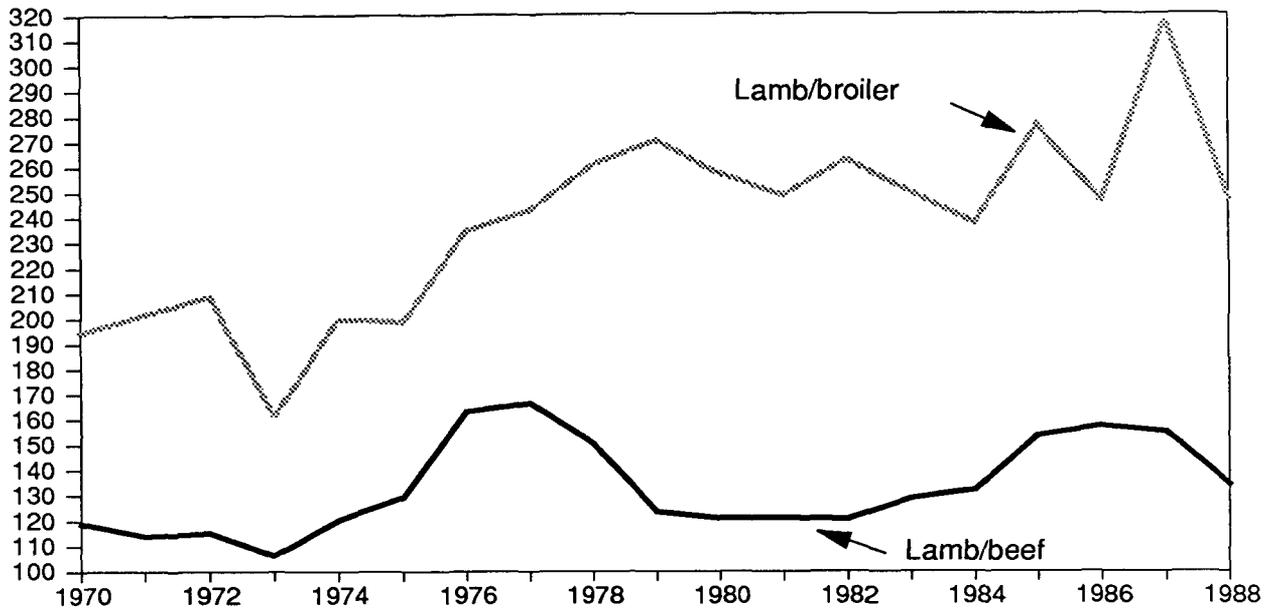
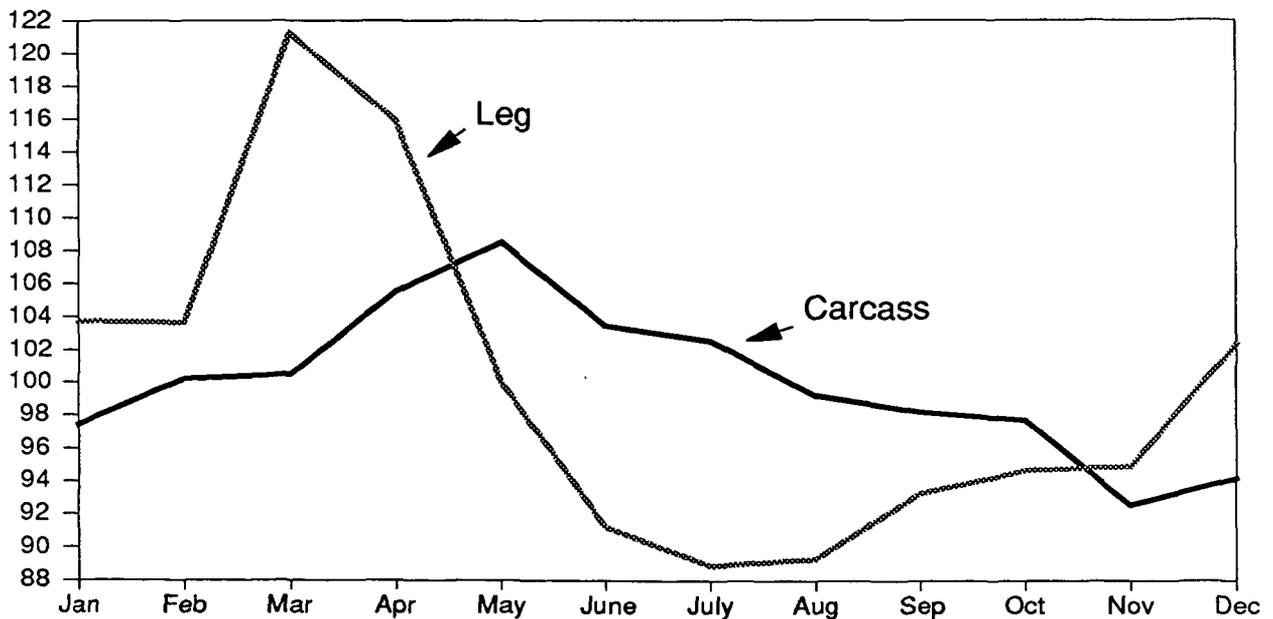


Figure 10

### Seasonal patterns in wholesale lamb prices, 1976-88

Index



Feeder lamb prices vary with slaughter lamb prices and feed costs. Lambs usually stay on feed for 2-3 months; hence, the feeder lamb prices will lead the slaughter lamb price in seasonal peaks and troughs. Feeder lamb prices tend to peak in April and decline sharply until July; then they increase until the next April.

### **Recent Fluctuation in Lamb Prices**

Lamb prices dropped dramatically in April 1988 from the March highs, which was counter to normal seasonal patterns. The prices continued to decline throughout the year, reaching year-earlier levels in November. The major cause of the decline in the slaughter lamb prices was the dramatic increase in domestic production in March, which resulted from increased slaughter and record-high slaughter weights (figs. 12-14). Production reached 34 million pounds in March 1988, compared with slightly under 28 million pounds in April 1987, the comparable Easter/Passover period.

The low of the current production cycle was probably reached in May 1987 (fig. 13). Expansion in 1988, coupled with an untimely bunching of production in March, disturbed the usual seasonal price pattern. Initial prices in 1988 were above 1987, but as production increased and slaughter weights reached record highs, prices fell after March, counter to the normal seasonal pattern. Thus, April and May prices in 1988 were considerably below the same months in 1987, reflecting the cyclical upturn in production, exacerbated by heavy slaughter weights. Extended feeding times in hopes of the expected seasonal price increases resulted in very heavy lambs, and prices were further discounted due to the fatter carcasses during spring and early summer 1988.

Coinciding with this downturn in lamb prices, a shipment of 9,000 live lambs from New Zealand was released from quarantine in March 1988. These lambs were equivalent to about 1-2 percent of average monthly production in the spring period. Nearly 8,700 of these lambs went into feedlots and were likely slaughtered sometime between late April and early June. The coincident timing led to concerns that the live lamb imports rather than the cyclical upturn in production and record heavy weights depressed prices. However, the quantity of live lambs imported was insufficient to explain the large drop in prices.

### **Lamb and Mutton Consumption**

Lamb and mutton consumption, like all meat consumption series published by ERS, is an estimated net disappearance series (23). Consumption is determined as production plus imports and beginning cold storage stocks, minus exports, shipments to U.S. territories, and ending cold storage stocks. Mutton consumption is a very small part of total lamb and mutton consumption. Estimates of lamb consumption have been made since 1967, based on assumptions about the relative levels of stocks and exports (table 7). Domestic lamb production, on average 10 times as large as imports, is by far the largest source of supply.

Figure 11

### Seasonal patterns in live lamb prices, 1976-88

Index

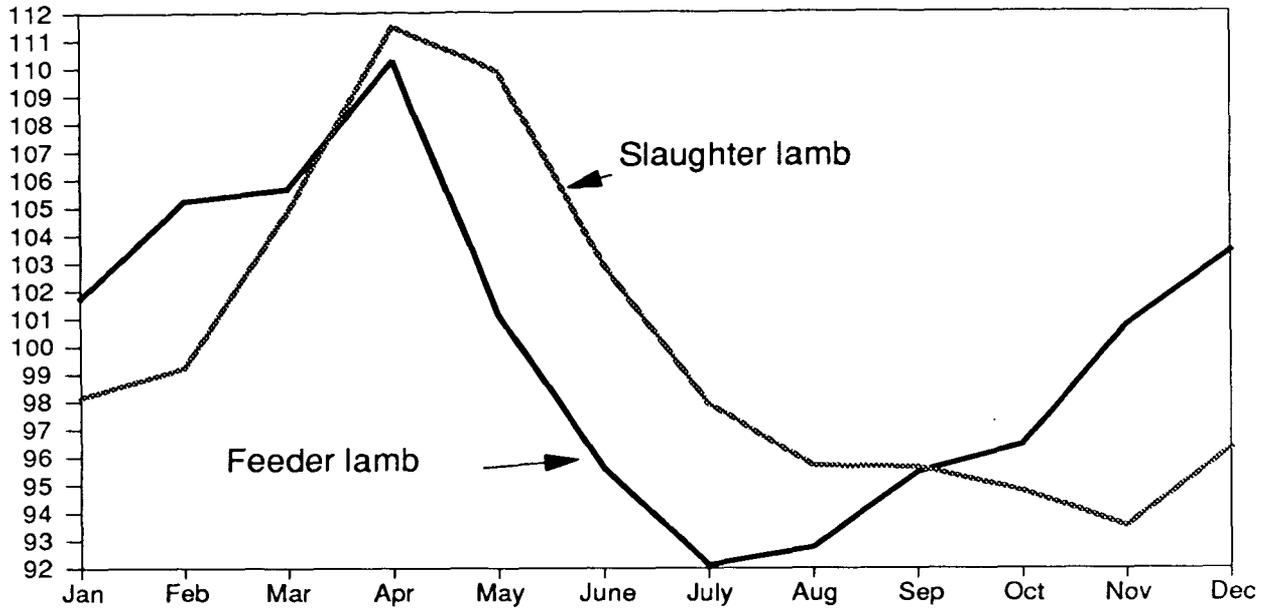


Figure 12

### Monthly commercial lamb production

Million pounds

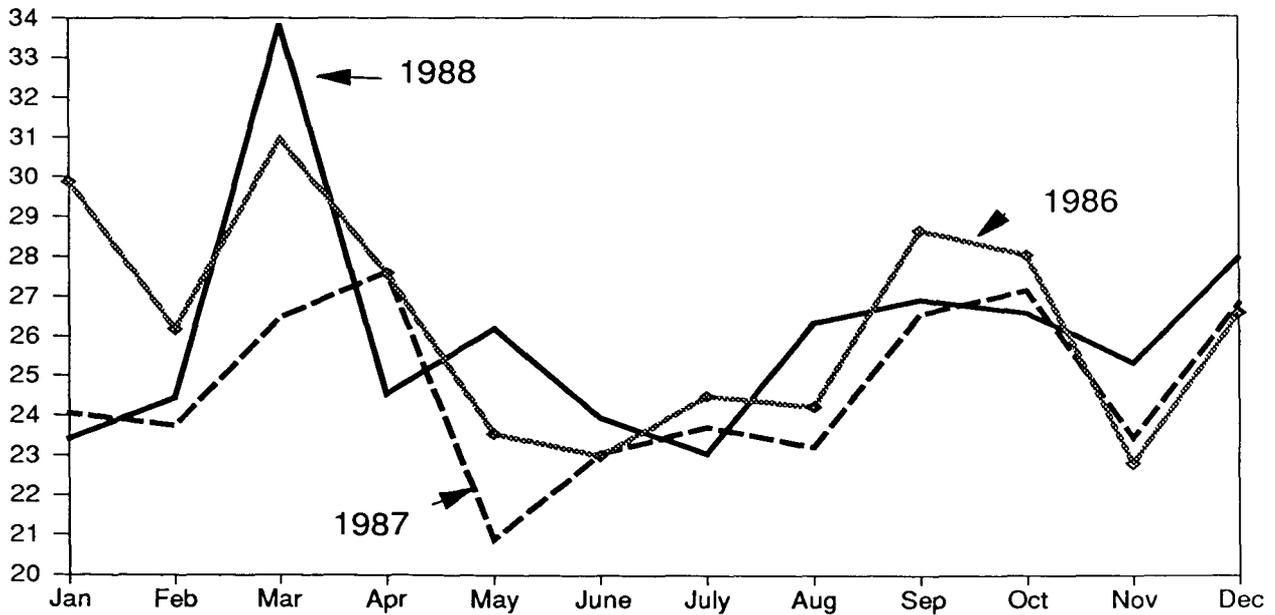


Figure 13

### Monthly slaughter lamb prices San Angelo, TX

Dollars per cwt

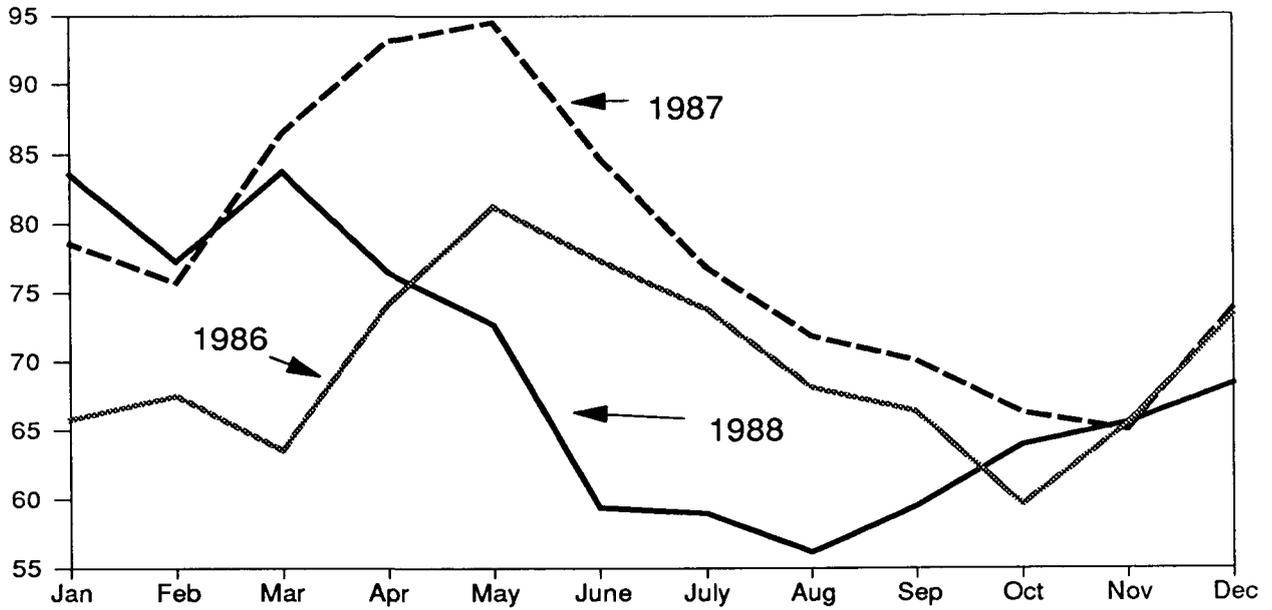
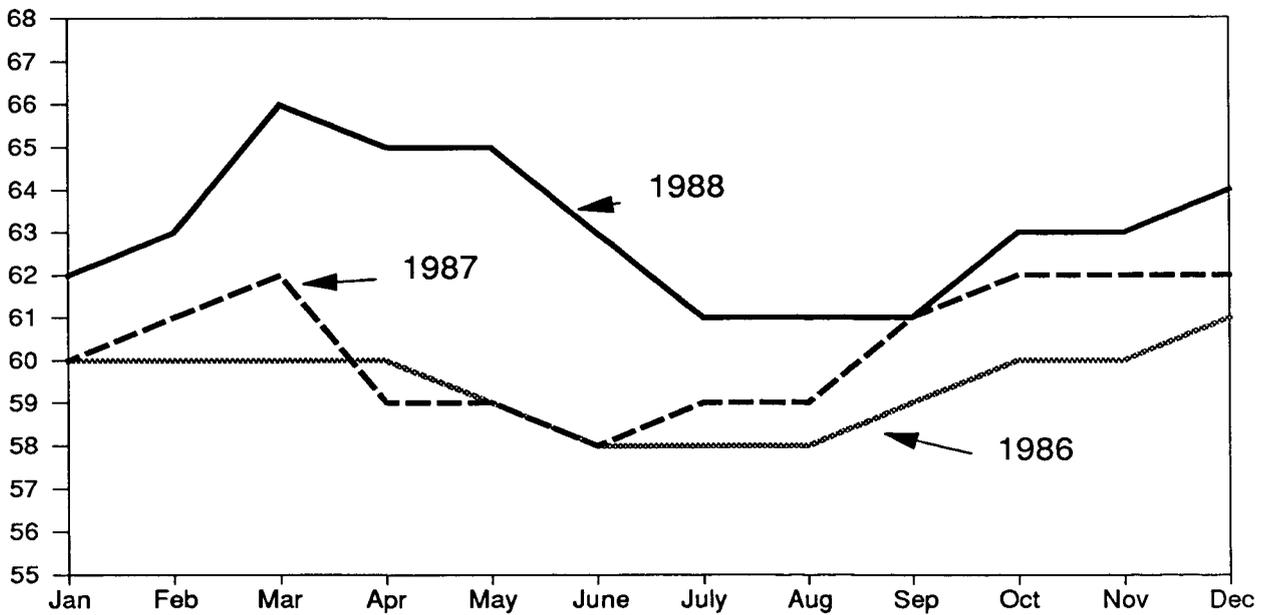


Figure 14

### Federally inspected dressed weights of lambs

Pounds



Lamb and mutton consumption peaked on a per capita basis in 1945 at 7.3 pounds carcass weight (6.5 pounds retail weight). This was about 5 percent of red meat consumption. Consumption of lamb and mutton on a per capita basis reached a record low in 1987 at 1.3 pounds per person, retail weight (table 7). Lamb and mutton consumption in 1988 was estimated to have increased to 1.4 pounds, due mostly to domestic production increases.

Lamb and mutton consumption, like beef and pork consumption, as a percentage of total meat and poultry consumption has been declining, as increases in meat consumption have come from poultry (fig. 15). Lamb and mutton consumption has declined to less than 1 percent of red meat consumption and was 0.6 percent of total meat and poultry consumption in 1988 (fig. 16).

Broiler and turkey consumption has increased over time due mainly to lower relative prices, compared with beef, pork, and lamb. To a lesser extent, the gain in market share for the poultry industry has been a result of offering a perceived lower fat/cholesterol product, advertising, and development of new products. Beef, pork, and poultry industries have all been attempting to add new products that fit into modern lifestyles, such as prepared and further-processed products that can easily be used in a family where both adults work or in single-person households.

Survey data indicate that the lamb industry lacks a consumer base; only a very small percentage of consumers eat lamb (table 8). Nationwide cross-sectional consumer surveys done by USDA and reported by the National Research Council indicate the low levels of lamb consumption in the United States. The 1985 survey covered 1 day, and the 1977 survey covered a 2-week period that was sampled throughout the year. The low lamb consumption in both surveys is a reflection of how small the industry is relative to other meats.

The 1985 survey found that only 1 percent of the females (19-50 years of age) and only 0.5 percent of males (19-50) consumed lamb, veal, or game (19). Both of these percentages were down from the 1977 levels of 1.3 percent for females and 1.9 percent for males. Because veal and game consumption is included in the per capita basis with lamb, the true percentage of consumers eating lamb during the survey periods is probably half of the reported share. In holiday periods, consumption of lamb might be higher, but if gains are to be made in the consumer base for lamb, the industry must attract year-round consumers.

The lamb industry's challenge is to attract new consumers of relatively expensive red meat when red meats are losing their market share to poultry, due primarily to lower relative prices of poultry. Gains for the lamb industry depend on increasing the consumer base. Even though lamb has been sold in the United States for many years, its unfamiliarity makes it like a new product to most consumers.

Table 7--Lamb and mutton supply and use

| Commodity and year         | Supply     |      |                  |         |       | Use           |                 |               |             |            |            |
|----------------------------|------------|------|------------------|---------|-------|---------------|-----------------|---------------|-------------|------------|------------|
|                            | Production |      | Beginning stocks | Imports | Total | Exports<br>1/ | Shipments<br>2/ | Ending stocks | Consumption |            |            |
|                            | Commercial | Farm |                  |         |       |               |                 |               | Total       | Per capita | Per capita |
|                            |            |      |                  |         |       |               |                 | Total         | Carcass     | Retail     |            |
| ----- Million pounds ----- |            |      |                  |         |       |               |                 |               |             |            |            |
| Lamb and mutton:           |            |      |                  |         |       |               |                 |               |             |            |            |
| 1967                       | 636.0      | 10.0 | 17.0             | 121.0   | 784.0 | 6.0           | 0               | 5.0           | 763.0       | 3.84       | 3.42       |
| 1968                       | 592.0      | 10.0 | 15.0             | 147.0   | 764.0 | 7.0           | 0               | 4.0           | 743.0       | 3.70       | 3.29       |
| 1969                       | 540.0      | 10.0 | 14.0             | 153.0   | 717.0 | 6.0           | 0               | 6.0           | 695.0       | 3.43       | 3.05       |
| 1970                       | 540.0      | 11.0 | 16.0             | 122.0   | 689.0 | 7.0           | 0               | 9.0           | 663.0       | 3.23       | 2.88       |
| 1971                       | 545.0      | 11.0 | 19.0             | 103.0   | 678.0 | 8.0           | 0               | 9.0           | 651.0       | 3.13       | 2.79       |
| 1972                       | 533.0      | 10.0 | 19.0             | 148.0   | 710.0 | 7.0           | 0               | 6.0           | 687.0       | 3.27       | 2.91       |
| 1973                       | 502.0      | 10.0 | 16.0             | 53.0    | 581.0 | 6.0           | 0               | 5.0           | 560.0       | 2.64       | 2.35       |
| 1974                       | 453.0      | 11.0 | 15.0             | 26.0    | 505.0 | 8.0           | 0               | 4.0           | 483.0       | 2.26       | 2.01       |
| 1975                       | 400.0      | 11.0 | 14.0             | 27.7    | 452.7 | 8.0           | 0               | 2.0           | 432.0       | 2.00       | 1.78       |
| 1976                       | 361.0      | 10.0 | 12.0             | 36.3    | 419.3 | 3.8           | 3.0             | 15.0          | 397.4       | 1.82       | 1.62       |
| 1977                       | 340.0      | 10.0 | 15.0             | 22.5    | 387.5 | 4.6           | 1.5             | 10.0          | 371.4       | 1.69       | 1.50       |
| 1978                       | 301.0      | 9.0  | 10.0             | 39.3    | 359.3 | 3.2           | 1.3             | 12.0          | 342.8       | 1.54       | 1.37       |
| 1979                       | 282.0      | 9.0  | 12.0             | 44.4    | 347.4 | 1.4           | 1.6             | 11.0          | 333.4       | 1.48       | 1.32       |
| 1980                       | 310.0      | 8.0  | 11.0             | 33.0    | 362.0 | 1.5           | 3.0             | 9.0           | 348.5       | 1.53       | 1.36       |
| 1981                       | 328.0      | 10.0 | 9.0              | 31.1    | 378.1 | 2.4           | 2.4             | 11.0          | 362.3       | 1.57       | 1.40       |
| 1982                       | 356.0      | 9.0  | 11.0             | 20.8    | 396.8 | 1.7           | 2.4             | 8.7           | 384.0       | 1.65       | 1.47       |
| 1983                       | 367.0      | 8.0  | 8.7              | 18.1    | 401.7 | 1.4           | 2.2             | 11.0          | 387.1       | 1.65       | 1.47       |
| 1984                       | 371.0      | 8.0  | 11.0             | 20.0    | 410.0 | 1.9           | 3.2             | 7.0           | 397.9       | 1.68       | 1.49       |
| 1985                       | 352.0      | 7.0  | 7.0              | 36.5    | 402.5 | 1.0           | 2.5             | 13.0          | 386.0       | 1.61       | 1.44       |
| 1986                       | 331.0      | 7.0  | 13.0             | 41.1    | 392.1 | 2.1           | 2.1             | 13.0          | 375.0       | 1.55       | 1.38       |
| 1987                       | 309.0      | 7.0  | 13.0             | 44.0    | 373.0 | 1.5           | 2.4             | 7.9           | 361.2       | 1.48       | 1.32       |
| 1988                       | 326.0      | 7.0  | 7.9              | 51.3    | 392.2 | 1.5           | 2.4             | 7.8           | 388.3       | 1.58       | 1.40       |
| Lamb:                      |            |      |                  |         |       |               |                 |               |             |            |            |
| 1967                       | 595.5      | 9.4  | 14.8             | 12.3    | 631.9 | 4.8           | 0               | 1.8           | 615.2       | 3.10       | 2.75       |
| 1968                       | 556.5      | 9.4  | 11.8             | 22.9    | 600.6 | 5.4           | 0               | 3.3           | 582.0       | 2.90       | 2.58       |
| 1969                       | 502.9      | 9.3  | 13.3             | 43.6    | 569.2 | 4.6           | 0               | 3.6           | 551.0       | 2.72       | 2.42       |
| 1970                       | 504.1      | 10.3 | 13.6             | 43.5    | 571.5 | 5.9           | 0               | 7.7           | 547.9       | 2.67       | 2.38       |
| 1971                       | 503.5      | 10.2 | 17.7             | 38.2    | 569.5 | 6.7           | 0               | 7.3           | 545.5       | 2.63       | 2.34       |
| 1972                       | 498.7      | 9.4  | 17.3             | 37.3    | 562.6 | 5.7           | 0               | 3.9           | 543.0       | 2.59       | 2.30       |
| 1973                       | 460.1      | 9.3  | 13.9             | 27.3    | 510.6 | 5.4           | 0               | 3.1           | 492.0       | 2.32       | 2.07       |
| 1974                       | 426.3      | 10.4 | 13.1             | 17.8    | 467.6 | 7.5           | 0               | 3.4           | 446.7       | 2.09       | 1.86       |
| 1975                       | 373.3      | 10.2 | 13.4             | 24.6    | 421.5 | 7.3           | 0               | 1.3           | 402.9       | 1.87       | 1.66       |
| 1976                       | 341.5      | 9.5  | 11.3             | 34.2    | 396.5 | 3.6           | 2.0             | 4.2           | 375.8       | 1.72       | 1.53       |
| 1977                       | 316.1      | 9.3  | 14.2             | 20.8    | 360.4 | 4.3           | 1.3             | 9.6           | 345.2       | 1.57       | 1.39       |
| 1978                       | 282.6      | 8.5  | 9.6              | 38.0    | 338.6 | 3.1           | 1.2             | 11.4          | 323.0       | 1.45       | 1.29       |
| 1979                       | 266.3      | 8.5  | 11.4             | 42.6    | 328.8 | 1.3           | 1.5             | 10.2          | 315.7       | 1.40       | 1.25       |
| 1980                       | 290.2      | 7.5  | 10.2             | 33.0    | 341.0 | 1.4           | 2.9             | 8.7           | 328.1       | 1.44       | 1.28       |
| 1981                       | 308.2      | 9.4  | 8.7              | 31.1    | 357.4 | 2.3           | 2.2             | 10.5          | 342.4       | 1.49       | 1.32       |
| 1982                       | 332.5      | 8.4  | 10.5             | 18.7    | 370.1 | 1.6           | 2.3             | 8.0           | 358.2       | 1.54       | 1.37       |
| 1983                       | 343.9      | 7.5  | 8.0              | 17.9    | 377.4 | 1.3           | 2.1             | 10.3          | 363.7       | 1.55       | 1.38       |
| 1984                       | 342.9      | 7.5  | 10.3             | 18.3    | 378.9 | 1.8           | 2.9             | 6.6           | 367.7       | 1.55       | 1.38       |
| 1985                       | 331.7      | 6.6  | 6.6              | 31.9    | 376.8 | 0.9           | 2.3             | 12.3          | 361.3       | 1.51       | 1.34       |
| 1986                       | 315.9      | 6.7  | 12.3             | 29.3    | 364.2 | 1.9           | 1.9             | 11.7          | 348.6       | 1.44       | 1.28       |
| 1987                       | 296.7      | 6.7  | 11.7             | 28.7    | 343.9 | 1.4           | 2.2             | 7.5           | 332.8       | 1.37       | 1.22       |
| 1988                       | 308.5      | 6.7  | 7.5              | 29.5    | 352.2 | 1.4           | 2.1             | 7.0           | 341.7       | 1.39       | 1.24       |

1/ Prior to 1976 exports and shipments were combined.

2/ Shipments to U.S. territories.

Figure 15

### Per capita meat consumption

Pounds

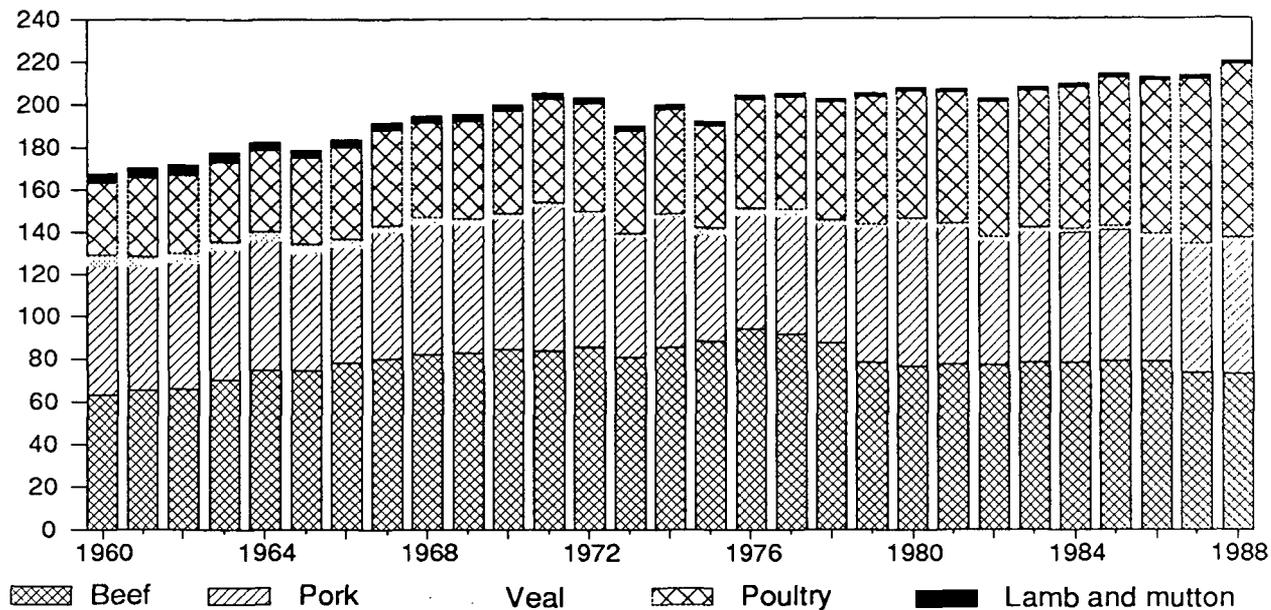


Figure 16

### Lamb and mutton's share of meat consumption

Percent

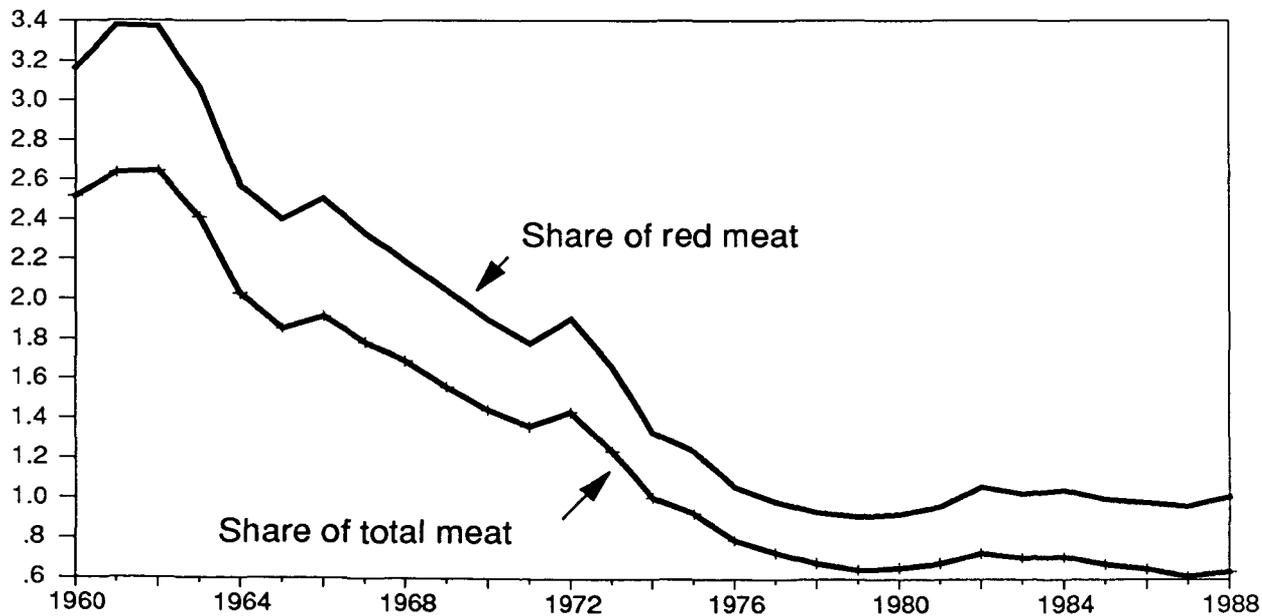


Table 8--Trends in meat, poultry, and fish consumption by age and sex 1/

| Group and food                            | Mean intake                |           | Share of per capita consumption |      |
|---|----------------------------|-----------|---------------------------------|------|
|   | 1977                       | 1985      | 1977                            | 1985 |
|   | - <u>Grams per day</u> -   |           | - - <u>Percent</u> - -          |      |
| Children, 1-5 years old:                  |                            |           |                                 |      |
| Beef                                      | 21                         | 14        | 29.1                            | 17.5 |
| Pork                                      | 7                          | 7         | 20.5                            | 16.2 |
| Lamb, veal, and game                      | <u>2/</u>                  | 1         | .3                              | 1.4  |
| Organ meats                               | <u>2/</u>                  | <u>2/</u> | .7                              | .3   |
| Frankfurter, sausages, and luncheon meats | 15                         | 12        | 33.1                            | 28.2 |
| Chicken                                   | 17                         | 16        | 17.0                            | 19.6 |
| Fish and shellfish                        | 5                          | 5         | 7.0                             | 8.1  |
| Mixtures <u>3/</u>                        | 45                         | 45        | 34.7                            | 32.0 |
| Females, 19-50:                           |                            |           |                                 |      |
| Beef                                      | 49                         | 27        | 34.9                            | 23.1 |
| Pork                                      | 18                         | 14        | 24.0                            | 20.5 |
| Lamb, veal, and game                      | 1                          | 1         | 1.3                             | 1.0  |
| Organ meats                               | 1                          | 1         | .9                              | 1.0  |
| Frankfurter, sausages, and luncheon meats | 16                         | 13        | 25.1                            | 24.6 |
| Chicken                                   | 22                         | 19        | 16.1                            | 16.8 |
| Fish and shellfish                        | 11                         | 13        | 9.8                             | 11.5 |
| Mixtures <u>3/</u>                        | 65                         | 88        | 33.2                            | 37.1 |
| Males, 19-50:                             |                            |           |                                 |      |
| Beef                                      | 80                         | 52        | 42.0                            | 28.3 |
| Pork                                      | 28                         | 26        | 28.2                            | 25.3 |
| Lamb, veal, and game                      | 3                          | 1         | 1.9                             | .5   |
| Organ meats                               | 2                          | 1         | 1.4                             | .4   |
| Frankfurter, sausages, and luncheon meats | 32                         | 27        | 35.7                            | 31.4 |
| Chicken                                   | 28                         | 23        | 14.0                            | 13.3 |
| Fish and shellfish                        | 14                         | 21        | 8.5                             | 11.4 |
| Mixtures <u>3/</u>                        | 105                        | 110       | 39.0                            | 39.7 |
|   | <u>Survey participants</u> |           |                                 |      |
|   | 1977                       |           | 1985                            |      |

|                         | <u>Number</u> |       |
|-------------------------|---------------|-------|
| Children, 1-5 years old | 690           | 548   |
| Female, 19-50 years old | 2,228         | 1,503 |
| Male, 19-50 years old   | 1,778         | 1,134 |

1/ The 1977 survey was for a 2-week period; the 1985 survey was for 1 day.

2/ Values are less than 0.5 grams per day, but more than zero.

3/ Mixtures are mainly meat, poultry, or fish.

Source: (19).

Some promotion funds are available from a checkoff in the wool support program. The American Sheep Industry Association receives these funds to promote wool and lamb products. In 1987, \$4 million were set aside to promote these products. Beef, pork, and poultry are increasing both checkoff and private promotion funds. The lamb industry will likely need to consider increasing the promotion of its product just to hold its market share. Promotion of imported lamb by Australia and New Zealand in the United States may increase demand for domestic lamb because of the current lack of U.S. consumer awareness.

### **Lamb Imports**

The United States imports both sheep meat and live animals. Live animal imports have never been large, and the United States has been a net exporter of live animals. However, the United States has been a net importer of lamb meat and mutton. Mutton is covered under Public Law 96-177, the Meat Import Act of 1979, which restricts by a single quota the importation of certain fresh, chilled, and frozen beef, veal, mutton, and goat meat products. Lamb imports are not included under the Meat Import Act. Lamb and mutton imports have been declining since 1960, along with domestic production and consumption.

### **Trends in Imports**

Data separating lamb and mutton imports show that mutton was the prominent meat imported in the late sixties and early seventies, (fig. 17). Lamb imports have varied from as little as 12 million pounds in 1967 to 44 million pounds in 1969 (fig. 18). Lamb imports reached another peak in 1979 and then trended downward during the early eighties as domestic production expanded cyclically. The variation in lamb imports appears to depend on domestic prices; imports rise when cyclical declines in domestic production raise prices. Conversely, U.S. imports decline when domestic production is high and prices are low.

Lamb imports during the current production cycle have varied from a high of 16 percent of domestic consumption in 1979 to a low of 5 percent in 1983 (fig. 19). Lamb imports since 1984 have been in the 9- to 10-percent range of domestic consumption and are expected to remain in this range over the next several years.

New Zealand was the largest exporter of lamb to the United States until 1987, when Australia became the largest supplier (fig 20). The switch was due in part to the imposition of a countervailing duty on New Zealand lamb by the U.S. International Trade Commission because of New Zealand's agricultural policies.

### **Fresh Lamb Imports**

Imports of fresh products as opposed to frozen products from both New Zealand and Australia have become a large proportion of lamb

Figure 17

### U.S. lamb and mutton imports

Million pounds

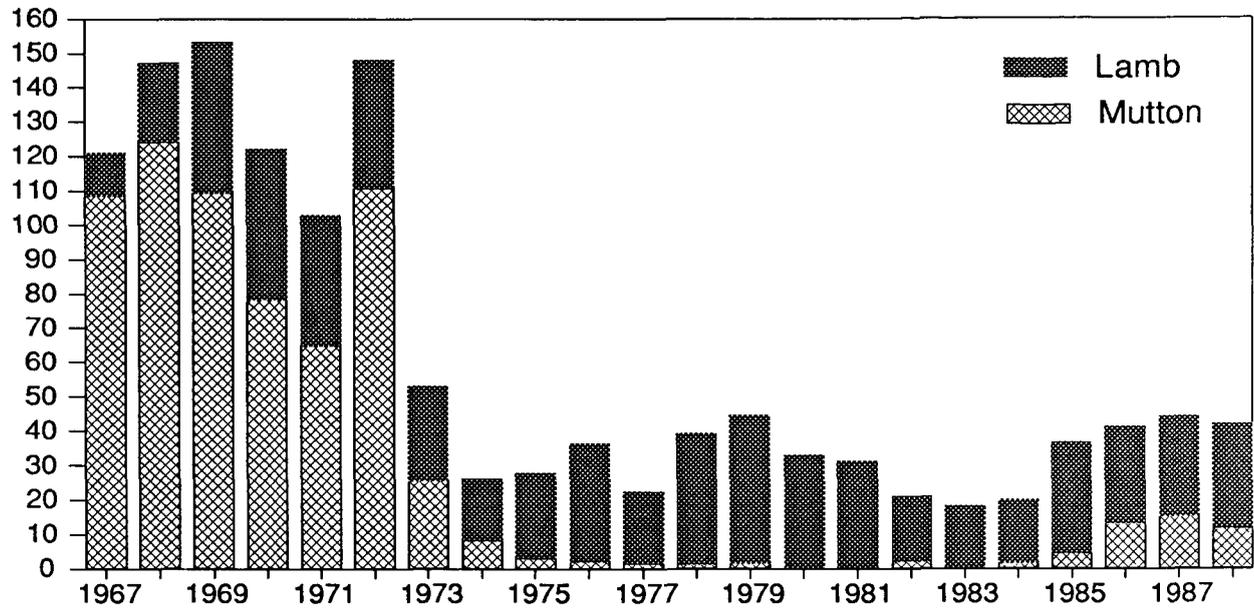


Figure 18

### U.S. lamb imports

Million pounds

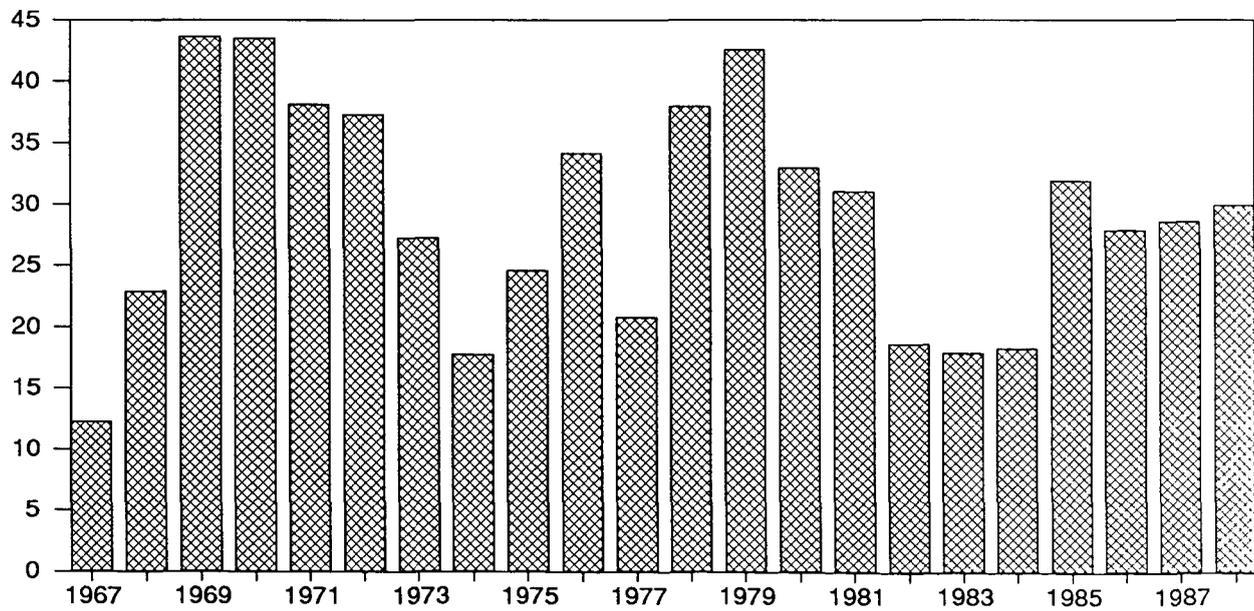


Figure 19

### Lamb imports as a share of domestic production

Percent

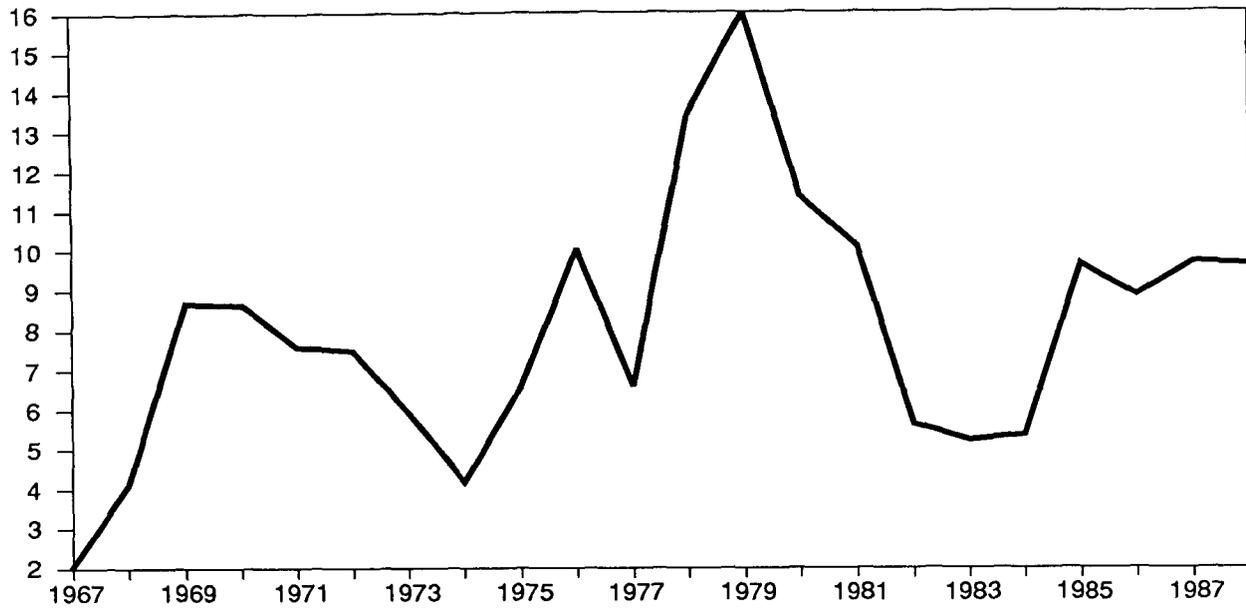
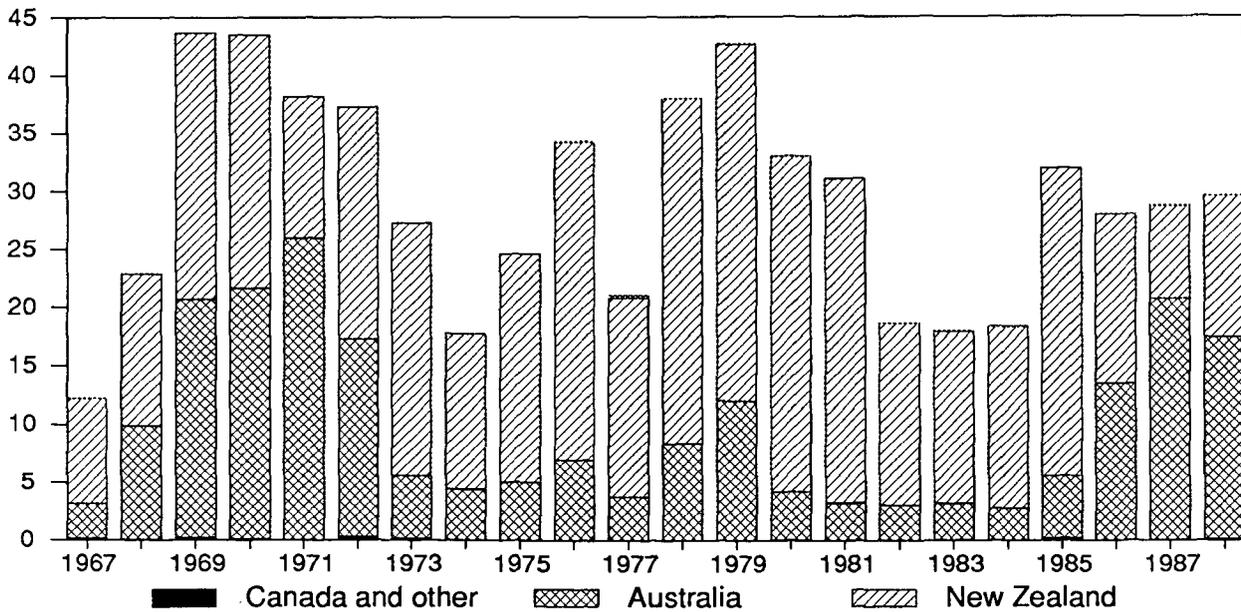


Figure 20

### U.S. lamb imports by country of origin

Million pounds



imports during the past several years (fig. 21). During January-September 1988, 60 percent of the Australian lamb exports to the United States were fresh. Of this fresh lamb, approximately 98 percent was cuts and 2 percent was carcasses (table 9). Nearly 15 percent of New Zealand exports to the United States was fresh, while 85 percent was frozen during January-September 1988 (table 10).

The largest part of Australian lamb exports to the United States, both fresh and frozen during July 1981-June 1988, were legs. Legs accounted for 32 percent of the total lamb exports (including carcasses) and 43 percent of the cuts (table 11). During this period, loins, shoulders, and racks were 14, 8, and 10 percent of the total.

Legs from Australia accounted for 58 percent of the fresh lamb cuts imported by the United States during July 1981-June 1988, but declined to 43 percent in the June 1987-July 1988 period. As fresh imports to the United States have increased from about 322 metric tons in the 1981/82 period to over 5,661 in the 1987/88 period, the mixture of cuts has moved closer to the composition of the carcass.

#### **Live Lamb Trade**

The U.S. Department of Commerce does not identify imports of live animals as sheep or lambs, or for slaughter or breeding. The United States has generally been a net exporter of live animals, trading mostly with Canada and Mexico (table 12). Most U.S. sheep exports, generally cull ewes, have gone to Mexico. Most of the live trade between the United States and Canada is in breeding animals or movements across the border to slaughter facilities.

#### **Seasonality of Imports**

U.S. imports of lamb are heaviest in March through May, usually peaking in April much like domestic production (fig. 22). Foreign suppliers, as well as domestic producers, respond to peak prices in the United States and the peak production period in the Southern Hemisphere. New Zealand exports to the United States tend to peak in May, with high levels in March and April. Australian exports have been the largest in March and April but are also large in January. The proportion of Australian imports in March and April has been increasing.

#### **Conclusions**

The decline in the U.S. sheep industry since World War II is not the result of one factor but rather many factors that have compounded each other over time. The sheep industry has become a specialty industry and makes up only 0.6 percent of total U.S. meat consumption. Unless there is a major change in the demand for lamb that would raise returns and attract new producers, the

Figure 21

### U.S. fresh lamb imports as a percentage of total

Percent

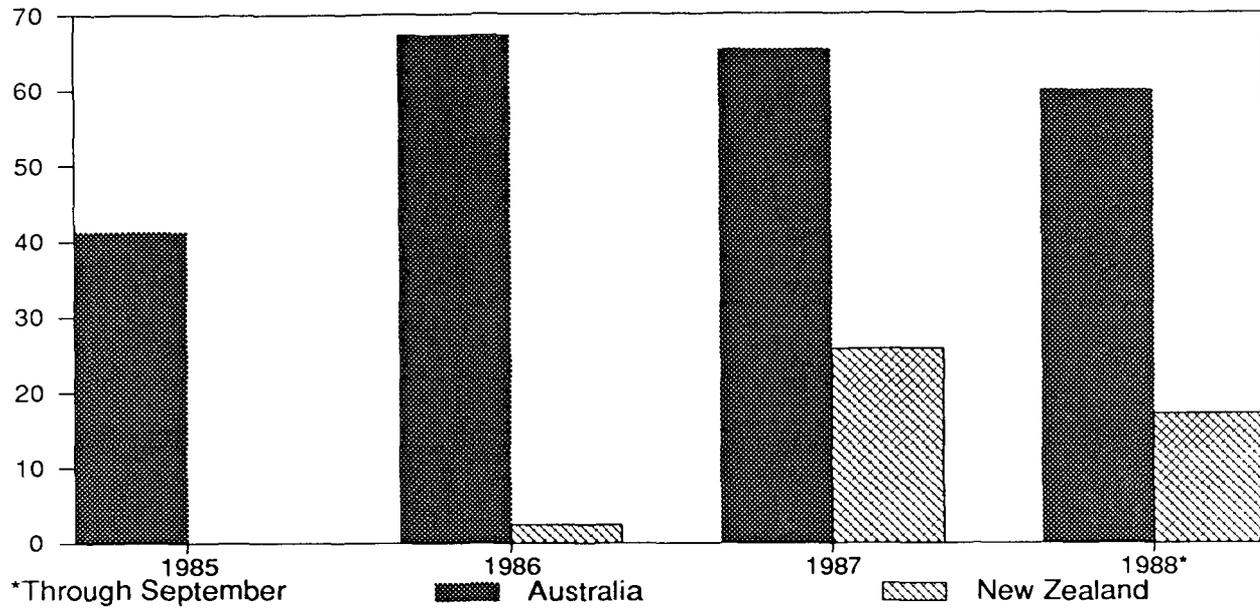


Figure 22

### Seasonal patterns of U.S. lamb imports, 1967-88

Index

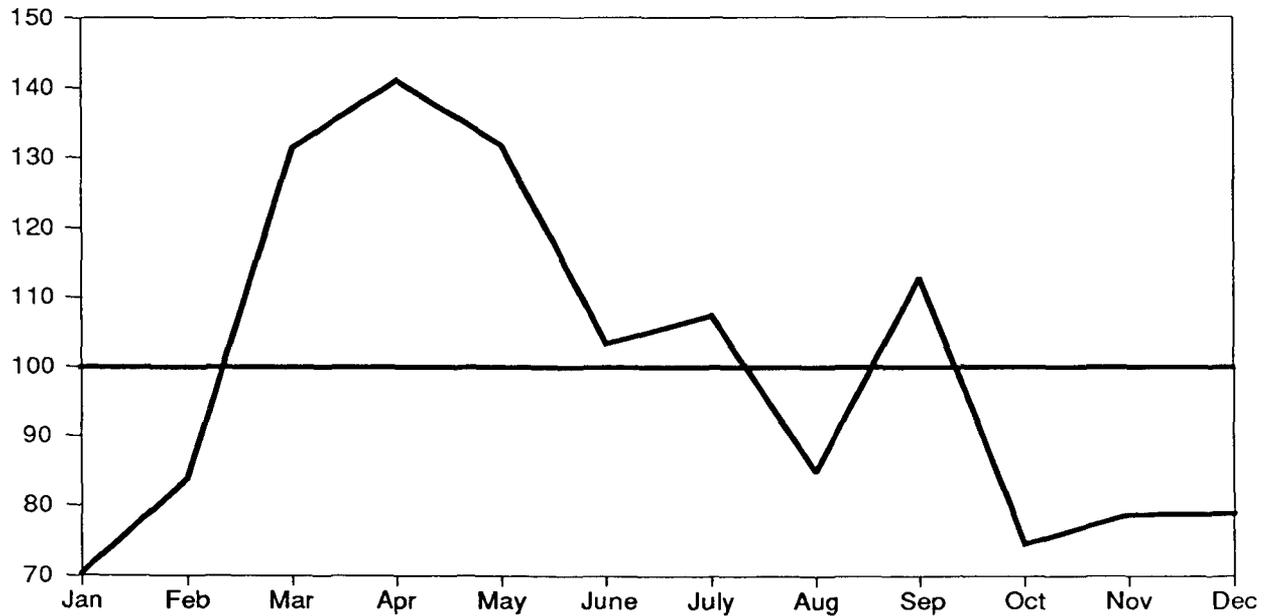


Table 9--Australian lamb exports to the United States

| Item               | East Coast |       |          |      | West Coast |         |          |       | U.S. total |
|--------------------|------------|-------|----------|------|------------|---------|----------|-------|------------|
|                    | Bone in    |       | Boneless |      | Bone in    |         | Boneless |       |            |
|                    | Carcass    | Cuts  | Carcass  | Cuts | Carcass    | Cuts    | Carcass  | Cuts  |            |
| <u>Metric tons</u> |            |       |          |      |            |         |          |       |            |
| Chilled:           |            |       |          |      |            |         |          |       |            |
| 1985               |            |       |          |      |            |         |          |       |            |
| January            | 0          | 0     | 0        | 0    | 0          | 47.9    | 0        | 0     | 47.9       |
| February           | 0          | 0     | 0        | 0    | 2.8        | 47.3    | 0        | 0     | 50.1       |
| March              | 0          | 0     | 0        | 0    | 1.4        | 85.0    | 0        | 0     | 86.4       |
| April              | 0          | 0     | 0        | 0    | 7.7        | 37.5    | 0        | 0     | 44.7       |
| May                | 0.6        | 0.3   | 0        | 0    | 3.3        | 22.5    | 0        | 0     | 26.7       |
| June               | 2.0        | 0     | 0        | 0    | 10.7       | 55.0    | 0        | 0.8   | 68.5       |
| July               | 25.4       | 2.3   | 0        | 0    | 10.2       | 33.2    | 0        | 0     | 71.1       |
| August             | 22.6       | 2.4   | 0        | 0    | 18.2       | 51.9    | 0        | .2    | 95.3       |
| September          | 23.4       | 10.2  | 0        | 0    | 24.9       | 18.2    | 0        | 0     | 77.1       |
| October            | 28.0       | 30.9  | 0        | 0    | 41.2       | 77.0    | 0        | .1    | 177.2      |
| November           | 42.9       | 41.7  | 0        | 0    | 35.8       | 67.0    | 0        | .1    | 187.5      |
| December           | 29.5       | 11.5  | 0        | 0    | 46.1       | 94.7    | 0        | .9    | 182.7      |
| Year               | 174.4      | 99.3  | 0        | 0    | 202.5      | 636.7   | 0        | 2.5   | 1,115.2    |
| 1986               |            |       |          |      |            |         |          |       |            |
| January            | 51.6       | 41.1  | 0        | 6.2  | 67.7       | 135.1   | 0        | .2    | 301.9      |
| February           | 57.1       | 78.9  | 0        | 2.7  | 64.1       | 108.7   | 0        | 6.7   | 318.2      |
| March              | 52.1       | 90.1  | 0        | .5   | 74.0       | 219.9   | 0        | 1.1   | 437.7      |
| April              | 44.7       | 83.1  | 0        | .6   | 94.8       | 116.1   | 0        | 1.3   | 340.6      |
| May                | 15.7       | 13.6  | 0        | 0    | 92.2       | 137.3   | 0        | .6    | 259.4      |
| June               | 3.0        | 2.4   | 0        | 0    | 110.9      | 114.6   | 0        | 1.7   | 232.6      |
| July               | 0          | 0     | 0        | 0    | 137.6      | 130.4   | 0        | 1.2   | 269.2      |
| August             | 0          | 0     | 0        | 0    | 130.3      | 138.9   | 0        | 1.8   | 271.0      |
| September          | 0          | 2.7   | 0        | 0    | 122.0      | 176.6   | 0        | 2.4   | 303.7      |
| October            | 0          | 6.8   | 0        | 0    | 169.5      | 197.5   | 0        | 3.5   | 377.3      |
| November           | 6.9        | 1.4   | 0        | 0    | 137.8      | 215.0   | 0        | 0     | 379.6      |
| December           | 0          | 0     | 0        | 0    | 156.7      | 249.9   | 0        | 18.7  | 425.3      |
| Year               | 231.1      | 338.1 | 0        | 0    | 1,357.6    | 1,940.0 | 0        | 57.7  | 3,934.5    |
| 1987               |            |       |          |      |            |         |          |       |            |
| January            | 0          | 0     | 0        | 0    | 138.2      | 209.2   | 0        | 7.8   | 355.6      |
| February           | 0          | 0     | 0        | 0    | 192.1      | 177.5   | 0        | 7.4   | 377.0      |
| March              | 0          | 0     | 0        | 0    | 419.9      | 405.7   | 0        | 33.5  | 859.1      |
| April              | 5.3        | 0     | 0        | 0    | 411.1      | 381.1   | 0        | 37.7  | 835.2      |
| May                | 0          | 0     | 0        | 0    | 374.6      | 321.8   | 0        | 11.4  | 707.8      |
| June               | 0          | 0     | 0        | 0    | 327.6      | 278.4   | 0        | 13.5  | 619.6      |
| July               | 0          | 0     | 0        | 0    | 209.0      | 272.8   | 0        | 11.3  | 494.0      |
| August             | 0          | 0     | 0        | 0    | 167.7      | 222.6   | 0        | 8.6   | 398.9      |
| September          | 0          | 0     | 0        | 0    | 151.5      | 238.0   | 0        | 13.0  | 402.5      |
| October            | 0          | 0     | 0        | 0    | 127.4      | 315.5   | 0        | 14.9  | 457.8      |
| November           | 0          | 0     | 0        | 0    | 118.6      | 271.6   | 0        | 23.9  | 414.1      |
| December           | 0          | 0     | 0        | 0    | 45.3       | 292.3   | 0        | 15.3  | 352.9      |
| Year               | 5.3        | 6.0   | 0        | .7   | 2,683.9    | 3,386.9 | 0        | 198.3 | 6,275.7    |
| 1988               |            |       |          |      |            |         |          |       |            |
| January            | 0          | 0     | 0        | 0    | 230.4      | 298.0   | 0        | 11.5  | 540.2      |
| February           | 0          | 0     | 0        | 0    | 121.9      | 422.5   | 0        | 21.2  | 565.6      |
| March              | 0          | 0     | 0        | 0    | 157.9      | 574.3   | 0        | 54.2  | 786.4      |
| April              | 0          | 0     | 0        | 0    | 204.2      | 265.2   | 0        | 14.6  | 484.4      |
| May                | 0          | 0     | 0        | 0    | 115.6      | 275.0   | 0        | 17.6  | 408.2      |
| June               | 0          | 0     | 0        | 0    | 127.6      | 217.4   | 0        | 10.4  | 355.4      |
| July               | 7.9        | 0     | 0        | 0    | 53.4       | 129.5   | 0        | 6.8   | 197.6      |
| August             | 0          | 0     | 0        | 0    | 23.0       | 181.7   | 0        | 23.3  | 228.0      |
| September          | 1.3        | 0     | 0        | 0    | 32.8       | 106.0   | 0        | 12.2  | 152.3      |
| Year 1/            | 9.2        | 0     | 0        | 0    | 1,066.8    | 2,470.3 | 0        | 171.1 | 3,718.1    |

Continued--

See footnotes at end of table

Table 9--Australian lamb exports to the United States--Continued

| Item               | East Coast |         |          |       | West Coast     |        |          |       | U.S. total |
|--------------------|------------|---------|----------|-------|----------------|--------|----------|-------|------------|
|                    | Bone in    |         | Boneless |       | Bone in        |        | Boneless |       |            |
|                    | Carcass    | Cuts    | Carcass  | Cuts  | Carcass        | Cuts   | Carcass  | Cuts  |            |
| <u>Metric tons</u> |            |         |          |       |                |        |          |       |            |
| Frozen:            |            |         |          |       |                |        |          |       |            |
| 1985               |            |         |          |       |                |        |          |       |            |
| January            | 0          | 6.0     | 0        | 49.6  | 0              | 23.8   | 0        | 35.9  | 115.3      |
| February           | 7.6        | 7.3     | 0        | 66.7  | 0              | 31.2   | 0        | 9.1   | 121.5      |
| March              | 21.4       | 23.3    | 0        | 49.8  | 7.4            | 47.6   | 0        | 16.7  | 166.2      |
| April              | 0          | 15.3    | 9.2      | 64.4  | 0              | 50.9   | 0        | 52.4  | 192.2      |
| May                | 1.3        | 4.4     | 0        | 26.8  | 0              | 36.2   | 0        | 4.4   | 73.1       |
| June               | 0          | 10.4    | 0        | 59.2  | 0              | 12.1   | 0        | 27.5  | 109.2      |
| July               | 1.3        | 21.0    | 0        | 93.9  | -1.3 <u>2/</u> | 49.2   | 0        | 0     | 164.1      |
| August             | 0          | 27.3    | 0        | 64.7  | 0              | 39.1   | 0        | 13.5  | 144.6      |
| September          | 1.4        | 16.6    | 0        | 115.9 | 0              | 25.1   | 0        | 0     | 159.0      |
| October            | 0          | 6.0     | 0        | 54.7  | 0              | 47.0   | 0        | 4.7   | 112.4      |
| November           | 0          | 12.9    | 0        | 60.1  | 0              | 0      | 0        | 0     | 73.0       |
| December           | 3.3        | 30.7    | 0        | 55.1  | 0              | 66.7   | 0        | 0     | 155.8      |
| Year               | 36.3       | 181.1   | 9.2      | 760.9 | 6.1            | 428.9  | 0        | 164.2 | 1,586.7    |
| 1986               |            |         |          |       |                |        |          |       |            |
| January            | 1.0        | 21.8    | 0        | 66.2  | 0              | 12.8   | 0        | 21.5  | 124.3      |
| February           | 7.6        | 49.6    | 0        | 49.7  | 0              | 91.0   | 0        | 4.6   | 202.5      |
| March              | 14.3       | 59.3    | 0        | 37.4  | 0              | 12.4   | 0        | 0     | 123.4      |
| April              | 7.3        | 75.1    | 0        | 33.6  | 0              | 104.5  | 0        | 0     | 220.5      |
| May                | 7.3        | 51.3    | 0        | 16.7  | 0              | 105.7  | 0        | 4.6   | 185.6      |
| June               | 11.0       | 10.7    | 2.8      | 87.0  | 0              | 27.6   | 0        | 0     | 139.1      |
| July               | 0          | 32.5    | 0.3      | 12.6  | 0              | 21.8   | 0        | 0     | 67.2       |
| August             | 7.7        | 36.8    | 0        | 19.7  | 0              | 46.2   | 0        | 0     | 110.4      |
| September          | 7.2        | 0.7     | 16.9     | 0     | 0              | 74.0   | 0        | 0     | 98.8       |
| October            | 20.3       | 82.5    | 0        | 4.1   | 2.4            | 70.1   | 0        | 0     | 179.4      |
| November           | 13.9       | 75.8    | 13.2     | 21.6  | 0              | 44.0   | 0        | 0     | 168.5      |
| December           | 21.2       | 74.0    | 0        | 0     | 10.4           | 190.4  | 0        | 0     | 296.0      |
| Year               | 118.8      | 570.1   | 33.2     | 348.6 | 12.8           | 801.8  | 0        | 30.7  | 1,916.0    |
| 1987               |            |         |          |       |                |        |          |       |            |
| January            | 15.0       | 0       | 0        | 0     | 0              | 17.0   | 0        | 0     | 32.0       |
| February           | 21.4       | 78.6    | 0        | 23.0  | 7.4            | 120.9  | 0        | .4    | 251.7      |
| March              | 7.0        | 104.4   | 0        | 0     | 0              | 155.2  | 0        | 0     | 266.6      |
| April              | 6.5        | 171.2   | 0        | 11.1  | 0              | 165.1  | 0        | 0     | 367.7      |
| May                | 8.4        | 148.5   | 0        | 26.7  | 0              | 86.3   | 0        | 20.0  | 289.9      |
| June               | 8.4        | 144.0   | 0        | 22.8  | 0              | 155.3  | 0        | 19.1  | 349.6      |
| July               | 35.2       | 151.9   | 0        | 12.0  | 0              | 112.7  | 0        | 13.3  | 325.1      |
| August             | 0          | 58.0    | 33.7     | 20.6  | 11.3           | 121.0  | 0        | 47.7  | 292.3      |
| September          | 43.7       | 32.5    | 0        | 53.6  | 20.2           | 116.9  | 0        | 17.6  | 284.5      |
| October            | 15.1       | 172.4   | 0        | 15.1  | 19.8           | 94.2   | 0        | 16.6  | 333.2      |
| November           | 23.9       | 99.4    | 0        | 8.9   | 0              | 85.9   | 0        | 7.1   | 225.2      |
| December           | 10.4       | 166.3   | 0        | 47.2  | 0              | 99.8   | 0        | 0     | 323.7      |
| Year               | 178.2      | 1,327.2 | 33.7     | 33.7  | 214.0          | 58.7   | 0        | 155.6 | 3,324.7    |
| 1988               |            |         |          |       |                |        |          |       |            |
| January            | 0          | 155.0   | 0        | 17.8  | 0              | 90.3   | 0        | 0     | 263.1      |
| February           | 8.0        | 158.0   | 0        | 19.3  | 5.2            | 94.1   | 0        | 19.2  | 303.8      |
| March              | 11.5       | 267.9   | 0        | 0     | 30.5           | 1167.1 | 0        | 21.5  | 498.5      |
| April              | 7.4        | 118.9   | 0        | 0.6   | 8.6            | 112.1  | 0        | 5.1   | 252.7      |
| May                | 14.3       | 177.6   | 0        | 0.6   | 0              | 131.9  | 0        | 11.4  | 335.8      |
| June               | 0          | 105.5   | 0        | 12.5  | 0              | 159.8  | 0        | 19.1  | 349.6      |
| July               | 0          | 0       | 0        | 0     | 0              | 67.3   | 0        | 10.7  | 78.0       |
| August             | 0          | 106.0   | 0        | 17.2  | 0              | 51.9   | 0        | 12.9  | 188.0      |
| September          | 4.3        | 121.1   | 0        | 12.9  | 0              | 107.4  | 0        | 35.2  | 280.9      |
| Year <u>1/</u>     | 45.5       | 1,210.0 | 0        | 111.4 | 13.8           | 981.9  | 0        | 136.1 | 2,498.7    |

1/ Year to date2/ Statistical correction.

Source: (5).

Table 10--New Zealand lamb exports to the United States

| Month              | 1986    |        | 1987    |        | 1988    |        |
|--------------------|---------|--------|---------|--------|---------|--------|
|                    | Chilled | Frozen | Chilled | Frozen | Chilled | Frozen |
| <u>Metric tons</u> |         |        |         |        |         |        |
| January            | 20      | 1,091  | 37      | 57     | 53      | 6      |
| February           | 66      | 1,899  | 25      | 53     | 55      | 96     |
| March              | 5       | 539    | 58      | 127    | 88      | 476    |
| April              | 22      | 2,224  | 55      | 177    | 94      | 469    |
| May                | 9       | 356    | 26      | 212    | 59      | 664    |
| June               | 35      | 1,237  | 49      | 244    | 106     | 732    |
| July               | 0       | 350    | 36      | 349    | 67      | 652    |
| August             | 25      | 706    | 51      | 325    | 81      | 431    |
| September          | 15      | 626    | 40      | 410    | NA      | NA     |
| October            | 7       | 455    | 78      | 239    | NA      | NA     |
| November           | 28      | 334    | 110     | 157    | NA      | NA     |
| December           | 11      | 80     | 43      | 14     | NA      | NA     |
| Total              | 243     | 10,077 | 608     | 2,364  | 603     | 3,526  |

NA = Not available.

Source: (20).

Table 11--Australian lamb exports to the United States, year ending June

| Period 1/          | Carcass  | Cuts                      |          |          |          |             |        |             |               | Total carcass and cuts |
|--------------------|----------|---------------------------|----------|----------|----------|-------------|--------|-------------|---------------|------------------------|
|                    |          | Boneless, manufac- turing | Legs     | Loins    | Racks    | Should- ers | Breast | Fore- shank | Assorted cuts |                        |
| <u>Metric tons</u> |          |                           |          |          |          |             |        |             |               |                        |
| Total:             |          |                           |          |          |          |             |        |             |               |                        |
| 1981/82            | 223.39   | 181.35                    | 1,086.71 | 25.14    | 64.20    | 16.37       | 0      | 41.61       | 0             | 1,638.76               |
| 1982/83            | 192.01   | 147.93                    | 672.97   | 146.1    | 99.59    | 23.22       | 0      | 31.54       | 0             | 1,313.39               |
| 1983/84            | 581.72   | 245.87                    | 594.46   | 224.49   | 77.49    | 39.75       | 4.18   | 35.23       | 0.37          | 1,740.33               |
| 1984/85            | 166.77   | 397.21                    | 498.80   | 242.80   | 138.09   | 111.65      | 0      | 46.48       | .02           | 1,601.19               |
| 1985/86            | 1,132.06 | 568.51                    | 1,230.35 | 470.77   | 415.39   | 298.10      | 2.35   | 194.22      | 192.29        | 4,504.04               |
| 1986/87            | 2,892.41 | 75.95                     | 2,066.03 | 882.89   | 772.62   | 881.12      | 41.45  | 367.82      | 261.58        | 8,241.87               |
| 1987/88            | 2,055.29 | 120.15                    | 2,946.91 | 1,050.68 | 1,043.61 | 1,246.04    | 12.80  | 639.00      | 283.04        | 9,397.51               |
| Fresh:             |          |                           |          |          |          |             |        |             |               |                        |
| 1981/82            | 151.09   | 0                         | 144.43   | 9.85     | .10      | 16.37       | 0      | 0           | 0             | 321.84                 |
| 1982/83            | 143.55   | 0                         | 175.60   | 137.25   | .03      | 4.92        | 0      | 0           | 0             | 462.35                 |
| 1983/84            | 35.81    | 0                         | 326.08   | 177.98   | 1.14     | 4.57        | 0      | 0           | 0             | 545.61                 |
| 1984/85            | 28.45    | 1.42                      | 362.03   | 170.10   | .44      | 1.89        | 0      | .69         | 0             | 569.01                 |
| 1985/86            | 1,076.02 | 22.39                     | 829.34   | 323.11   | 126.32   | 129.92      | .03    | .06         | 192.12        | 2,699.30               |
| 1986/87            | 2,729.83 | 1.18                      | 1,291.39 | 630.59   | 451.45   | 410.83      | 1.38   | 3.47        | 260.71        | 5,780.82               |
| 1987/88            | 1,777.90 | 27.13                     | 1,686.08 | 731.44   | 622.01   | 512.86      | 2.52   | 18.55       | 282.92        | 5,661.40               |
| Frozen:            |          |                           |          |          |          |             |        |             |               |                        |
| 1981/82            | 72.30    | 181.35                    | 942.28   | 15.29    | 64.10    | 0           | 0      | 41.60       | 0             | 1,316.92               |
| 1982/83            | 48.46    | 147.93                    | 497.37   | 8.87     | 99.56    | 18.31       | 0      | 31.54       | 0             | 852.04                 |
| 1983/84            | 482.91   | 245.87                    | 268.18   | 46.48    | 76.35    | 35.18       | 4.18   | 35.19       | .37           | 1,194.72               |
| 1984/85            | 138.33   | 395.79                    | 136.13   | 72.17    | 137.66   | 109.75      | 0      | 45.79       | .02           | 1,036.17               |
| 1985/86            | 56.04    | 546.12                    | 401.01   | 147.67   | 289.07   | 168.18      | 2.32   | 194.16      | .17           | 1,804.74               |
| 1986/87            | 162.58   | 74.76                     | 774.65   | 252.30   | 321.17   | 470.30      | 40.08  | 364.35      | .87           | 2,461.04               |
| 1987/88            | 277.39   | 93.03                     | 1,260.83 | 319.24   | 421.60   | 733.18      | 10.28  | 620.45      | .11           | 3,736.11               |

1/ Period begins July 1 and end June 30 of the next year.

Source: (6).

level of production will likely cycle around present levels in the foreseeable future.

The main challenge to the U.S. lamb industry is to expand consumption of a relatively expensive red meat in a market where poultry is capturing more of the red meat market because of lower relative prices. Furthermore, only a small segment of the population consumes lamb, which means that the industry also needs to attract new consumers to expand consumption.

U.S. imports and domestic production of lamb have both declined at about the same rate, indicating that the decline in the lamb industry is not the result of import penetration, but due mainly to a decline in consumer demand. Imports have been counter-cyclical, attracted into the United States when production declines lead to higher prices.

An increasing proportion of U.S. lamb imports have been fresh product, particularly from Australia. Australia has been an innovator in the delivery of fresh lamb to the United States. The Australians have also been promoting their lamb to U.S. consumers in a much more visible way than the U.S. industry. The Australians appear to be trying to establish a broader consumer base, which in the long run could benefit the U.S. industry.

Most sheep production is located in the Western United States because sheep are one of the few animals that can effectively use the forage in many mountain and arid areas. If sheep are not used to harvest the forage in these areas, these resources will remain idle. In fact, many of the sheep permits on U.S. Government grazing land are idle because sheep producers are leaving the industry.

ERS costs and returns information indicates that stock sheep

Table 12--U.S. live sheep and lamb imports and exports

| Year | Exports           | Imports | Year | Exports           | Imports |
|------|-------------------|---------|------|-------------------|---------|
|      | <u>1,000 head</u> |         |      | <u>1,000 head</u> |         |
| 1970 | 133               | 12      | 1980 | 124               | 21      |
| 1971 | 214               | 5       | 1981 | 221               | 7       |
| 1972 | 159               | 14      | 1982 | 281               | 9       |
| 1973 | 204               | 10      | 1983 | 221               | 16      |
| 1974 | 291               | 1       | 1984 | 317               | 24      |
| 1975 | 339               | 3       | 1985 | 363               | 22      |
| 1976 | 244               | 5       | 1986 | 122               | 28      |
| 1977 | 205               | 9       | 1987 | 42                | 33      |
| 1978 | 142               | 11      | 1988 | 175               | 37      |
| 1979 | 125               | 9       |      |                   |         |

production has been profitable more often than domestic cattle production, on an equivalent resource base. This indicates that sheep require higher returns than cattle to attract the intensity of management necessary in sheep production. Management and labor problems persist in the industry because sheep are susceptible to disease and predators. Because sheep are excellent foragers in arid areas, sheep tending is a lonely existence that does not appeal to many people.

Sheep producers have confronted the problem of labor intensity by reducing the amount of labor required to produce a pound of lamb and by increasing the weights of lambs slaughtered. This has been done through genetics and feedlot finishing.

The sheep industry has benefited from U.S. Government programs. In 1987, 17 percent of stock sheep receipts were Government payments from the wool program. In many years, the wool program has been the difference between profits and losses for the U.S. sheep industry.

Lamb has become a specialty product in the United States. Per capita consumption of lamb was 1.2 pounds in 1988, less than 0.6 percent of meat and poultry consumption. As the infrastructure of the industry shrinks, small-scale production and distribution tend to increase the costs of processing live animals into meat. Such costs are generally borne by both consumers and producers. It is important to know that U.S. imports have declined along with U.S. production in the domestic market, indicating that the industry's problem is a lack of a consumer base. The lamb industry will likely need to consider the costs and benefits of increasing the promotion of its product to attract a broader consumer base.

The industry has adjusted to a long-term decline unmatched by any other livestock sector. Producers' returns have consistently been positive in recent years, and marketing facilities and slaughtering plants have been adjusted to gain scale economies for a declining industry.

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## Appendix A--Wool

Wool is a joint product of the sheep industry, along with lamb and mutton. Wool receipts annually accounted for 25-35 percent of stock sheep receipts. The largest proportion of these wool receipts are payments from a U.S. Government support program that has been in effect since 1954. Government payments for wool have helped to improve the profitability of the sheep industry, likely slowing, but not stopping, the industry's decline.

### Trends in Domestic Wool Production

U.S. wool production has declined proportionally to the decline in the U.S. sheep inventories. Unlike lamb production, wool production has shown no significant gain in output per animal. The domestic wool production record was 338 million pounds in 1942. In 1988, the amount was 90.4 million pounds, less than a fourth of the peak production.

Domestic wool production has also declined as a percentage of domestic use. U.S. imports of raw wool were approximately twice that of domestic production in 1988. The biggest effect has been on imports of wool fabric. Wool fabric imports were more than double raw wool products on an equivalent basis in 1988 (24).

Domestic wool prices during the past few years have been increasing, as demand increased in the international market. Factors affecting wool prices are fashion, relative fiber prices, price variability, and overall economic activity (7).

Domestic wool prices have been supported by various U.S. Government programs since 1938 (7). The Agricultural Act of 1954 (Title VII) provided for the present wool and mohair support program, as renewed under each farm law. A base rate of \$0.62 per pound was established by the law. The Food and Agricultural Act of 1965 introduced a formula that adjusts the base rate. This rate is adjusted by the ratio of the average parity index (as calculated by USDA and published in Agricultural Prices) for the preceding 3 years divided by the average parity index for the period 1958 (29). The ratio for the 1988 support price uses the 1985-87 parity indexes.

Actual payments to producers depend on the price that they have received for their wool. A payment rate is established by the Agricultural Stabilization and Conservation Service by a formula. This formula bases the payment rate for wool on the percentage that the support price exceeds the market price. For example, the support price for 1987 was \$1.81 per pound and the average farm price received by farmers was \$0.917. This resulted in a payment rate of 97.4 percent ( $(\$1.81/\$0.917)-1$ ). A producer receiving \$3.00 a pound for wool would receive \$2.92 per pound in payments, less the promotion fee. Payments to producers under the program in 1987 were \$65 million, less \$4 million for promotion.

## Appendix B--World Sheep Production

The United States has a very small sheep industry, compared with many other countries (app. table 1). In 1987, the United States ranked 13th among the major sheep-producing countries, with an inventory of 10 million head. Australia was the largest with 159 million head, followed by the USSR. China had the third largest sheep population with approximately 108 million head, and New Zealand was the fourth largest with 69 million head.

Many of the leading sheep-producing countries are also major wool-producing countries (app. table 2). Australia is by far the largest wool-producing country. In the marketing year October 1987 to September 1988, Australia produced 917,000 metric tons of wool, which was almost twice the level of the next highest producer, the USSR, with 477,000 metric tons. New Zealand was the third largest producer with 355,000 metric tons during this period. China was the fourth largest producer, 208,000 metric tons. The United States is the 14th largest wool producer in the world.

Countries with large per capita sheep populations have become large exporters of lamb and mutton (app. table 3). New Zealand was the largest exporter of lamb, mutton, and goat (481,000 metric tons) in the world in 1988. Australia was the second largest exporter with 237,000 metric tons. The European Community (EC) was the third largest exporter of lamb, mutton, and goat; however, a great deal of this trade was intra-EC.

Appendix table 1--World sheep and lamb inventories 1/

| Country            | 1984              | 1985    | 1986    | 1987    | 1988    | 1989    |
|--------------------|-------------------|---------|---------|---------|---------|---------|
|                    | <u>1,000 head</u> |         |         |         |         |         |
| United States      | 11,487            | 10,443  | 9,983   | 10,334  | 10,774  | 11,000  |
| Argentina          | 33,938            | 29,441  | 29,243  | 28,998  | 29,202  | 29,502  |
| Uruguay            | 23,337            | 22,777  | 24,808  | 25,707  | 27,365  | 28,420  |
| European Community | 57,275            | 52,218  | 54,051  | 54,705  | 56,567  | 57,922  |
| Belgium-           |                   |         |         |         |         |         |
| Luxembourg         | 120               | 134     | 147     | 149     | 151     | 153     |
| Denmark            | 38                | 40      | 52      | 70      | 73      | 90      |
| France             | 11,882            | 11,580  | 11,241  | 10,580  | 10,360  | 9,986   |
| West Germany       | 1,218             | 1,300   | 1,296   | 1,383   | 1,414   | 1,449   |
| Greece             | 9,962             | 10,029  | 10,122  | 10,000  | 10,512  | 10,694  |
| Ireland            | 2,537             | 2,690   | 2,774   | 2,917   | 3,252   | 3,387   |
| Italy              | 10,745            | 11,098  | 11,300  | 11,451  | 11,487  | 11,500  |
| Netherlands        | 766               | 814     | 868     | 985     | 1100    | 1150    |
| Portugal           | 2,493             | 2,743   | 3,000   | 3,118   | 3,180   | 3,219   |
| Spain              | 17,554            | 17,520  | 17,300  | 17,600  | 17,894  | 18,000  |
| United Kingdom     | 23,317            | 23,946  | 24,540  | 25,976  | 27,820  | 29,000  |
| Eastern Europe:    |                   |         |         |         |         |         |
| Bulgaria           | 10,978            | 10,500  | 9,724   | 9,563   | 8,886   | 8,975   |
| Czechoslovakia     | 1,041             | 1,068   | 1,087   | 1,087   | 1,087   | 1,087   |
| East Germany       | 2,359             | 2,528   | 2,587   | 2,647   | 2,710   | 2,700   |
| Hungary            | 2,977             | 2,832   | 2,465   | 2,337   | 2,336   | 2,310   |
| Poland             | 2,493             | 3,920   | 4,112   | 4,300   | 4,075   | 4,075   |
| Romania            | 18,451            | 18,637  | 18,609  | 18,762  | 18,900  | 19,400  |
| Yugoslavia         | 7,459             | 7,679   | 7,693   | 7,819   | 7,824   | 7,899   |
| USSR               | 145,265           | 142,876 | 140,850 | 142,210 | 140,783 | 142,000 |
| Turkey             | 47,650            | 47,772  | 47,000  | 43,500  | 40,000  | 36,500  |
| Egypt              | 1,157             | 1,450   | 1,500   | 1,550   | 1,650   | 1,685   |
| South Africa       | 31,265            | 30,256  | 29,481  | 29,728  | 29,640  | 30,155  |
| India              | 51,130            | 52,770  | 54,460  | 55,482  | 51,684  | 50,986  |
| Australia          | 139,242           | 149,747 | 155,561 | 158,800 | 164,590 | 171,310 |
| New Zealand        | 70,263            | 69,739  | 67,854  | 69,204  | 64,244  | 64,800  |
| China <u>2/</u>    | 95,200            | 94,200  | 100,500 | 107,800 | ---     | ---     |

--- = Not available.

1/ Data for 1988 are preliminary; data for 1989 are forecast.

2/ Commonwealth Secretariat (8).

Source: (27).

Appendix table 2--World wool production, year ending September

| Country                         | 1977-82<br>average | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---------------------------------|--------------------|------|------|------|------|------|------|
| <u>1,000 greasy metric tons</u> |                    |      |      |      |      |      |      |
| Australia                       | 702                | 702  | 728  | 814  | 830  | 887  | 917  |
| New Zealand                     | 347                | 371  | 364  | 373  | 358  | 350  | 355  |
| United Kingdom                  | 49                 | 50   | 54   | 56   | 58   | 59   | 62   |
| India                           | 35                 | 35   | 35   | 35   | 35   | 30   | 33   |
| Lesotho                         | 2                  | 3    | 3    | 3    | 3    | 3    | 3    |
| Canada                          | 1                  | 2    | 2    | 2    | 2    | 1    | 1    |
| Falkland Islands                | 2                  | 2    | 2    | 2    | 2    | 2    | 3    |
| Other                           |                    |      |      |      |      |      |      |
| Commonwealth                    | 4                  | 5    | 5    | 5    | 5    | 5    | 5    |
| Argentina                       | 170                | 162  | 162  | 150  | 152  | 150  | 152  |
| South Africa                    | 105                | 113  | 108  | 105  | 98   | 90   | 92   |
| United States                   | 49                 | 49   | 47   | 44   | 41   | 39   | 40   |
| Uruguay                         | 69                 | 82   | 82   | 71   | 87   | 90   | 90   |
| Turkey                          | 59                 | 62   | 62   | 60   | 61   | 61   | 61   |
| Spain                           | 28                 | 30   | 31   | 32   | 31   | 32   | 32   |
| Brazil                          | 30                 | 28   | 25   | 30   | 28   | 28   | 30   |
| Pakistan                        | 37                 | 41   | 45   | 48   | 49   | 50   | 51   |
| France                          | 24                 | 25   | 25   | 24   | 24   | 24   | 24   |
| Chile                           | 20                 | 22   | 21   | 21   | 21   | 20   | 22   |
| Iran                            | 16                 | 16   | 16   | 16   | 16   | 16   | 16   |
| Morocco                         | 18                 | 13   | 16   | 15   | 15   | 15   | 15   |
| Iraq                            | 18                 | 18   | 17   | 17   | 17   | 17   | 18   |
| Yugoslavia                      | 10                 | 10   | 10   | 10   | 10   | 10   | 10   |
| Italy                           | 12                 | 13   | 13   | 13   | 13   | 13   | 14   |
| Portugal                        | 9                  | 9    | 9    | 9    | 9    | 9    | 9    |
| Peru                            | 11                 | 12   | 12   | 12   | 12   | 12   | 12   |
| Ireland                         | 8                  | 7    | 7    | 7    | 7    | 8    | 8    |
| Greece                          | 10                 | 10   | 10   | 10   | 10   | 10   | 10   |
| West Germany                    | 5                  | 5    | 5    | 5    | 5    | 6    | 6    |
| Other Asia                      | 60                 | 63   | 64   | 66   | 61   | 69   | 69   |
| Other Africa                    | 71                 | 71   | 74   | 86   | 94   | 93   | 93   |
| Other America                   | 20                 | 21   | 21   | 21   | 22   | 21   | 21   |
| Other Western                   |                    |      |      |      |      |      |      |
| Europe                          | 10                 | 11   | 11   | 11   | 12   | 12   | 12   |
| USSR                            | 470                | 474  | 485  | 488  | 468  | 492  | 477  |
| Romania                         | 36                 | 39   | 39   | 42   | 44   | 44   | 44   |
| Bulgaria                        | 35                 | 35   | 36   | 36   | 34   | 33   | 32   |
| Hungary                         | 11                 | 13   | 13   | 12   | 11   | 11   | 10   |
| Poland                          | 13                 | 12   | 13   | 15   | 17   | 18   | 19   |
| East Germany                    | 11                 | 13   | 12   | 15   | 15   | 16   | 16   |
| Czechoslovakia<br>and Albania   | 7                  | 8    | 8    | 8    | 8    | 8    | 8    |
| China                           | 160                | 202  | 194  | 183  | 178  | 183  | 208  |
| Mongolia                        | 20                 | 21   | 20   | 20   | 19   | 19   | 19   |

Source: (8).

Appendix table 3--Lamb, mutton, and goat meat supply and use

| Year                                    | 1984  | 1985  | 1986  | 1987  | 1988  | 1989  |
|---|-------|-------|-------|-------|-------|-------|
| <u>1,000 metric tons carcass weight</u> |       |       |       |       |       |       |
| <b>Production:</b>                      |       |       |       |       |       |       |
| Argentina                               | 95    | 92    | 86    | 82    | 83    | 86    |
| Australia                               | 450   | 552   | 584   | 591   | 589   | 619   |
| Bulgaria                                | 103   | 112   | 113   | 110   | 110   | 110   |
| China                                   | 586   | 593   | 620   | 690   | 800   | 880   |
| EC-12                                   | 908   | 914   | 881   | 997   | 1,045 | 1,074 |
| India                                   | 48    | 499   | 517   | 486   | 531   | 535   |
| New Zealand                             | 667   | 727   | 611   | 583   | 572   | 536   |
| Other countries                         | 357   | 371   | 407   | 381   | 382   | 392   |
| South Africa                            | 231   | 219   | 198   | 201   | 203   | 205   |
| Turkey                                  | 375   | 380   | 385   | 382   | 380   | 375   |
| United States                           | 172   | 162   | 153   | 143   | 151   | 155   |
| USSR                                    | 866   | 880   | 894   | 905   | 810   | 915   |
| <b>Imports:</b>                         |       |       |       |       |       |       |
| EC-12                                   | 278   | 301   | 296   | 620   | 317   | 327   |
| Intra-EC                                | 200   | 221   | 197   | 203   | 199   | 199   |
| Japan                                   | 149   | 159   | 159   | 153   | 155   | 160   |
| Korea                                   | 11    | 15    | 14    | 16    | 18    | 19    |
| Other countries                         | 8     | 21    | 14    | 12    | 10    | 11    |
| United States                           | 9     | 16    | 19    | 20    | 25    | 27    |
| USSR                                    | 30    | 21    | 26    | 35    | 35    | 35    |
| <b>Exports:</b>                         |       |       |       |       |       |       |
| Australia                               | 129   | 168   | 221   | 207   | 237   | 250   |
| Bulgaria                                | 7     | 7     | 4     | 4     | 7     | 12    |
| EC-12                                   | 77    | 90    | 101   | 119   | 136   | 153   |
| India                                   | 52    | 35    | 35    | 22    | 20    | 15    |
| Korea                                   | 23    | 21    | 15    | 13    | 14    | 15    |
| Other countries                         | 44    | 39    | 38    | 39    | 40    | 33    |
| New Zealand                             | 528   | 544   | 522   | 490   | 481   | 451   |
| Romania                                 | 23    | 21    | 30    | 30    | 30    | 30    |
| Turkey                                  | 47    | 40    | 45    | 45    | 45    | 45    |
| United States                           | 1     | 1     | 1     | 1     | 1     | 1     |
| <b>Consumption:</b>                     |       |       |       |       |       |       |
| Argentina                               | 79    | 80    | 76    | 75    | 75    | 77    |
| Australia                               | 307   | 382   | 364   | 383   | 356   | 369   |
| Bulgaria                                | 81    | 89    | 87    | 81    | 81    | 81    |
| China                                   | 586   | 593   | 620   | 690   | 800   | 880   |
| EC-12                                   | 1,119 | 1,118 | 1,094 | 1,197 | 1,223 | 1,248 |
| India                                   | 458   | 478   | 502   | 473   | 517   | 520   |
| Japan                                   | 155   | 155   | 165   | 150   | 160   | 160   |
| New Zealand                             | 138   | 176   | 158   | 93    | 92    | 92    |
| South Africa                            | 231   | 219   | 200   | 203   | 206   | 207   |
| Turkey                                  | 323   | 330   | 346   | 355   | 365   | 370   |
| United States                           | 182   | 174   | 171   | 164   | 175   | 181   |
| USSR                                    | 896   | 901   | 919   | 939   | 944   | 949   |

Source: (27).

## Appendix C--Australian and New Zealand Sheep Production

As in the United States, Australian and New Zealand sheep producers use sheep to harvest forage that might otherwise go unused. Australian sheep production is located in semi-arid areas where sheep excel at foraging. Sheep producers in Australia, like those in the United States, tend also to be in the cattle and crop business. New Zealand, on the other hand, is not as arid as Australia but has a large supply of grass that producers use for both sheep and cattle.

### Australia

Australia has the largest sheep population in the world. They forage on a large area of semi-arid land ideally suited to sheep production, much like parts of the Western United States. The major difference between the U.S. and Australian sheep industries is the dependence on wool production by the Australian sheep producers. Wool is by far the major product and source of revenue for the Australian sheep industry.

### Australian Sheep Production

Australian sheep producers tend to have multienterprise farms. Wool is by far the largest receipt category of the Australian sheep producer, accounting for 66 percent of their receipts in 1986-87 (app. table 4). During 1953-84 on average, wool sales accounted for 41 percent of the receipts of a sheep farm; sheep, 14 percent; wheat, 26 percent; cattle, 8.5 percent; and other crops, 7.5 percent (18).

Lamb and mutton exports are a major use of domestic sheep production in Australia. Australia exported approximately 40 percent of its lamb and mutton production in 1988 (27). Because of the dependence of the Australian sheep industry on wool production, mutton exports are larger than lamb exports. The largest market for mutton is the Middle East and Japan. Lamb exports in 1988 were only 32 percent of the total Australian lamb and mutton exports (app. table 5). Lamb exports go mainly to the Middle East and the United States. The U.S. share of the Australian lamb export market has increased during the past 4 years. The U.S. share of Australian lamb exports in 1988 was about 19 percent.

Australians, on average, ate 49 pounds of lamb and mutton (carcass weight basis) in 1988 (27). This is approximately 30 times the per capita consumption of lamb in the United States. This indicates that there is a domestic market for lamb and mutton in Australia that does not exist in the United States.

### New Zealand

The New Zealand sheep industry differs from the Australian sheep industry to a great extent because of climatic differences. New Zealand has a much more lush vegetation than does Australia, and the New Zealanders use sheep to harvest this vegetation. The

Appendix table 4--Australian sheep farm survey results, per farm

| Item                              | Unit        | 1985-86 | 1986-87 |
|-----------------------------------|-------------|---------|---------|
| Total farm area as of June 30     | Hectares    | 6,095   | 6,737   |
| Wheat sown                        | do.         | 10      | 8       |
| Sheep carried as of June 30       | Number      | 3,941   | 3,954   |
| Beef cattle carried as of June 30 | do.         | 54      | 60      |
| Area harvested:                   |             |         |         |
| Wheat                             | Hectares    | 4       | 7       |
| Other grains                      | do.         | 13      | 11      |
| Wheat harvested                   | Metric tons | 7       | 10      |
| Sheep sold                        | Number      | 1,381   | 1,235   |
| Beef cattle sold                  | do.         | 27      | 21      |
| Sheep and lambs shorn             | do.         | 4,404   | 4,249   |
| Wool produced                     | Kilograms   | 18,223  | 18,302  |
| Labor used                        | Weeks       | 106     | NA      |
| Cash receipts:                    |             |         |         |
| Sales--                           |             |         |         |
| Sheep                             | Aus\$       | 21,322  | 24,860  |
| Beef cattle                       | do.         | 8,345   | 6,930   |
| Other livestock                   | do.         | 363     | 710     |
| Wool                              | do.         | 63,059  | 73,550  |
| Wheat                             | do.         | 890     | 1,140   |
| Other crops                       | do.         | 2,503   | 1,500   |
| Off-farm sharefarming             | do.         | 490     | 200     |
| Off-farm contracts                | do.         | 1,717   | 1,510   |
| Other income                      | do.         | 1,733   | 1,500   |
| Total cash receipts               | do.         | 100,422 | 111,900 |
| Cash costs:                       |             |         |         |
| Purchases--                       |             |         |         |
| Sheep                             | do.         | 6,703   | 8,740   |
| Beef cattle                       | do.         | 1,462   | 2,000   |
| Hired labor                       | do.         | 5,178   | 3,120   |
| Sharing and crutching             | do.         | 8,353   | 8,010   |
| Materials                         | do.         | 23,388  | 23,890  |
| Services                          | do.         | 21,623  | 22,170  |
| Interest                          | do.         | 11,806  | 10,260  |
| Rent                              | do.         | 1,186   | 1,170   |
| Payment to sharefarmers           | do.         | 89      | 290     |
| Other cash costs                  | do.         | 725     | 530     |
| Total cash costs                  | do.         | 80,512  | 80,180  |
| Farm cash operation surplus       | do.         | 19,910  | 31,720  |

NA = Not available.

Source: (4).

Appendix table 5--Australian lamb export, year ending  
June 30

| Exports/<br>destination | 1984/85                  | 1985/86 | 1986/87 | 1987/88 |
|-------------------------|--------------------------|---------|---------|---------|
|                         | <u>1,000 metric tons</u> |         |         |         |
| Lamb:                   |                          |         |         |         |
| Middle East             | 16.4                     | 20.6    | 21.5    | 17.1    |
| United States           | 1.6                      | 4.5     | 8.2     | 9.4     |
| Japan                   | 5.9                      | 8.1     | 6.3     | 4.9     |
| EC                      | .3                       | .6      | 5.2     | 3.9     |
| Canada                  | .5                       | 1.3     | 2.1     | 1.9     |
| Other                   | .5                       | 8.8     | 9.5     | 11.7    |
| Total                   | 32.4                     | 49.3    | 52.9    | 48.9    |
| Mutton:                 |                          |         |         |         |
| Middle East             | 21.3                     | 34.9    | 40.3    | 27.5    |
| Japan                   | .2                       | 29.1    | 26.1    | 27.4    |
| Malaysia/Singapore      | 6.4                      | 6.1     | 8.7     | 8.3     |
| EC                      | 10.1                     | 7.0     | 7.5     | 6.2     |
| United States           | .6                       | 2.4     | 4.4     | 6.0     |
| Other                   | 8.2                      | 14.8    | 23.1    | 28.8    |
| Total                   | 66.6                     | 94.3    | 110.1   | 104.2   |

Source: (5).

climatic differences have resulted in the New Zealand producers using different breeds of sheep. New Zealand breeds are meat-type sheep that produce a coarser wool. Hence, New Zealanders rely more on meat products for their livelihood.

New Zealand sheep production is usually a joint enterprise with a cattle operation. Sheep meat and wool returns were roughly equivalent until 1985-86 (app. table 6). After this period, wool receipts increased, while sheep receipts dropped off. Part of the reason for the shipment of live sheep from New Zealand to the United States in 1988 is the low prices New Zealand producers have been receiving for their lambs.

New Zealand is the largest exporter of lamb and mutton in the world. Exports of lamb were 89 percent of domestic production from October 1986 to September 1987. USDA's Foreign Agricultural Service estimates that New Zealand exports of lamb, mutton, and goat for 1988 were about 858 million pounds (carcass weight) or 93 percent of domestic production. New Zealand, unlike Australia, produces more lamb for export than mutton, reconfirming the reliance on meat production as opposed to wool production for their domestic industry. The United States made up less than 1 percent of New Zealand lamb exports in 1987 (app. table 7).

As in Australia, domestic consumption of lamb and mutton is fairly high on a per capita basis in New Zealand. New Zealand domestic per capita consumption of lamb was 13.8 kilograms (30.4 pounds) and mutton was 26.2 kilograms (57.8 pounds) in 1987.

Appendix table 6--New Zealand sheep and beef farm income and expenditures per farm

| Year                        | 1983-84                    | 1984-85 | 1985-86 | 1986-87 | 1987-88 |
|-----------------------------|----------------------------|---------|---------|---------|---------|
|                             | <u>New Zealand dollars</u> |         |         |         |         |
| Income:                     |                            |         |         |         |         |
| Wool                        | 38,448                     | 46,954  | 42,400  | 48,800  | 54,900  |
| Sheep                       | 36,154                     | 44,411  | 24,957  | 31,500  | 28,700  |
| Cattle                      | 14,023                     | 21,745  | 18,824  | 19,900  | 18,900  |
| Deer                        | -403                       | 121     | 899     | 1,000   | 1,400   |
| Goat                        | 26                         | 300     | 181     | 300     | 200     |
| Crop                        | 14,205                     | 16,444  | 15,589  | 13,200  | 11,700  |
| Other                       | 2,322                      | 2,648   | 3,469   | 2,700   | 2,800   |
| Total gross income          | 104,775                    | 132,623 | 106,319 | 117,400 | 118,600 |
| Expenditures:               |                            |         |         |         |         |
| Fertilizer, lime, and seeds | 10,801                     | 14,146  | 8,201   | 8,900   | 8,700   |
| Repairs and maintenance     | 8,539                      | 9,387   | 7,142   | 6,300   | 6,600   |
| Interest                    | 16,305                     | 17,736  | 21,509  | 24,600  | 25,700  |
| Other                       | 50,639                     | 57,146  | 54,128  | 54,900  | 56,900  |
| Total farm expenditures     | 86,284                     | 98,415  | 90,980  | 94,700  | 97,900  |
| Net farm income             | 18,491                     | 34,208  | 15,339  | 22,700  | 20,700  |

Source: (20).

Appendix table 7--New Zealand meat production and consumption, year ending September 1/

| Meat    | 1987                 |                   |                      |               | 1988<br>production<br>estimates |
|---------|----------------------|-------------------|----------------------|---------------|---------------------------------|
|         | Production           |                   | Consumption          |               |                                 |
|         | Quantity             | Share of<br>total | Quantity             | Per<br>capita |                                 |
|         | 1,000<br>metric tons | Percent           | 1,000<br>metric tons | Kilograms     | 1,000<br>metric tons            |
| Beef    | 540.0                | 44.7              | 134.9                | 37.8          | 537.2                           |
| Veal    | 15.1                 | 1.2               | 1.8                  | .5            | 15.2                            |
| Mutton  | 203.3                | 16.8              | 86.7                 | 26.2          | 188.6                           |
| Lamb    | 406.6                | 33.6              | 45.5                 | 13.8          | 418.0                           |
| Pigmeat | 44.4                 | 3.7               | 46.9                 | 14.2          | 44.6                            |
| Total   | 1,209.4              | 100.0             | 315.8                | 92.5          | 1,203.6                         |

1/ Meat quantity is bone-in carcass weight.

Source: (20).

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