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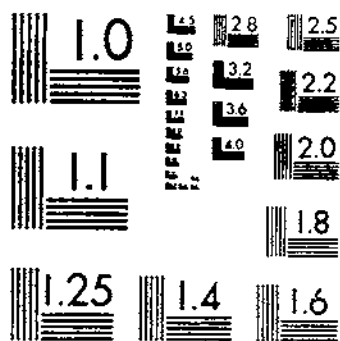
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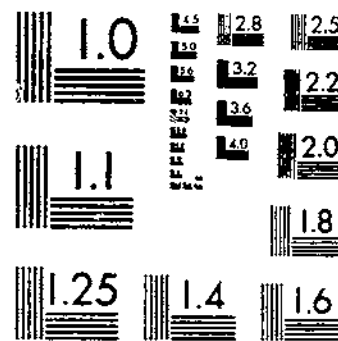
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REGIONAL LOCATION OF PRODUCTION OF MAJOR FIELD CROPS AT ALTERNATIVE
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**REGIONAL LOCATION
OF PRODUCTION OF MAJOR FIELD
CROPS AT ALTERNATIVE DEMAND
AND PRICE LEVELS, 1975**

A Linear Programing Analysis

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SUMMARY

The objective of the linear programming analysis reported here is to determine the location, in 1975, of production of wheat, corn, oats, barley, grain sorghum, soybeans, and cotton that would maximize profits to farmers under specified assumptions. The analysis covers 144 crop production regions in the United States, which in the past have accounted for most of the production of the crops considered. For purposes of the analysis, the contiguous United States is divided into 31 consumption regions, each possessing a stated requirement for wheat, feed grains, and oilmeals. These demands can be satisfied by production within the consumption regions or by interregional transfers. There is also a stated national requirement for cotton lint.

Solutions that would bring the highest net returns to farmers are computed at 10 different price levels. At low product prices the supply potential is not very great, as crop production costs exceed revenues obtained from crop production. Demands are largest at the low product prices. As product prices increase, more and more producing regions become potential suppliers; at the same time, requirements decrease, as a function of the price elasticity of demand.

The profit-maximizing cropping pattern derived in the analysis concentrates production in known areas of specialization. In this pattern, wheat is grown primarily in the Plains States and the Pacific Northwest. Feed grains are concentrated in the Corn Belt along with soybean production. Most of the cotton is grown in Texas, Arizona, and California; very little is grown in the deep South and the Southeast.

From these geographic concentrations of production it appears that comparative advantage in crop production is more a result of product specialization than of proximity to demand centers. If the demand centers exercised the dominant pull, a more diversified pattern of crop production would result.

In the solutions, none of the seven crops would be grown in many production regions. Under the conditions of the analysis, production of these crops in such regions would reduce total profits. The assumption of a single production function for each crop and region tends to cause a region either to use all of its resources in crop production or to use none. Land productivity does vary within these broad regions, however, and a more sophisticated pattern of adjustment would recognize these differences.

Because of the heavy concentration of production in the areas of specialization, sizable amounts of the products are shipped between States. The Northeast receives wheat from Nebraska and Kansas, and the South imports wheat from Kansas and Oklahoma. Colorado and Montana ship their wheat west. Wheat is used for feed in all of the 17 western States except South Dakota, Nebraska, and Texas.

Illinois, Indiana, Ohio, and Missouri are the main feed grain exporters from the Corn Belt. Feed grains from these States flow to the South and the East. Kansas, Oklahoma, and Illinois ship feed

grains to Arkansas. Nebraska, Arizona, New Mexico, and Utah ship feed grains to the west coast.

There is also much interstate shipment of oilmeals. The States exporting oilmeals are Ohio, Minnesota, Iowa, Illinois, Texas, Nebraska, New Mexico, and Arizona.

Our projections show a continuing increase of potential agricultural productivity over demand. In the profit-maximizing pattern, 71 million acres of land in the production regions are not needed for the production of wheat, feed grains, and oilseed crops.

The cropping pattern that maximizes profits includes about 55 million acres of wheat, an amount equivalent to the national allotments in recent years. A sizable amount of this wheat would be used as feed, however. The wheat fed in this profit-maximizing solution greatly exceeds the quantities fed in recent years. Most of the half-billion bushels are fed in the West. As a consequence, the West does not import any feed grains from the Corn Belt. In fact, no feed grains are transported from east to west across the Missouri River.

The cropping pattern for feed grains, even counting feed wheat, includes about 20 million acres less than was used for feed grains in recent years. Soybean and cotton acreages in the solution are much lower than recent acreage of these crops.

Regional Location of Production of Major Field Crops at Alternative Demand and Price Levels, 1975

A Linear Programing Analysis

Melvin D. Skold and Earl O. Heady ¹

INTRODUCTION

Economists have long been concerned with the importance of geographic location in economic activity. Generally, however, analyses have dealt with static situations and a single unseparated market. Only recently have economists become acquainted with the tools needed to test empirically some of the more basic economic theories involving the temporal and spatial aspects of economic activity.

This report is one in a group by Iowa State University of Science and Technology and the Economic Research Service, U.S. Department of Agriculture, analyzing interregional competition in American agriculture. The studies are based on the premise that there is overcapacity in agriculture. They focus on two questions: (1) How would land and other resources need to be allocated among regions of the United States to meet the demands for major crops at the least possible cost (or with the highest returns to farmers), and (2) how much land and other resources would be needed to meet demands for these crops under different conditions.

The Problem

In the study reported here, the demand for wheat, feed grains, and oilmeals at different price levels was projected to 1975, and the geographic production pattern which would bring the highest net returns to farmers under each of the demand-price relationships was determined by use of linear programing.

Technical innovations and changes in demand affect different geographic areas in different ways. Projection analysis may indicate that one or more of the products now of major importance in an area may be in excess supply in the future, so that resources would need to be withdrawn from their production in that area, and possibly more resources devoted to these products in another area. Divergence among geographic areas may arise for the following reasons:

1. Technologies affect certain areas uniquely because (a) the response to technology varies from area to area, and (b) a technology may be applicable only to the products of a particular area.

¹ Mr. Skold transferred to the Kansas Agricultural Experiment Station, Manhattan, Kans., January 1965.

2. Effects of shifts in demand vary because of (a) divergent trends in demand for products special to certain areas, and (b) changes in demand from one area to another resulting primarily from population shifts.

3. There may be a change in the structure of transportation facilities or transportation rates.

Previous Research

The literature contains many examples of empirical testings of variously designed models of interregional competition and spatial equilibrium (4, 5, 8, 10, 11).² The analyses discussed below (4, 5, 6, 7) are part of a group on interregional competition; the present study is a continuation.

A focus on the future has certain advantages. (1) A comparison can be made between the optimal production locations and product flows indicated by the analysis for a future point in time and (a) current patterns of production or (b) optimal patterns of production indicated by solutions based on present economic data. (2) The adjustments suggested by the normative linear programming solutions may indicate major shifts in resource use, and thus indicate the inefficiencies associated with continuing present patterns of resource use into the future. (3) The effect on resource use of temporal changes in some of the variables, such as technology, demand, and local factor and product prices, that are postulated by location theorists as being important to production location, can be examined.

Projections are always sprinkled generously with judgments and conditional assumptions, yet if one is to arrive at a realistic approach to the solution of the surplus production problem and associated income and resource problems, one must look carefully at the prospects for the future. Just as an entrepreneur allocates his resources on the basis of expectations, society can gain by making plans about its future course of action. Society needs to know of the prospective demand for agricultural products and the potential for producing these products, and to attempt to bring the two in balance. Information about the regional sources of prospective demand, and the geographic location of the potential supply, is essential in this connection.

The first report, by Egbert and Heady (4), presented a model related to the feed grain and wheat sectors. This model included 104 major grain producing regions. Each region had the potential of producing wheat for food, wheat for feed, feed grains, or some combination of the three. The amount of production within any given region was limited only by the amount of cropland available. A national requirement for wheat and feed grains was specified. Production costs, production techniques, and product requirements related to the year 1954. The objective of the model was to determine the means of meeting the prespecified product requirements at least cost. The cost-minimizing solution to the spatial linear programming problem indicated the optimal location of production of wheat and feed grains. In addition, the dual solution to the problem provided information about the marginal value of land, or location rent, in the various production regions. It also indicated equilibrium prices for wheat and for feed grains.

The analysis was later expanded to include cotton and soybeans and

² Italic numbers in parentheses refer to items in Literature Cited, p. 58.

a profit-maximizing model was added (5). The inclusion of these crops required 18 more production regions, making a total of 122. Both cost-minimizing and profit-maximizing solutions were obtained. The cost-minimizing solution determined the location of production of wheat, feed grains, oilmeals, and cotton lint to meet the stated national requirements at least cost. The profit-maximizing solution indicated the location of production that would maximize the profit to the wheat-feed grain-oilmeal sectors, within the restriction that production could not exceed the stated requirements for the products.

In a further revision of the initial model, the 48 contiguous States were divided into 10 consumption regions (6). Whereas previous analyses had assumed a single national demand for the products in question, the requirements for these products were now estimated for each of the 10 consumption regions. The object of this model was to determine the location of production that would minimize production and distribution of wheat and feed grains subject to the land availability restraints of the production regions and the product requirements of the consumption regions.

Methods and Procedures

In the present report, the Heady-Egbert model has been further extended. Thirty-one spatially separated consumption regions are delineated. The number of production regions has been expanded to 144, by splitting in two those production regions that crossed the bounds of consumption regions. The consumption regions are connected by a set of transportation activities that enable the interregional transfer of products.

Each production region has the potential for producing wheat, feed grains in rotation, feed grains and soybeans in rotation, soybeans, cotton, or any combination of these. (See "Rotations," p. 10.) The feed grains are corn, oats, barley, and grain sorghum. Each consumption region has a specified demand for wheat, feed grains, and oilmeals. In addition, a national demand for cotton lint is specified.

Production in a crop production region is first used to help fulfill the requirements of the consumption region in which it is located. Once the requirements of a consumption region are met the product can be shipped, if it is profitable to do so, to another consumption region to help fulfill its demands.

Wheat can be used to meet demands for feed grain in a consumption region if it is a cheaper source of livestock feed than other grains produced in that region or imported from another region.

A price-dependent demand curve is estimated for each final product (wheat, feed grains, and oilmeals) in each consumption region. Each curve has 10 points, and at each point the price and quantity data are specified. The demand curves are of the traditional shape, so that low prices call for larger quantities. For each set of prices corresponding to one of the 10 points on the demand curve, a vector of net revenues is created. Net revenues are determined by multiplying the appropriate price by the regional crop yield and subtracting the estimated production expenses.

The results consist of a series of 10 solutions—one for each price level. As prices increase, a stepped supply function is generated

Figure 1.—Location of production regions.

by more and more production regions becoming profitable producers. The market-clearing equilibrium prices are found where the requirements within each consumption region are just met.

At the equilibrating solution the optimal (most profitable) location of crop production is found. Also, the optimal interregional flow of products is determined.

THE PROGRAMING MODEL

The analyses in this report are based upon a single mathematical model. By changing the assumptions regarding certain economic parameters we have applied different sets of data to this mathematical model to obtain the profit-maximizing solutions.

Assumptions About the Model and the Data

Consumption and production regions.—As explained earlier, 144 production regions and 31 consumption regions are defined (figs. 1 and 2). Historically, the production regions account for 95 percent of the wheat, 97 percent of the corn, 93 percent of the oats, 84 percent of the barley, and 99 percent each of the grain sorghum, soybeans, and cotton produced in the United States. The consumption regions each comprise either one State or one or more adjoining States. A list showing the production regions in each consumption region appears on the inside of the back cover.

Production activities.—The existence of any of the five potential production activities in a production region is dependent upon the region's historical production of the crops involved.

Transfer activities.—The model contains 31 wheat-to-feed grain transfer activities—1 for each consumption region. These activities allow for the use of wheat as a feed if it is a less expensive source of livestock nutrients than feed grains. No limit is imposed on the amount of wheat that can be used as feed.

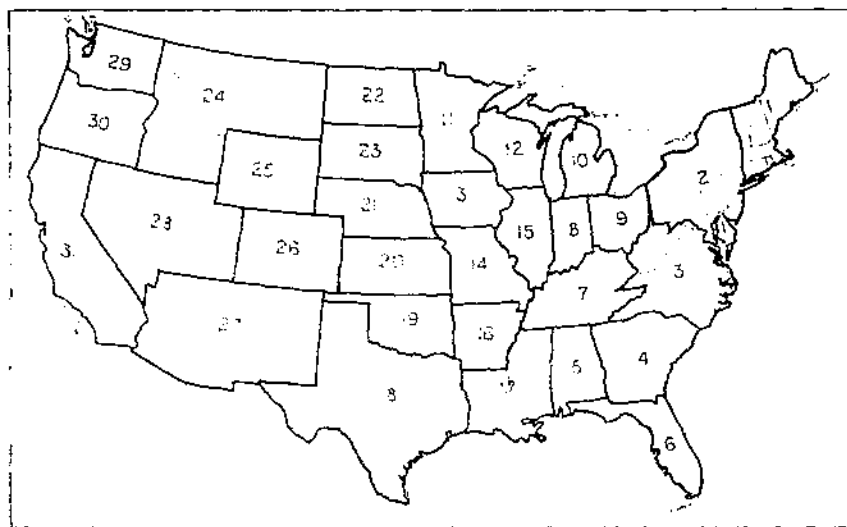


Figure 2.—Location of consumption regions.

Transportation activities.—For each of the three commodity groups, movement between consumption regions is allowed. Some of the theoretically possible activities are excluded because of the physical potentials of the consumption regions. For example, the possibility of shipping oilmeals from consumption region 30 (Oregon) to consumption region 26 (Colorado) was eliminated because Oregon has no historical production of soybeans or cotton, the two activities that produce oilmeals in the model. The study of the regional movements of grain was helpful in defining activities; however, interregional grain movements were not held strictly to past patterns. The model includes 459 wheat transportation activities, 459 feed grain activities, and 428 oilmeal activities.

Production requirements.—There is a demand restraint in each of the 31 consumption regions for wheat, feed grains, and oilmeals, and an aggregate demand restraint for cotton lint. The demand for cotton lint is satisfied by cotton activities brought into the solution. No transportation of cotton lint is required; that is, transportation costs are assumed to be zero to a central market. The demands for feed grains and oilmeals are expressed in terms of feed units. This enables the aggregation of feed crops into a single "rotation" activity. It also makes it possible to consider soybean oilmeal and cottonseed oilmeal as a homogenous product, and to use a single transportation activity for both. Wheat demand is expressed in bushels; a bushel of wheat can be transformed into feed units via the wheat-to-feed grain transfer activity.

Land restraints.—A land restraint was established for each of the 144 production regions, to reflect the total amount of land available for use in the five possible activities. All of the land available within a region can be used for wheat, feed grain rotation, or feed grain-soybean rotation. The soybean activity is limited to 50 percent of the total land available. This prevents continuous production of soybeans, which may be very costly in terms of soil loss, from entering the solutions. Cotton cannot occupy a larger percentage of the total land available than its past maximum percentage.

The Mathematical Model

Mathematically, the profit maximization model is:

$$\text{Maximize } \phi = \sum_{i=1}^{144} \sum_{k=1}^5 r_{ki} x'_{ki} - \sum_{m=1}^{31} d_m y_m - \sum_{l=1}^3 \sum_{m=1}^{31} b_{lm} z_{lm} \quad (1)$$

subject to the side-conditions that:

$$D_{1m} \geq \sum_{i=1}^p a_{1i} x'_{1i} - h_m y_m \pm \sum_{m'=1}^5 t_{1mm'} z_{1mm'} \quad (2)$$

$$D_{2m} \geq \sum_{i=1}^p a_{2i} x'_{2i} + \sum_{i=1}^p a_{3i} x'_{3i} + h_m y_m \pm \sum_{m'=1}^5 t_{2mm'} z_{2mm'} \quad (3)$$

$$D_{3m} \geq \sum_{i=1}^p a_{3i} x'_{3i} + \sum_{i=1}^p a_{4i} x'_{4i} + \sum_{i=1}^p a_{5i} x'_{5i} \pm \sum_{m'=1}^5 t_{3mm'} z_{3mm'} \quad (4)$$

$$D_c = \sum_{i=1}^{144} a_{5i} x'_{5i} \quad (5)$$

The symbols in equation 1 are defined as:

r_{ki} = net returns for the k th crop activity in the i th production region,

x'_{ki} = level of production of the k th activity in the i th production region,

d_m = cost per unit of transferring wheat into feed grains in the m th consumption region,

y_m = level of the wheat-to-feed grains activity transfer in the m th consumption region,

$b_{lm'm}$ = cost of transporting a unit of the l th product from (to) the m th consumption region to (from) the m' th consumption region, and

$z_{lm'm}$ = level of the activity transferring the l th product from (to) the m th consumption region to (from) the m' th consumption region.

In equations 2-5 the new symbols mean:

D_{lm} = demand for the l th product in the m th consumption region in which $l=1$ =wheat; $l=2$ =feed grain and $l=3$ =oilmeal demand,

a_{ki} = yield per acre of the k th production activity in the i th production region for which $k=1$ =wheat; $k=2$ =feed grain rotation; $k=3$ =feed grain-soybean rotation; $k=4$ =soybeans, and $k=5$ =cotton,

p = number of production regions in the m th consumption region,

h_m = amount of wheat transferred into feed grains per unit of the wheat-to-feed grain transfer activity in the m th consumption region,

$t_{lm'm}$ = amount of the l th product transported from the m th consumption region to the m' th consumption region or the amount of the l th product transported to the m th consumption region from the m' th consumption region per unit of the relevant transportation activity, and

D_c = national demand requirement for cotton lint.

In addition, equation 1 must be maximized within the restrictions on land availability:

$$L_{Ti} \geq \sum_{k=1}^5 x'_{ki} \quad (6)$$

$$L_{Ci} \geq x'_{5i} \quad (7)$$

$$L_{Si} \geq x'_{4i} \quad (8)$$

where—

L_{Ti} = total amount of land available for the $k=5$ production activities in the i th production region,

L_{Ci} = amount of land available for cotton production in the i th production region,

L_{Si} = amount of land available for soybean production in the i th production region,

and the other symbols are as defined above. Finally, we have the condition that:

$$x'_{ki} \geq 0, y_m \geq 0, \text{ and } z_{lm'm} = 0. \quad (9)$$

That is, the level of the production, transfer, and transportation activities must be positive.

METHOD OF ANALYSIS

The optimal location of production of the seven crops included in the analysis, together with the pattern of distribution of the crops to the respective consumption regions, was considered at 10 sets of product price levels. The price levels used in the programming operations were derived from statistical relationships between quantities demanded and product prices.

Demand Schedules

By making certain assumptions about the structural parameters affecting demand, such as population, income, and per capita consumption, a set of requirements was generated for each of the 3 demand entities in each of the 31 consumption regions. It was assumed that the averages of the 1957-61 prices for the products in question were the base prices. Using the quantities that would be demanded at these prices under the specified assumptions, a single price-quantity point for each product in each consumption region was obtained. Regional quantities demanded were then set at nine alternative levels, and the prices associated with different quantities were derived by use of price-flexibility coefficients.³ Resulting from these operations, a demand "curve" was derived for each product in each consumption region. The demand schedules synthesized in this manner have the typical negative slope, as illustrated in figure 3.

Estimation of Production Potential

Land available.—The acreage of land available in each production region for the seven crops is the acreage devoted to these crops in 1953. In most cases, the 1953 acreage was the largest of record, as that year was the last in which there were no acreage controls or marketing quotas for wheat and feed grains. As stated earlier, each production activity has the potential to use all of the land available within any production region, except that soybeans are limited to 50 percent of the land available and cotton to the proportion of land used for cotton in 1950-60.

Crop yields.—It was assumed that the ratio of production region average yields to State average yields will be the same in 1975 as it has been in the past. The 1940-62 trends in yields per harvested acre were projected linearly to 1975 for each State. Then, for each crop in each production region, the 11-year average yield for 1950-60 was determined. A similar average was calculated for each State. By indexing each production region to the State within which it lies, a coefficient was derived for adjusting the 1975 State yield estimates to yield estimates for production regions. Where data were not

³ The price-flexibility coefficient is the $P=f(Q)$ relationship, as opposed to the $Q=f(P)$ relationship in which the resultant coefficient is the price elasticity.

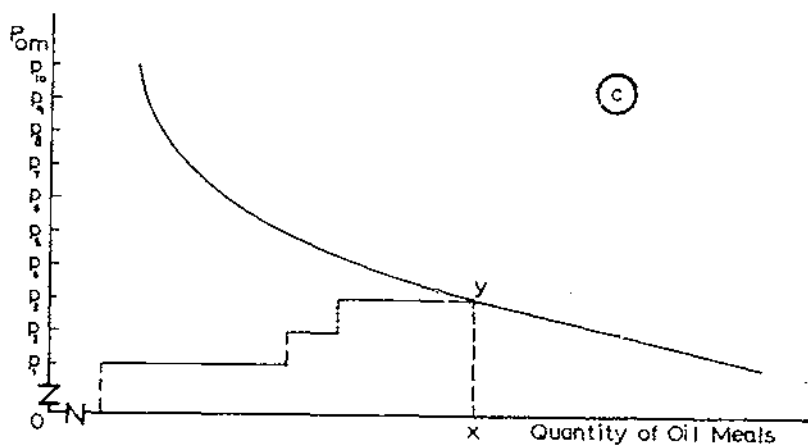
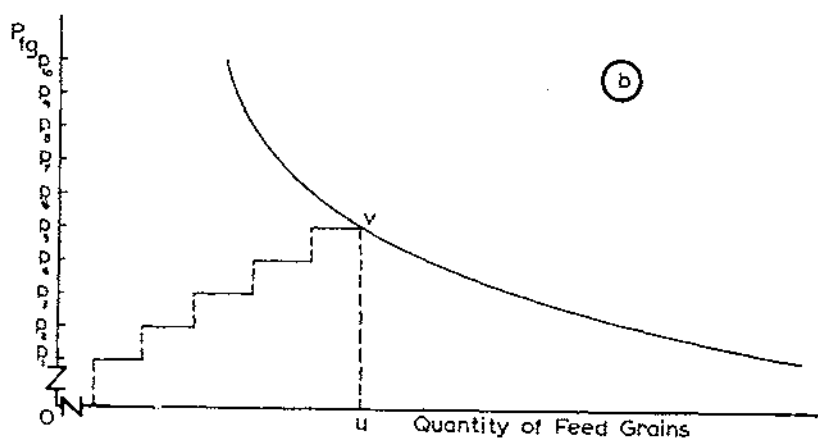
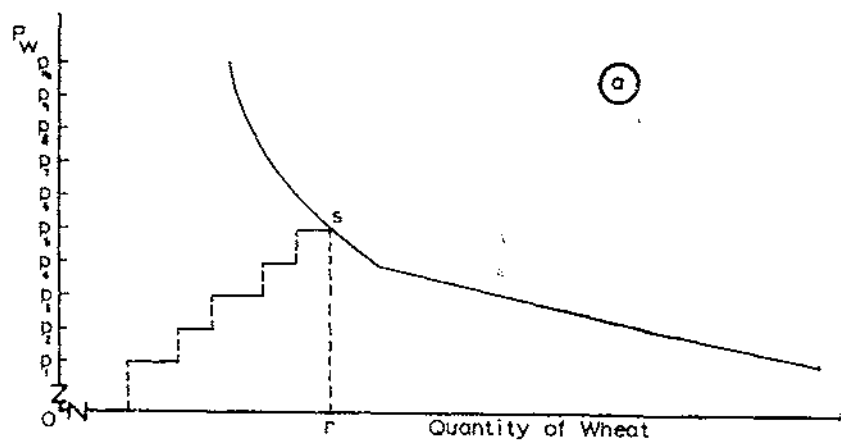


Figure 3.—Demand schedules with stepped supply functions.

available to establish the 1950-60 average yield, an average was established by using agricultural census data for 1949, 1954, and 1959.

Rotations.—For the activities in which more than one crop is involved, the average rotation in a production region during the 11 years 1950-60 was used in specifying the 1975 rotational weights for that region. Thus, in the feed grain rotation activity, the proportion of total feed grain acreage that is in corn, oats, barley, or grain sorghum is the same as the average in 1950-60. Similarly, in the feed grain-soybean activity, the weights given to the respective crops are based on the 1950-60 period.

Crop production costs.—Per acre costs of production in 1975 were obtained for the crops in the model by updating Egbert's cost estimates for 1954 (5) to take account of experienced and expected trends. This is the most precise and uniform set of estimates of per acre production costs available. In making them, Egbert synthesized the production practices for each crop within each production region in great detail. Degree of mechanization, size of power equipment used, and the amount of labor, power, and machine time required for each operation were taken into consideration. Fuel and maintenance expense for equipment was allocated to each enterprise.

Indexes of operating expenses per unit of production were derived by dividing estimated operating expenses, expressed as relatives, by the index of gross farm production for the years 1949-61. A series was constructed for the cropping sector of agriculture by States, and the State series was then adjusted to take cognizance of different rates of change in operating expenses per unit of production for the seven crops. Projecting the trends in the series to 1975, we obtained estimates of operating expenses in 1975 relative to operating expenses in 1954. Egbert's per acre crop production expenses for 1954 were then adjusted by the appropriate index to reflect production costs in 1975. For a given crop, all production regions within a given State were adjusted by the same index. Our estimates of per acre production expenses for the seven crops in 1975 are presented in appendix table 10.

Net returns.—Using the 1957-61 average prices as the base prices corresponding to the base quantities demanded, the net returns were calculated as follows:

$$R_i^r = \hat{Y}_{r,75}^i P_i^s - C_{r,75}^i \quad (10)$$

where

R_i^r = the net return for the i th crop in the r th production region,

$\hat{Y}_{r,75}^i$ = estimated per acre yield for the i th crop in the r th production region in 1975.

P_i^s = price of the i th crop in the s th State in which the r th production region lies, and

$C_{r,75}^i$ = estimated per acre cost of producing the i th crop in the r th production region in 1975.

To obtain the base prices (1957-61 average), the product prices for each region were indexed to the U.S. average prices. This index was used to compute the regional prices at the alternative price levels. The P_i^s in equation 10 was replaced by the relevant price in each instance.

The procedure for estimating crop yields by production region can be summarized as:

$$\hat{Y}_{s,75}^i = \bar{Y}_{s,40-62}^i + 24b_s^i \quad (11)$$

$$\hat{Y}_{r,75}^i = (\bar{Y}_{r,50-60}^i / \bar{Y}_{s,50-60}^i) \hat{Y}_{s,75}^i \quad (12)$$

In the above,

$\hat{Y}_{s,75}^i$ = estimated yield per acre for the i th crop in the s th State for 1975,

$\bar{Y}_{s,40-62}^i$ = average per acre yield of the i th crop in the s th State in 1940-62,

b_s^i = average rate of increase per year in the yield of the i th crop in the s th State, 1940-62.

$\hat{Y}_{r,75}^i$ = estimated yield of the i th crop in the r th production region in 1975,

$\bar{Y}_{r,50-60}^i$ = average yield of the i th crop in the r th production region in 1950-60, $r \leq s$, and

$\bar{Y}_{s,50-60}^i$ = average yield of the i th crop in the s th State in 1950-60.

The yield estimates for each crop by production region are presented in appendix table 11.

Calculation of Basic Demand Estimates

Per capita consumption.—Data from the 1955 Household Consumption Survey (1) were used in estimating per capita consumption rates of wheat and livestock products in 1975. The technique used in projecting the 1975 consumption rates was that suggested by Lavell and Burk (3), which assumes that the rate of consumption of a given food in a given urbanization category in a geographic area will be the same in 1975 as in 1955, but that the income-urbanization-geographic distribution of the population will have changed. Estimates of the income distribution of the U.S. population by urbanization category and geographic area were supplied by Lavell.⁴

The method can best be seen in the following equations:

$$c_{kh}^{i,75} = \sum_{j=1}^m c_{jkh}^{i,55} p_{jkh}^{75} \quad (13)$$

$$c_h^{i,75} = \sum_{k=1}^3 c_{kh}^{i,75} w_{kh}^{75} \quad (14)$$

and

$$c^{i,75} = \sum_{h=1}^4 c_h^{i,75} g_h^{75} \quad (15)$$

In the above,

$c_{kh}^{i,75}$ = the per capita consumption of the i th food in the k th urbanization category and the h th geographical area in 1975,

⁴ Lavell, Robert. Economic Research Service, U.S. Department of Agriculture. Private communication. 1960.

- c_{jkh}^{1955} = the per capita consumption of the i th food within the j th income class in the k th urbanization category and the h th geographical area in 1955,
 p_{jkh}^{1955} = the percentage of the population contained in the j th income class in the k th urbanization category and the h th geographical area in 1975,
 c_{jkh}^{1975} = the per capita consumption of the i th food in the h th geographic area in 1975,
 u_{jkh}^{1975} = the percentage of the population living in the k th urbanization category in the h th geographic area in 1975,
 c_{jkh}^{1975} = per capita consumption of the i th food in 1975, and
 g_h^{1975} = the percentage of the population living in the h th geographical area in 1975.

Food consumption in any group is influenced by many factors. The consumption estimates used here take cognizance only of income, the degree of urbanization, and geographic location. The 1975 per capita consumption estimates are based on the assumption that real per capita disposable income will be 50 percent higher in 1975 than it was in 1955.

Simple conversion of the retail weights of foods consumed to farm weights gives the per capita consumption requirements at the farm level. Multiplication of the farm level requirements per capita by the appropriate population figure gives the aggregate demand for a particular product.

Population.—Population is, singly the most important variable affecting the aggregate demand for farm products. The lower the price and income elasticities are, the more apparent this becomes.

The 1975 U.S. population was assumed to be 230 million people. This estimate was adapted from projections made by the Bureau of the Census, as were the estimates of population distribution among the States.

Livestock feeding efficiency.—Feed conversion rates are relevant to the demand for both feed grains and oilmeals. The 1940–58 trends in livestock feeding efficiency were projected linearly to 1975. Livestock product requirements derived from the per capita consumption and population data were translated into feed grain requirements by using these estimated levels of feeding efficiency.

Exports.—Foreign demand provides an important outlet for U.S. agricultural products. Percentage of wheat exported in 1975 is assumed to be equal to the average in 1956–61, a period in which exports were relatively high. Exports of feed grains and oilmeals are assumed to be 25 percent greater than the 1956–61 average.

Allocation of Demands Among Consumption Regions

In specifying the regional demands, only the point of primary distribution was considered. That is, the demand for the products was not distributed in accordance with regional population, but according to a region's share of total primary distribution.

For wheat, the point of primary distribution selected was the flour-milling industry. About 97 percent of all wheat consumed is a product of flour. All flour was allocated among consumption regions on the basis of the 1956–61 average volume of flour milled by States.

The demand for feed grains was distributed among regions in proportion to the estimated livestock feeding within each region. For this purpose, trends in the relocation of the livestock industry during 1930-60 were projected to 1975. The processed cereal and industrial demands for feed grains were allocated among States in accordance with value of shipments of these products reported in the 1958 Census of Manufactures (12).

The allocation of demand for oilmeals follows the distribution pattern reported by Jennings (9). The percentage of the total fed within each consumption region was adjusted in accordance with the rate of change per year in the amount of livestock fed in each consumption region. Exports were allocated among regions in proportion to 1956-61 exports.

The base quantity of cotton lint required was estimated on the basis of projected per capita consumption. The demand for cotton lint was not allocated among the 31 consumption regions.

Table 1 contains the basic demand estimates for the study. These are the quantities from which the demand schedules are derived.

TABLE 1.—Base estimates of demand for feed grains, oilmeals, and wheat, by consumption region, 1975¹

Consumption region	Feed grains (feed units)	Oilmeals (feed units)	Wheat
	1,000 tons	1,000 tons	1,000 bushels
1 New England.....	4,129.0	921.6	9,633.3
2 New York, Pennsylvania, New Jersey, Maryland, Delaware.....	11,502.6	3,498.7	141,640.2
3 Virginia, West Virginia, North Carolina.....	6,854.5	1,429.6	18,864.9
4 South Carolina, Georgia.....	6,189.1	837.5	1,595.8
5 Alabama.....	3,305.7	1,029.2	6,552.6
6 Florida.....	1,190.5	279.6	—43.0
7 Kentucky, Tennessee.....	3,601.8	785.8	12,665.2
8 Indiana.....	8,729.1	1,061.1	8,312.7
9 Ohio.....	5,523.9	1,203.2	31,858.7
10 Michigan.....	2,491.4	424.4	12,050.8
11 Minnesota.....	9,211.6	677.6	70,208.1
12 Wisconsin.....	8,302.8	734.9	21,252.2
13 Iowa.....	22,599.1	1,368.7	10,390.8
14 Missouri.....	6,972.7	1,058.7	47,955.9
15 Illinois.....	14,800.7	1,672.4	36,630.1
16 Arkansas.....	1,929.0	452.6	—152.4
17 Louisiana, Mississippi.....	4,695.0	3,618.9	57,059.6
18 Texas.....	4,900.8	1,505.0	188,674.0
19 Oklahoma.....	128.9	505.2	22,872.6
20 Kansas.....	984.2	823.7	82,540.5
21 Nebraska.....	4,920.2	494.3	15,812.3
22 North Dakota.....	687.2	26.7	7,446.8
23 South Dakota.....	3,116.7	105.2	1,097.7
24 Montana, Idaho.....	556.1	128.9	—7,300.8
25 Wyoming.....	38.1	57.2	—530.6
26 Colorado.....	497.7	240.7	6,077.4
27 New Mexico, Arizona.....	341.9	429.4	—527.1
28 Utah, Nevada.....	464.4	201.0	10,377.8
29 Washington.....	1,302.6	273.3	106,311.6
30 Oregon.....	770.9	187.8	60,094.4
31 California.....	5,415.7	669.3	12,840.1
United States.....	146,162.0	26,493.4	992,271.2

¹ Negative entries indicate the amount by which production outside the programed areas exceeds demand in the consumption region.

Deriving the Demand Schedules

The above discussion relates to the methods used to calculate the basic demand estimates presented in table 1. These estimates relate to 1957-61 average product prices.

Feed grains and oilmeals.—Feed grain and oilmeal demands are assumed to be derived primarily from the demand for livestock and livestock products. The quantities of feed grains and oilmeals demanded vary in proportion to the quantity of livestock demanded. On the basis of this structural relationship, the equilibrium quantities and prices of both the feed crops and livestock products were estimated. The average quantity of livestock in 1957-61 is assumed to be the quantity of livestock that would be supported by the base quantities of feed grains and oilmeals presented in table 1. The base livestock prices associated with these quantities would be the 1957-61 average livestock prices. Thus, we use the quantities of livestock supported by our base feed quantities to be our base livestock quantities.

The amount of livestock product required within each consumption region is assumed to change by a fixed percentage. Assuming no difference in feed conversion efficiency in going from one set of livestock requirements to another, the amounts of feed grain and oilmeals required to produce the quantities of livestock needed to meet each specified set of livestock requirements were obtained. In other words, a 10-percent increase in the quantity of livestock products demanded would mean a 10-percent increase in the demand for feed.

We assumed the 1957-61 average prices for feed grain, oilmeal, and livestock to correspond to the quantities demanded of each from the data in table 1. Given this set of price-quantity data for feed grains, oilmeals, and livestock products, and appropriate flexibility coefficients, other prices were derived by assuming alternative quantities (table 2). The livestock prices were generated by inserting assumed quantities into the price flexibility matrix reported by Brandow (2). Thus, a demand schedule for each livestock product in each consumption region was formed. From this was developed a set of derived demands for feed grains and oilmeals. The Brandow study also gives the information that was used to derive the new feed grain and oilmeal prices.

Wheat.—Starting with the prices and quantities in table 1, the wheat demand schedule was calculated on the assumption that the price elasticity of demand for wheat at farm level was -0.025 , and that the price elasticity for exports was -0.75 . The demand schedule was obtained by varying prices in \$0.15 intervals and estimating the associated quantities.

Cotton lint.—The demand schedule for cotton lint was derived by varying cotton lint prices in the same proportions as soybean oilmeal and cottonseed oilmeal prices. A price elasticity of demand of -1.27 was assumed.

Supply Schedules

While the demand schedules were predetermined, as explained above, the supply schedules are determined in the analysis. At the low product prices, demands are greater and supplies may be relatively short. A solution is generated with these demand and price conditions, and if all requirements are not met, the process is repeated with lower demand requirements and higher prices (an increased supply potential). Conceivably, at each price level a slightly larger portion of total requirements would be met and the supply schedule would appear as the step function in figure 3. The programming operations are

TABLE 2.—Aggregate quantities of feed grains, oilmeals, and wheat demanded at various price levels, 1975

Solution	Feed grains		Oilmeals			Wheat		Cotton lint	
	Quantity (feed units)	Price per bushel (corn equivalent)	Quantity (feed units)	Soybeans, price per bushel	Cottonseed, price per ton	Quantity	Price per bushel	Quantity (500-lb. bales)	Price per pound
	1,000 tons	Dollars	1,000 tons	Dollars	Dollars	1,000 bushels	Dollars	Bales	Cents
1.....	175,394	0.39	31,792	1.32	28.59	1,795,654	0.45	21,165	20.08
2.....	170,571	.53	30,918	1.44	31.19	1,689,733	.60	19,006	21.94
3.....	165,601	.60	30,017	1.66	33.79	1,423,135	.75	18,274	23.79
4.....	160,778	.67	29,143	1.63	36.32	1,312,299	.90	17,081	25.49
5.....	155,955	.74	28,268	1.80	38.91	1,229,900	1.05	15,909	27.29
6.....	150,955	.81	27,388	1.92	41.50	1,162,743	1.20	14,817	29.09
7.....	146,182	1.95	26,463	2.04	44.05	1,100,151	1.35	13,768	30.94
8.....	138,854	1.09	25,168	2.22	47.94	1,063,546	1.50	12,212	33.60
9.....	131,546	1.23	23,884	2.40	51.78	1,025,542	1.65	10,863	36.30
10.....	116,930	1.51	21,195	2.76	59.51	892,271	1.80	8,449	41.80

¹ The initial quantity and price assumption from which the demand schedules were estimated.

repeated with continuously higher prices until a solution is reached in which all requirements are met. The product prices at which all requirements are met are the product equilibrium prices.

PROGRAMED RESULTS

In discussing the programing operations, we refer to the results for a given set of prices as a "solution." There are 10 solutions in all, one for each set of assumed product prices. They are numbered in ascending order according to product prices. That is, Solution 1 has the lowest set of prices (and consequently the greatest product demands). Solution 2 has the next highest prices, and so on through Solution 10, which has the highest prices and the lowest demands.

Solutions

The results of the 10 solutions are presented in tables 3, 4, and 5 for wheat, feed grains, and oilmeals, respectively. Aggregate production of cotton lint at the prices used in the various solutions is presented in table 6.

In table 3, the first column identifies the solution number. Column 2 gives the regional price of wheat for the solution in question, and column 3 gives the estimated wheat requirements at each price level. In column 4 are the estimated amounts of production within the consumption region at each price level, and in column 5 are the production regions in which this production occurs. Column 6 shows the amount of wheat fed in the consumption regions at each price. The final four columns deal with interregional trade. Columns 7 and 8 show the quantity of wheat exported from the consumption region and the consumption regions to which it is shipped. Columns 9 and 10 show the amount of wheat imported and the consumption regions in which the imports originate. Table 4, on feed grains, has the same format. In table 5, the format is similar but a distinction is made between soybean and cottonseed production.

TABLE 3.—Wheat requirements and production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, 1975

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

CONSUMPTION REGION 1—NEW ENGLAND

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	0.50	17,432.8							
2.....	.07	15,239.5							
3.....	.83	13,316.3							
4.....	1.00	13,057.7							
5.....	1.17	11,940.3							
6.....	1.33	11,288.3							
7.....	1.50	10,768.0							
8.....	1.67	10,325.3			124,525.5			134,850.8	20.
9.....	1.83	9,956.3			117,971.6			127,927.8	15. 20.
10.....	2.00	9,633.3						9,633.3	20, 21.

CONSUMPTION REGION 2—NEW YORK, NEW JERSEY, PENNSYLVANIA, MARYLAND, DELAWARE

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	.45	256,317.8							
2.....	.60	224,069.1							
3.....	.75	203,143.2							
4.....	.90	187,322.0							
5.....	1.05	175,560.2							
6.....	1.20	165,974.0						52,458.3	8.
7.....	1.35	158,324.0						158,324.0	8, 20, 21.
8.....	1.50	151,814.2						151,814.2	8, 20, 21.
9.....	1.65	146,389.4						146,389.4	8, 15.
10.....	1.80	141,640.2						141,640.2	8, 20.

CONSUMPTION REGION 3—VIRGINIA, WEST VIRGINIA, NORTH CAROLINA

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	.46	34,138.7							
2.....	.62	29,843.6							
3.....	.77	27,056.4							
4.....	.93	24,049.2							
5.....	1.08	23,382.7							
6.....	1.24	22,105.9							
7.....	1.39	21,087.0						21,087.0	21.
8.....	1.55	20,220.0						20,220.0	20.
9.....	1.70	19,497.5	10,165.3	13				9,332.1	20.
10.....	1.85	18,804.9						18,804.9	21.

CONSUMPTION REGION 4—SOUTH CAROLINA, GEORGIA

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	.47	2,897.8							
2.....	.62	2,524.5							
3.....	.78	2,288.7							
4.....	.93	2,110.5							
5.....	1.09	1,978.0							
6.....	1.24	1,870.0							
7.....	1.40	1,783.8	1,783.8	14					
8.....	1.55	1,710.4	42,894.2	14, 123	41,184.9				
9.....	1.71	1,649.3	64,812.0	11, 14, 123, 63	162.7				
10.....	1.88	1,595.8	1,595.9	14					

CONSUMPTION REGION 5—ALABAMA

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	.45	11,851.8							
2.....	.59	10,366.0							
3.....	.74	9,307.9							
4.....	.89	8,065.9							
5.....	1.04	8,121.8							
6.....	1.19	7,678.3							
7.....	1.34	7,324.4							

TABLE 3.—Wheat requirements and production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

CONSUMPTION REGION 5—ALABAMA—Continued

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
8.	1.49	7,023.3	-----	-----	-----	-----	-----	7,023.3	20.
9.	1.63	6,772.3	-----	-----	-----	-----	-----	6,772.3	7.
10.	1.78	6,552.6	-----	-----	-----	-----	-----	6,552.6	20.

CONSUMPTION REGION 6—FLORIDA

1.	.47	-77.7	-----	-----	77.7	-----	-----	-----	-----
2.	.62	-67.9	-----	-----	67.9	-----	-----	-----	-----
3.	.76	-61.6	-----	-----	61.6	-----	-----	-----	-----
4.	.93	-56.8	-----	-----	56.8	-----	-----	-----	-----
5.	1.09	-53.2	-----	-----	53.2	-----	-----	-----	-----
6.	1.24	-50.3	-----	-----	50.3	-----	-----	-----	-----
7.	1.40	-48.0	-----	-----	48.0	-----	-----	-----	-----
8.	1.55	-46.0	-----	-----	46.0	-----	-----	-----	-----
9.	1.71	-44.4	-----	-----	44.4	-----	-----	-----	-----
10.	1.86	-43.0	-----	-----	43.0	-----	-----	-----	-----

CONSUMPTION REGION 7—KENTUCKY, TENNESSEE

1.	.45	22,010.4	-----	-----	-----	-----	-----	-----	-----
2.	.61	20,035.8	-----	-----	-----	-----	-----	-----	-----
3.	.76	18,184.6	-----	-----	-----	-----	-----	-----	-----
4.	.91	16,749.9	-----	-----	-----	-----	-----	-----	-----
5.	1.06	15,698.2	-----	-----	-----	-----	-----	-----	-----
6.	1.21	14,841.0	-----	-----	-----	-----	-----	-----	-----
7.	1.36	14,157.0	14,157.0	23	-----	-----	-----	-----	-----
8.	1.52	13,574.9	13,574.9	23	-----	-----	-----	-----	-----
9.	1.67	13,080.8	10,892.1	23	-----	6,772.3	5	-----	-----
10.	1.82	12,665.2	-----	-----	-----	-----	-----	12,665.2	20.

CONSUMPTION REGION 8—INDIANA

1.	.44	15,043.0	-----	-----	-----	-----	-----	-----	-----
2.	.58	13,150.3	-----	-----	-----	-----	-----	-----	-----
3.	.73	11,922.2	11,922.2	39	-----	-----	-----	-----	-----
4.	.87	10,993.7	18,489.6	39	-----	7,495.9	10	-----	-----
5.	1.02	10,303.4	25,240.1	39	-----	14,936.7	10	-----	-----
6.	1.16	9,740.8	62,199.1	39	-----	52,458.3	2	-----	-----
7.	1.31	9,201.8	63,231.0	38,39	-----	53,039.2	2	-----	-----
8.	1.46	8,909.8	62,199.1	39	-----	53,289.4	2	-----	-----
9.	1.60	8,591.4	110,864.0	38,39	-----	108,272.6	2	-----	-----
10.	1.75	8,312.7	62,199.1	39	-----	53,886.4	2	-----	-----

CONSUMPTION REGION 9—OHIO

1.	.44	57,652.6	-----	-----	-----	-----	-----	-----	-----
2.	.58	50,399.2	-----	-----	-----	-----	-----	-----	-----
3.	.73	45,652.3	-----	-----	-----	-----	-----	-----	-----
4.	.87	42,134.8	-----	-----	-----	-----	-----	-----	-----
5.	1.02	39,488.2	-----	-----	-----	-----	-----	39,488.2	20, 26.
6.	1.16	37,832.0	-----	-----	-----	-----	-----	37,832.0	11, 20.
7.	1.31	35,611.3	-----	-----	-----	-----	-----	35,611.3	11.
8.	1.46	34,147.1	-----	-----	-----	-----	-----	34,147.1	11.
9.	1.60	32,026.9	-----	-----	-----	-----	-----	32,026.9	11.
10.	1.75	31,858.7	-----	-----	-----	-----	-----	31,858.7	11.

TABLE 3.—Wheat requirements and production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importation consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSUMPTION REGION 10—MICHIGAN									
	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1	0.45	21,807.6							
2	.61	10,081.9							
3	.76	17,281.5							
4	.91	15,657.1						7,485.0	8.
5	1.06	14,036.1						14,036.7	8.
6	1.21	14,121.1	14,121.1	41					
7	1.36	13,470.2	13,470.2	41					
8	1.52	12,916.4	12,916.4	41					
9	1.67	12,454.8	12,454.8	41					
10	1.82	12,050.8	12,050.8	41					
CONSUMPTION REGION 11—MINNESOTA									
1	.49	127,651.3							
2	.65	111,060.3							
3	.81	100,603.8	60,344.9	63					
4	.97	92,851.6	92,851.6	56,63					
5	1.13	87,021.5	87,021.5	56,63					
6	1.30	82,269.8	162,583.1	56,63	73,098.5	6,314.8	9		
7	1.46	78,477.9	14,089.2	56,63		35,611.3	9		
8	1.62	75,251.1	109,398.2	56,63		34,147.1	9		
9	1.78	72,562.1	162,583.0	56,63	57,094.0	32,926.0	9		
10	1.94	70,208.1	162,066.5	56,63		31,558.7	9		
CONSUMPTION REGION 12—WISCONSIN									
1	.44	38,458.0							
2	.56	33,620.2							
3	.74	30,480.4							
4	.88	28,074.8							
5	1.03	26,341.7						26,341.7	21.
6	1.18	24,903.4						24,903.4	15.
7	1.32	23,755.5						23,755.5	21.
8	1.47	22,778.8						22,778.8	21.
9	1.62	21,964.8						21,964.8	21.
10	1.76	21,252.2						21,252.2	21.
CONSUMPTION REGION 13—IOWA									
1	.45	18,803.6							
2	.60	16,437.9							
3	.75	14,002.7							
4	.90	13,742.0						13,742.0	20.
5	1.05	12,879.2						12,879.2	20.
6	1.20	12,176.0						12,176.0	20.
7	1.35	11,614.8						11,614.8	21.
8	1.50	11,137.2						11,137.2	21.
9	1.65	10,739.2						10,739.2	20.
10	1.80	10,390.8						10,390.8	21.
CONSUMPTION REGION 14—MISSOURI									
1	.44	86,783.0							
2	.59	75,854.3							
3	.74	68,779.3	29,796.1	50				38,983.2	20.
4	.88	63,422.7	35,679.8	50,52				2,347.3	20.
5	1.03	59,440.4	59,440.4	28,50,52					
6	1.18	56,194.7	56,194.7	26,50,52					
7	1.32	53,604.6	53,604.6	26,50					
8	1.47	51,400.6	51,400.6	26,50					
9	1.62	49,563.9	49,563.9	26,50					
10	1.76	47,955.9	47,955.9	50,52					

TABLE 3.—Wheat requirements and production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

CONSUMPTION REGION 15—ILLINOIS

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	0.45	95,287.3							
2.....	.59	57,947.3							
3.....	.74	52,535.6							
4.....	.80	48,444.0	48,444.0	47					
5.....	1.04	45,402.3	45,402.3	47					
6.....	1.19	42,923.1	67,820.6	47		24,903.4	12		
7.....	1.34	40,944.8	40,944.8	47					
8.....	1.49	39,261.2	39,261.2	47					
9.....	1.63	37,858.3	182,618.2	47.53		144,759.9	1,2		
10.....	1.78	36,630.1	36,630.1	47					

CONSUMPTION REGION 16—ARKANSAS

1.....	.44	-275.7			275.7				
2.....	.59	-241.0			241.0				
3.....	.74	-218.5			218.5				
4.....	.88	-201.5			201.5				
5.....	1.03	-188.0			188.9				
6.....	1.18	-178.6				178.6	17		
7.....	1.32	-170.3				170.3	17		
8.....	1.47	-153.3				153.3	17		
9.....	1.62	-157.5	23,499.9	25		23,657.4	17		
10.....	1.76	-152.4				152.4	17		

CONSUMPTION REGION 17—LOUISIANA, MISSISSIPPI

1.....	.44	103,257.3							
2.....	.59	99,255.9							
3.....	.74	81,835.9							
4.....	.88	75,462.4							
5.....	1.03	70,724.2							
6.....	1.18	66,862.4						178.6	10.
7.....	1.32	63,789.0						59,405.2	16, 20.
8.....	1.47	61,158.2	4,285.6	129				56,872.7	16, 20.
9.....	1.62	58,072.8	4,285.6	129				54,687.2	15, 19.
10.....	1.76	57,059.6						57,059.6	16, 19, 20.

CONSUMPTION REGION 18—TEXAS

1.....	.45	341,432.1							
2.....	.60	298,474.8	99,171.7	95, 97, 101					
3.....	.75	270,600.1	139,279.5	95, 96, 100, 101					
4.....	.90	249,525.2	172,004.5	95, 96, 97, 98, 100, 101					
5.....	1.05	233,857.7	172,004.5	95, 96, 97, 98, 100, 101				24,202.8	19.
6.....	1.20	221,088.2	172,004.5	95, 96, 97, 98, 100, 101				40,083.7	20.
7.....	1.35	210,897.9	135,554.9	95, 96, 97, 98, 100, 101				75,343.6	16, 20.
8.....	1.50	202,226.5	158,085.9	95, 96, 97, 98, 100, 101				46,140.6	19.
9.....	1.65	195,000.3	204,334.7	95, 96, 97, 98, 100, 101	9,334.4				
10.....	1.80	188,674.3	188,678.3	95, 96, 97, 100, 101					

TABLE 3.—Wheat requirements and production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSUMPTION REGION 19—OKLAHOMA									
	Dollars	1,000 bushels	1,500 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	0.45	41,301.1							
2.....	.00	32,183.5							
3.....	.75	32,804.3	37,439.4	92.	4,635.1				
4.....	.90	30,240.4	34,749.5	92.	4,500.1				
5.....	1.05	28,359.1	59,918.0	92.	4,305.1	24,202.8	18.		
6.....	1.20	20,802.1	101,480.3	92, 94.	74,684.7				
7.....	1.35	25,590.7	101,480.8	92, 94.	4,091.0	71,829.1	18.		
8.....	1.50	24,515.5	101,480.8	92, 94.	30,830.7	48,140.0	18.		
9.....	1.65	23,639.5	115,540.1	92, 94.	60,870.6	31,029.9	17.		
10.....	1.80	22,872.6	59,918.0	92.	3,272.5	30,772.0	17.		
CONSUMPTION REGION 20—KANSAS									
1.....	.45	149,384.8	180,576.0	88, 89.	37,491.7				
2.....	.61	130,590.0	107,055.1	88, 89.	39,460.7				
3.....	.78	118,394.1	192,781.0	88, 89.	35,398.4	38,983.2	14.		
4.....	.91	109,173.3	226,780.0	88, 89.	101,627.3	16,050.4	13, 14.		
5.....	1.06	102,318.4	134,165.4	88, 89.	98,488.1	43,358.9	9, 13.		
6.....	1.21	90,731.5	291,243.5	88, 89.	102,235.0	92,277.0	9, 13, 18.		
7.....	1.39	92,273.0	291,243.5	88, 89.	92,480.8	106,489.7	2, 17, 18.		
8.....	1.52	88,479.0	352,096.0	88, 87, 88, 89.	30,290.7	233,326.3	1, 2, 3, 5, 10.		
9.....	1.67	85,317.3	352,096.0	88, 87, 88, 89.	225,422.5	41,356.2	1, 3, 13.		
10.....	1.82	82,540.5	244,165.5	88, 89.	24,904.5	136,621.5	1, 2, 5, 7, 10.		
CONSUMPTION REGION 21—NEBRASKA									
1.....	.45	28,614.6	28,614.6	76.					
2.....	.59	26,014.4	104,635.2	75, 76, 79.	79,590.8				
3.....	.74	22,678.3	104,635.2	75, 76, 79.	81,920.9				
4.....	.90	20,012.1	134,866.1	75, 76, 79.	113,954.0				
5.....	1.04	18,599.0	134,866.1	75, 76, 79.	88,925.3	26,341.7	12.		
6.....	1.19	18,528.0	160,926.4	75, 76, 78, 79.	142,397.5				
7.....	1.34	17,674.8	134,866.0	75, 76, 79.		117,191.2	2, 3, 12, 13.		
8.....	1.49	16,948.1	134,866.0	75, 76, 79.		117,917.9	2, 12, 13.		
9.....	1.63	16,342.5	134,866.0	75, 76, 79.	90,558.8	21,964.8	12.		
10.....	1.78	15,512.3	134,866.0	75, 76, 79.	62,427.8	50,625.0	1, 3, 12, 13.		
CONSUMPTION REGION 22—NORTH DAKOTA									
1.....	.48	13,476.0							
2.....	.61	11,780.5							
3.....	.80	10,680.3							
4.....	.95	9,848.5	9,848.5	66.					
5.....	1.11	9,230.1	30,250.2	66.	21,020.1				
6.....	1.27	8,726.2	31,263.5	65, 66.	22,537.3				
7.....	1.43	8,323.9	8,323.9	66.					
8.....	1.59	7,981.7	28,708.2	66.	20,726.5				
9.....	1.75	7,699.5	30,250.2	66.	22,553.8				
10.....	1.91	7,440.8	24,990.7	66.	17,453.9				
CONSUMPTION REGION 23—SOUTH DAKOTA									
1.....	.46	1,990.5							
2.....	.62	1,736.5							
3.....	.77	1,574.3							
4.....	.93	1,451.7	1,451.7	72.					
5.....	1.08	1,399.6	1,399.6	72.					
6.....	1.24	1,288.3	54,058.2	69, 72.	52,771.9				

TABLE 3.—Wheat requirements and production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

CONSUMPTION REGION 23—SOUTH DAKOTA—Continued

	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
7	1.39	1,227.0	1,227.0	72					
8	1.55	1,176.6	1,176.6	72					
9	1.70	1,134.5	54,058.2	69, 72	52,023.7				
10	1.85	1,097.7	1,097.7	69					

CONSUMPTION REGION 24—MONTANA, IDAHO

1	.42	-13,211.8			13,211.8				
2	.50	-11,549.5	9,052.0	104	20,601.5				
3	.70	-10,470.9	9,530.3	104	20,001.2				
4	.84	-9,655.4	78,098.8	104	10,418.7	68,335.5	29		
5	.98	-9,049.2	127,549.9	104, 105	18,838.1	117,763.0	29, 30		
6	1.12	-8,555.1	115,744.0	104, 105	18,235.0	106,083.2	29, 30		
7	1.26	-8,109.8	147,964.0	104, 105, 115	17,653.3	135,471.5	28, 29, 30		
8	1.40	-7,825.2	147,964.0	104, 105, 115	16,770.7	139,018.7	28, 29, 30		
9	1.54	-7,545.6	119,583.0	104, 105	15,888.0	111,240.6	29, 29, 30		
10	1.68	-7,300.8	78,098.8	104	14,122.7	71,276.9	28, 29, 30		

CONSUMPTION REGION 25—WYOMING

1	.42	-990.2			990.2				
2	.50	-839.4			839.4				
3	.70	-791.0			791.0				
4	.84	-791.7			791.7				
5	.98	-657.7			657.7				
6	1.12	-621.7	628.0	108	1,249.7				
7	1.26	-593.1	616.7	108	1,209.8				
8	1.40	-508.7	580.6	108	1,140.3				
9	1.53	-548.4	540.4	108	1,088.8				
10	1.67	-530.6	437.2	108	907.8				

CONSUMPTION REGION 26—COLORADO

1	.43	10,997.9	10,997.9	109, 111					
2	.57	9,614.2	9,614.2	109, 111					
3	.71	8,716.3	27,228.3	109, 111	18,512.0				
4	.85	8,037.5	20,047.4	109, 111	18,009.9				
5	1.00	7,592.8	80,413.1	77, 109, 111	35,276.6	37,608.7	9, 28		
6	1.14	7,121.5	80,413.1	77, 109, 111	66,365.9	7,035.7	28		
7	1.28	6,793.2	80,413.1	77, 109, 111	15,890.8	57,819.6	28		
8	1.43	6,513.9	87,751.6	77, 109, 111	15,010.8	66,226.9	28		
9	1.57	6,281.2	80,413.1	77, 109, 111	74,131.9				
10	1.71	6,077.4	80,413.1	77, 109, 111	66,488.9	7,346.8	28		

CONSUMPTION REGION 27—NEW MEXICO, ARIZONA

1	.45	-953.9			953.9				
2	.60	-833.0			833.9				
3	.75	-758.0			756.0				
4	.90	-697.1	11,212.2	142	11,939.3				
5	1.05	-653.3	10,927.8	142	11,581.1				
6	1.20	-617.7	18,199.8	112, 142	11,212.1	7,895.4	31		
7	1.35	-589.2	18,199.8	112, 142	18,759.9				
8	1.50	-565.0	18,199.8	112, 142	18,763.8				
9	1.65	-544.8	18,199.8	112, 142	18,744.6				
10	1.80	-527.1	5,894.2	112	6,421.3				

TABLE 3.—Wheat requirements and production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSUMPTION REGION 28—UTAH, NEVADA									
	Dollars	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels		1,000 bushels	
1.....	0.43	18,780.0							
2.....	.57	16,417.2							
3.....	.72	14,884.0							
4.....	.86	13,724.8							
5.....	1.00	12,863.0			15,732.2			28,595.2	26.
6.....	1.15	12,180.7	5,135.0	114				7,025.7	28.
7.....	1.29	11,600.2	5,135.0	114	04,020.3			101,394.6	24, 26.
8.....	1.43	11,123.2	5,135.0	114	115,311.8			121,300.0	24, 26.
9.....	1.58	10,725.7	5,135.0	114	31,380.0			36,070.8	24.
10.....	1.72	10,377.8	5,135.0	114	11,795.4			17,038.2	24, 26.
CONSUMPTION REGION 29—WASHINGTON									
1.....	.45	192,385.7	50,054.3	118	50,054.3				
2.....	.61	108,180.7	111,727.2	117, 118, 119	48,517.4				
3.....	.76	132,474.2	111,727.2	117, 118, 119	47,103.9				
4.....	.91	140,509.2	111,727.2	117, 118, 119	45,732.0				
5.....	1.06	131,771.1	111,727.2	117, 118, 119	44,360.0			68,335.6	24.
6.....	1.21	124,575.0	111,727.2	117, 118, 119	42,046.5			64,403.0	24.
7.....	1.36	118,134.0	111,727.2	117, 118, 119	41,574.5			55,795.2	24.
8.....	1.52	113,947.9	111,727.2	117, 118, 119	39,405.8			48,681.4	24.
9.....	1.67	109,876.2	111,727.2	117, 118, 119	37,417.0			41,716.6	24.
10.....	1.82	106,311.6	111,727.2	117, 118, 119	33,289.6			35,586.1	24.
								27,844.0	24.
CONSUMPTION REGION 30—OREGON									
1.....	.47	108,740.3	45,432.0	116	29,368.4				
2.....	.62	95,067.0	45,432.0	116	28,560.7				
3.....	.78	80,188.6	45,432.0	116	27,728.6				
4.....	.93	70,476.1	45,432.0	116	26,921.0				
5.....	1.09	74,485.9	45,432.0	116	26,113.4			53,350.1	24.
6.....	1.24	70,418.7	45,432.0	116	25,281.2			50,267.9	24.
7.....	1.40	67,173.0	45,432.0	116	24,473.6			46,314.0	24.
8.....	1.55	64,411.0	45,432.0	116	23,249.9			42,229.0	24.
9.....	1.71	62,109.4	45,432.0	116	22,026.3			38,703.7	24.
10.....	1.86	60,094.4	45,432.0	116	19,578.9			34,241.4	24.
CONSUMPTION REGION 31—CALIFORNIA									
1.....	.47	23,936.0	63,437.9	120, 121	63,437.9				
2.....	.62	20,612.0	71,815.1	120, 121, 143	71,815.1				
3.....	.78	18,415.6	49,650.4	120, 121, 143	40,650.4				
4.....	.94	10,981.3	49,650.4	120, 121, 143	32,675.9				
5.....	1.09	15,915.1	46,368.9	120, 121, 143	46,368.9				
6.....	1.25	15,046.1	46,368.9	120, 121, 143	38,928.2			7,605.4	27.
7.....	1.40	14,552.0	46,368.9	120, 121, 143	32,013.1				
8.....	1.56	13,702.5	40,657.3	120, 121, 143	35,804.8				
9.....	1.72	13,270.7	49,657.3	120, 121, 143	36,388.0				
10.....	1.87	12,840.1	61,206.5	120, 121, 143	48,366.4				

TABLE 4.—Feed grain requirements, production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, in feed units, 1975.

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

CONSUMPTION REGION 1—NEW ENGLAND

	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1.....	0.62	4,954.8							
2.....	.85	4,815.0							
3.....	.97	4,078.2							
4.....	1.06	4,541.0							
5.....	1.19	4,407.7							
6.....	1.31	4,285.3							
7.....	1.52	4,129.0							
8.....	1.75	3,922.6			3,922.6				
9.....	1.97	3,716.1			3,716.1				
10.....	2.43	3,393.2						3,393.2	8.

CONSUMPTION REGION 2—NEW YORK, NEW JERSEY, PENNSYLVANIA, MARYLAND, DELAWARE

1.....	.53	13,503.1							
2.....	.72	13,423.5							
3.....	.82	13,632.4	1,143.4	3					
4.....	.90	12,652.8	5,451.8	2,3,4					
5.....	1.01	12,273.2	6,350.4	1,2,3,4					
6.....	1.10	11,892.1	6,350.4	1,2,3,4					
7.....	1.28	11,592.6	6,350.4	1,2,3,4				5,152.2	8.
8.....	1.48	10,927.4	6,350.4	1,2,3,4				4,577.1	8,9.
9.....	1.67	10,352.3	6,350.4	1,2,3,4				4,091.9	8,9.
10.....	2.05	9,202.1	6,350.4	1,2,3,4				2,851.7	8.

CONSUMPTION REGION 3—VIRGINIA, WEST VIRGINIA, NORTH CAROLINA

1.....	.54	8,225.4							
2.....	.73	7,990.2							
3.....	.83	7,766.2							
4.....	.92	7,540.0	1,623.8	6					
5.....	1.02	7,313.8	2,138.9	5,6					
6.....	1.12	7,080.7	6,194.4	5,6,8,9,13					
7.....	1.31	6,854.5	6,035.5	5,6,7,8,9,13				218.8	8.
8.....	1.50	6,511.8	6,511.8	5,6,7,8,9,13					
9.....	1.70	6,169.1	6,169.1	5,6,7,8,9					
10.....	2.09	5,483.6	6,194.4	6,8,9,13		710.9	4		

CONSUMPTION REGION 4—SOUTH CAROLINA, GEORGIA

1.....	.49	7,427.6							
2.....	.67	7,232.7							
4.....	.78	7,012.3							
4.....	.84	6,808.1							
5.....	.94	6,608.8							
6.....	1.03	6,393.4							
7.....	1.20	6,189.1	181.1	20					
8.....	1.38	5,879.7	181.1	20	1,297.3			4,401.2	8.
9.....	1.56	5,570.2	181.1	20	1,989.6			3,399.5	8.
10.....	1.92	4,951.3	4,235.0	12,20				715.7	3,7.

TABLE 4.—Feed grain requirements, production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSUMPTION REGION 5—ALABAMA									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1	0.48	3,966.9							
2	.66	3,857.8							
3	.75	3,745.4							
4	.82	3,636.3							
5	.92	3,527.2							
6	1.01	3,414.8							
7	1.18	3,305.7	2,532.0	17, 19				773.7	14.
8	1.35	3,140.5	2,532.0	17, 19				608.4	14.
9	1.53	2,975.2	2,532.0	17, 19				443.1	14.
10	1.88	2,644.6	2,532.0	17, 19				112.5	14.
CONSUMPTION REGION 6—FLORIDA									
1	.49	1,428.6			2.4				
2	.67	1,380.3			2.1				
3	.75	1,348.8			1.9				
4	.83	1,309.5			1.8				
5	.93	1,270.3			1.7				
6	1.02	1,229.8			1.6				
7	1.19	1,190.5			1.5				
8	1.37	1,131.0			1.5			1,129.5	14.
9	1.54	1,071.4			1.4			1,079.0	14.
10	1.90	952.4			1.4			951.0	14.
CONSUMPTION REGION 7—KENTUCKY, TENNESSEE									
1	.49	4,322.1							
2	.67	4,203.3							
3	.75	4,080.8	336.5	35					
4	.83	3,962.0	612.5	35					
5	.93	3,843.1	612.5	35					
6	1.02	3,720.6	1,178.0	29, 35					
7	1.19	3,601.8	2,886.3	27, 29, 35				715.5	8.
8	1.37	3,421.7	2,886.3	27, 29, 35				535.4	15.
9	1.54	3,241.5	2,886.3	27, 29, 35				355.3	15.
10	1.90	2,881.4	2,886.3	27, 29, 35				4.9	4.
CONSUMPTION REGION 8—INDIANA									
1	.42	10,474.9							
2	.57	10,185.9	7,607.0	37, 38					
3	.65	9,899.1	9,899.1	37, 38, 39					
4	.71	9,602.0	4,281.7	37, 38, 39					
5	.80	9,314.0	9,314.0	37, 38, 39					
6	.87	9,017.2	11,550.9	37, 38					
7	1.02	8,725.1	14,815.6	37, 38		2,542.7	7		
8	1.17	8,292.7	15,875.0	37, 38		6,086.5	2, 3, 7		
9	1.32	7,856.2	13,253.2	37, 38		7,382.3	2, 4		
10	1.62	6,983.3	13,138.2	37, 38		5,397.0	2, 4		
CONSUMPTION REGION 9—OHIO									
1	.43	6,628.6							
2	.59	6,446.4							
3	.67	6,258.5							
4	.74	6,076.3	1,144.7	33					
5	.82	5,894.0	5,894.0	33					
6	.90	5,706.2	5,706.2	33					
7	1.05	5,523.9	5,523.9	33					
8	1.21	5,247.7	6,843.7	33		1,595.0	2		
9	1.36	4,971.5	6,975.0	33		2,004.4	2		
10	1.68	4,419.1	4,419.1	33					

TABLE 4.—Feed grain requirements, production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSUMPTION REGION 10—MICHIGAN									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1	0.43	2,889.6							
2	.58	2,907.4							
3	.68	2,822.7							
4	.73	2,740.5							
5	.91	2,558.3		2,558.3	40				
6	.99	2,573.6		2,573.6	40				
7	1.04	2,491.4		2,491.4	40				
8	1.19	2,396.8		2,396.8	40				
9	1.35	2,242.2		2,242.2	40				
10	1.66	1,993.1		1,993.1	40				
CONSUMPTION REGION 11—MINNESOTA									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1	.37	11,053.9							
2	.50	10,740.9							
3	.57	10,436.7		3,507.6	58				
4	.69	10,132.7		9,010.8	58, 60, 61				
5	.71	9,828.7		9,828.7	58, 58, 60, 61				
6	.77	9,515.6		7,145.7	58, 60, 61	2,330.9			
7	.90	9,211.6		9,211.6	58, 58, 60, 61				
8	1.03	8,751.0		8,751.0	58, 58, 60, 61				
9	1.17	8,200.4		6,491.9	58, 60, 61	1,798.5			
10	1.44	7,369.3		7,369.3	58, 60				
CONSUMPTION REGION 12—WISCONSIN									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1	.44	9,963.4							
2	.50	9,689.4		1,087.3	44				
3	.67	9,407.1		1,087.3	44				
4	.74	9,133.1		5,993.5	43, 44, 59				
5	.83	8,859.1		5,963.1	43, 44, 59			2,896.0	15.
6	.91	8,576.8		5,963.1	43, 44, 59			2,613.7	15.
7	1.06	8,302.8		5,963.1	43, 44, 59			2,339.7	15.
8	1.22	7,837.7		5,963.1	43, 44, 59			1,924.6	15.
9	1.38	7,472.6		5,963.1	43, 44, 59			1,509.4	15.
10	1.69	6,642.3		5,963.1	43, 44, 59			679.2	15.
CONSUMPTION REGION 13—IOWA									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1	.41	27,118.0							
2	.50	26,375.1		14,019.3	55				
3	.63	25,604.7		24,494.4	48, 55, 57				
4	.70	24,850.0		24,850.0	48, 54, 55, 57				
5	.78	24,113.2		24,113.2	46, 55, 57				
6	.86	23,344.8		23,344.8	46, 55, 57				
7	1.00	22,599.1		22,599.1	46, 55, 57				
8	1.14	21,460.1		21,460.1	46, 55, 57				
9	1.29	20,339.1		20,339.1	46, 55, 57				
10	1.59	18,079.2		18,079.2	46, 55, 57				
CONSUMPTION REGION 14—MISSOURI									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1	.44	8,367.2							
2	.50	8,137.1		7,786.0	52				
3	.67	7,900.1		7,900.1	50, 52				
4	.74	7,670.0		7,670.0	52				
5	.83	7,439.9		7,439.9	52				
6	.91	7,202.8		7,202.8	52				
7	1.06	6,972.7		7,786.1	52	813.4	5,17		
8	1.22	6,624.1		8,301.9	50, 52	1,737.9	5, 6		
9	1.38	6,275.4		7,788.5	50, 52	1,513.2	5, 6		
10	1.69	5,578.2		7,195.4	52	1,617.2	5, 6, 17		

TABLE 4.—Feed grain requirements, production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSUMPTION REGION 15—ILLINOIS									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1	0.43	17,760.8							
2	.59	17,272.4	17,272.4	45,47,53					
3	.87	16,769.1	16,769.1	45,47,53					
4	.74	16,280.8	16,280.8	45,47,53					
5	.82	16,792.3	16,792.3	45,47,53		2,586.0	12		
6	.90	15,289.1	17,902.8	45,47,53		2,613.7	12		
7	1.05	14,800.7	21,554.8	36,45,47,53		6,754.1	12, 17		
8	1.21	14,060.7	21,554.7	36,45,47,53		7,499.0	7, 12, 16, 17		
9	1.36	13,320.6	15,185.5	45,53		1,864.8	7, 12		
10	1.68	11,840.0	16,879.6	45,47,53		5,038.9	12, 16, 17		
CONSUMPTION REGION 16—ARKANSAS									
1	.47	2,314.8			8.7				
2	.64	2,251.1			7.6				
3	.72	2,185.5			6.9				
4	.80	2,121.9			6.3			2,115.5	20.
5	.89	2,056.2			6.0			2,052.2	20.
6	.96	1,992.6						1,982.6	20.
7	1.13	1,929.0						1,129.0	20.
8	1.30	1,852.5						1,832.5	15, 19, 20.
9	1.47	1,736.1						1,736.1	19, 20.
10	1.81	1,543.2						1,543.2	15.
CONSUMPTION REGION 17—LOUISIANA, MISSISSIPPI									
1	.40	5,834.1							
2	.67	5,470.1							
3	.76	5,319.5							
4	.84	5,164.6							
5	.94	5,009.6							
6	1.03	4,850.0							
7	1.20	4,695.1	241.0	24				4,454.1	14, 15.
8	1.38	4,460.3	385.9	24				4,074.4	15.
9	1.56	4,225.5	385.9	24				3,839.6	20.
10	1.92	3,756.0	385.0	24				3,370.1	14, 15.
CONSUMPTION REGION 18—TEXAS									
1	.48	5,861.0							
2	.65	5,710.2	1,180.4	103	3,123.9				
3	.73	5,552.6	3,571.4	97, 99, 102, 103, 132, 137, 138, 139, 140.					
4	.81	5,390.9	2,121.6	99, 102, 103, 132, 137, 138, 139, 140.					
5	.91	5,229.2	2,664.4	99, 102, 103, 132, 133, 136, 137, 138, 139, 140.					
6	.99	5,062.5	2,631.3	99, 102, 103, 132, 133, 136, 137, 138, 139, 140.				2,430.6	19, 20.
7	1.16	4,900.8	4,900.8	95, 99, 102, 103, 132, 133, 136, 137, 138, 139, 140.					

TABLE 4.—Feed grain requirements, production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

CONSUMPTION REGION 18—TEXAS—Continued

	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
8.	1.33	4,655.8	4,655.8	95, 99, 102, 103, 132, 133, 136, 137, 138, 139, 140.					
9.	1.50	4,410.7	2,604.4	95, 99, 102, 103, 132, 133, 136, 137, 138, 139, 140.	294.0			1,452.4	19.
10.	1.55	3,920.7	3,920.7	95, 98, 99, 100, 102, 103, 132, 133, 136, 137, 138, 139, 140.					

CONSUMPTION REGION 19—OKLAHOMA

1.	.48	154.6							
2.	.65	150.4							
3.	.74	149.0			146.0				
4.	.82	141.6			141.8				
5.	.92	137.5			137.5				
6.	1.00	133.1			2,352.6	2,219.5	18.		
7.	1.17	128.9			128.9				
8.	1.34	122.4			971.2	845.7	16.		
9.	1.62	116.0			1,917.4	1,501.5	16, 18.		
10.	1.88	103.1			103.1				

CONSUMPTION REGION 20—KANSAS

1.	.43	1,151.0			1,151.0				
2.	.58	1,148.5			1,148.5				
3.	.69	1,115.1			1,115.1				
4.	.73	1,082.6			3,198.1	2,115.5	16.		
5.	.81	1,050.1			3,102.4	2,052.2	16.		
6.	.89	1,016.6			3,220.4	2,263.8	16, 18.		
7.	1.04	984.2			2,913.2	1,929.0	18.		
8.	1.19	935.0			954.2	19.2	18.		
9.	1.35	885.7			7,100.5	6,215.1	16, 31.		
10.	1.66	787.3			787.3				

CONSUMPTION REGION 21—NEBRASKA

1.	.43	5,001.3							
2.	.58	5,741.9			2,507.1				
3.	.69	5,674.0	2,993.9	74, 80.	2,580.7				
4.	.73	5,412.3	1,822.3	74.	3,590.0				
5.	.81	5,249.0	2,445.7	74.	2,801.2				
6.	.89	5,082.6	507.1	74.	4,485.5				
7.	1.04	4,920.2	4,920.2	74, 80.					
8.	1.19	4,674.2	5,232.0	74, 80.		557.0	31.		
9.	1.35	4,428.2	1,386.6	74.	3,041.6				
10.	1.66	3,936.2			1,966.6				

CONSUMPTION REGION 22—NORTH DAKOTA

1.	.40	824.7							
2.	.54	802.1							
3.	.61	778.7							
4.	.68	756.0							

TABLE 4.—Feed grain requirements, production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
5	0.76	733.3	71.2	65	662.1				
6	.83	709.9			709.9				
7	.96	687.2	657.2	65					
8	1.11	652.0			652.0				
9	1.25	618.5			710.4	91.9	23		
10	1.54	549.8			549.8				

1	.37	3,740.4							
2	.50	3,637.2							
3	.57	3,531.2							
4	.63	3,428.4							
5	.71	3,325.5	2,765.3	73				560.2	26
6	.77	3,219.6	1,557.3	73	1,662.3				
7	.90	3,116.7	3,116.7	73					
8	1.03	2,960.0	2,960.0	73					
9	1.17	2,805.0	1,046.0	73	1,867.1			91.9	22
10	1.44	2,493.4	2,493.4	73					

1	.52	667.3			416.2				
2	.71	648.9			648.9				
3	.81	630.0			630.0				
4	.89	611.7			611.7				
5	1.00	593.3			593.3				
6	1.02	574.4			574.4				
7	1.27	556.1			556.1				
8	1.46	528.3			528.3				
9	1.65	500.5			500.5				
10	2.03	444.9			444.9				

1	.46	45.7			30.2				
2	.63	44.5			20.4				
3	.71	43.2			24.0			19.2	26
4	.79	41.0			22.1			19.8	26
5	.58	40.7			20.7			20.0	26
6	.07	39.4			39.4				
7	1.12	38.1			38.1				
8	1.29	36.2			36.2				
9	1.48	34.3			34.3				
10	1.80	30.5			30.5				

1	.45	597.2							
2	.62	580.8							
3	.70	563.9			583.1	19.2	25		
4	.77	547.5			587.3	10.8	25		
5	.87	531.1			1,111.2	580.1	23, 25		
6	.96	514.2			2,087.1	1,573.2	28, 31		
7	1.10	497.7			497.7				
8	1.27	472.8			472.8				
9	1.43	448.0			2,335.2	1,887.2	31		
10	1.76	398.2			2,094.4	1,696.2	31		

TABLE 4—Feed grain requirements, production, wheat-to-feed grain transfer, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price	Requirements	Production		Wheat-to-feed grain transfer	Exports		Imports	
			Quantity	Production regions		Quantity	Importing consumption regions	Quantity	Exporting consumption regions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSUMPTION REGION 27—NEW MEXICO, ARIZONA									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1.	0.50	410.3			30.0				
2.	.81	309.0			28.3				
3.	.92	387.4			33.5				
4.	1.01	370.1			376.1				
5.	1.13	364.8			364.8				
6.	1.24	353.2			353.2				
7.	1.44	341.0			591.9	250.0	31		
8.	1.66	324.8			591.1	266.3	31		
9.	1.88	307.7			590.4	282.7	31		
10.	2.31	273.5	304.5	142	202.2	233.3	31		
CONSUMPTION REGION 28—UTAH, NEVADA									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1.	.63	557.3							
2.	.83	542.0							
3.	.98	526.2							
4.	1.08	510.0							
5.	1.21	495.0			495.0				
6.	1.32	479.8							
7.	1.54	464.4			2,990.2	2,525.8	31	479.8	26.
8.	1.77	441.2			3,532.3	3,191.1	31		
9.	2.00	418.0			988.5	570.5	31		
10.	2.40	371.8			371.8				
CONSUMPTION REGION 29—WASHINGTON									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1.	.54	1,571.5			1,571.5				
2.	.74	1,528.3			1,528.3				
3.	.84	1,483.8			1,453.8				
4.	.92	1,440.6			1,440.6				
5.	1.03	1,397.3			1,397.3				
6.	1.13	1,352.8			1,352.8				
7.	1.32	1,309.6			1,309.6				
8.	1.51	1,244.1			1,244.1				
9.	1.71	1,178.6			1,178.6				
10.	2.10	1,047.7			1,047.7				
CONSUMPTION REGION 30—OREGON									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1.	.59	925.1			925.1				
2.	.81	899.7			899.7				
3.	.92	873.5			873.5				
4.	1.01	848.0			848.0				
5.	1.13	822.6			822.6				
6.	1.24	796.4			796.4				
7.	1.43	770.9			770.9				
8.	1.66	732.4			732.4				
9.	1.98	693.5			693.5				
10.	2.31	616.7			616.7				
CONSUMPTION REGION 31—CALIFORNIA									
	Dollars	1,000 tons	1,000 tons		1,000 tons	1,000 tons		1,000 tons	
1.	.58	6,500.0			1,995.3				
2.	.79	6,321.3			2,262.2				
3.	.89	6,137.1			1,564.3				
4.	.98	5,958.3			1,029.3				
5.	1.01	5,779.6			1,499.6				
6.	1.21	5,595.4			1,226.2			1,093.5	26.
7.	1.40	5,416.7			1,008.4			2,775.8	27, 28.
8.	1.61	5,145.8			1,130.7			4,015.2	21, 27, 28.
9.	1.82	4,875.0			1,146.2			3,728.8	20, 26, 27, 28.
10.	2.24	4,333.3			1,523.5			2,500.8	21, 26, 27.

TABLE 5.—Oil meal requirements, production, and transportation at various price levels, by consumption region, in feed units, 1975

Solution	Price		Require- ments	Production				Exports		Imports	
	Soybeann	Cotton- seed		Soybeans		Cottonseed		Quantity	Importing con- sumption regions	Quantity	Exporting consump- tion regions
				Quantity	Production regions	Quantity	Production regions				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CONSUMPTION REGION 1—NEW ENGLAND											
	Dollars	Dollars	1,000 tons	1,000 tons		1,000 tons		1,000 tons		1,000 tons	
1	1.43		1,105.9							1,105.9	8, 13.
2	1.56		1,075.5							1,075.5	8, 15.
3	1.68		1,044.2							1,044.2	15.
4	1.81		1,013.8							1,013.8	15.
5	1.94		983.4							983.4	8, 15.
6	2.07		952.0							952.0	9.
7	2.20		921.6							921.6	15, 21.
8	2.40		875.5							875.5	13, 21.
9	2.59		829.4							829.4	21.
10	2.98		737.3							737.3	21.
CONSUMPTION REGION 2—NEW YORK, NEW JERSEY, PENNSYLVANIA, MARYLAND, DELAWARE											
1	1.31		4,198.4							4,198.4	8.
2	1.43		4,083.0							4,083.0	8.
3	1.54		3,964.0							3,964.0	8, 15.
4	1.66		3,848.6							3,848.6	8.
5	1.78		3,733.1							3,733.1	8.
6	1.90		3,614.2							3,614.2	8, 9, 11, 15.
7	2.02		3,498.7							3,498.7	9, 15.
8	2.20		3,323.8							3,323.8	9, 15.
9	2.38		3,148.8							3,148.8	9, 11, 15.
10	2.73		2,799.0							2,799.0	8, 15.
CONSUMPTION REGION 3—VIRGINIA, WEST VIRGINIA, NORTH CAROLINA											
1	1.32	27.16	1,715.5	1,213.6	9					501.9	15.
2	1.44	29.63	1,668.3	1,213.6	9					454.7	15.
3	1.56	32.10	1,619.7	1,213.6	9					406.1	15.

TABLE 5.—Oil meal requirements, production, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price		Require- ments	Production				Exports		Imports	
	Soybean	Cotton- seed		Soybeans		Cottonseed		Quantity	Importing con- sumption regions	Quantity	Exporting consumption regions
				Quantity	Production regions	Quantity	Production regions				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

CONSUMPTION REGION 7—KENTUCKY, TENNESSEE											
	Dollars	Dollars	1,000 tons	1,000 tons		1,000 tons		1,000 tons		1,000 tons	
1.....	1.29	28.30	943.0	199.3	35.....					743.7	15.
2.....	1.41	30.83	917.1	199.3	35.....					717.8	15.
3.....	1.53	33.45	890.4	244.5	35.....					645.9	15.
4.....	1.65	35.96	864.4							864.4	15.
5.....	1.76	38.52	838.5							838.5	15.
6.....	1.88	41.09	811.8	217.4	23.....					594.4	15.
7.....	2.00	43.61	785.8	217.4	23.....					508.4	15.
8.....	2.18	47.46	746.6							746.6	15.
9.....	2.35	51.26	707.3							707.3	15.
10.....	2.70	58.91	628.7							628.7	15.

CONSUMPTION REGION 8—INDIANA											
1.....	1.33		1,273.4	5,737.9	37,38,39.....			4,464.5	1,2.....		
2.....	1.45		1,238.4	5,972.7	38,39.....			4,734.3	1,2,9.....		
3.....	1.58		1,202.3	4,996.1	38,39.....			3,793.8	2.....		
4.....	1.70		1,167.3	5,015.9	38,39.....			3,848.6	2.....		
5.....	1.82		1,132.2	5,031.0	38,39.....			3,989.8	1,2.....		
6.....	1.94		1,096.2	2,018.9	38.....			1,522.7	2.....		
7.....	2.06		1,061.1	518.4	38.....					542.7	11,13.
8.....	2.24		1,008.1							1,008.1	11,13.
9.....	2.42		955.0							955.0	11.
10.....	2.79		848.9	1,616.5	38.....			767.6	2.....		

CONSUMPTION REGION 9—OHIO											
1.....	1.33		1,443.9	1,443.9	33.....					509.8	8.
2.....	1.45		1,404.2	894.4	33.....						

3	1.58	1,363.2	1,363.2	33							
4	1.70	1,323.5	1,323.5	33							
5	1.82	1,283.8	1,283.8	33							
6	1.94	1,242.9	2,456.4	33						1,213.5	1,2
7	2.06	1,203.2	4,080.4	33						2,877.2	2
8	2.24	1,143.1	3,263.2	33				2,120.1	2		
9	2.42	1,082.9	3,181.3	33				2,098.3	2		
10	2.79	962.6	962.6	33							

CONSUMPTION REGION 10--MICHIGAN

1	1.36	509.3								509.3	15.
2	1.48	495.3								495.3	15.
3	1.61	480.8								480.8	15.
4	1.73	466.8								466.8	15.
5	1.85	452.8								452.8	15.
6	1.98	438.4								438.4	15.
7	2.10	424.4								424.4	15.
8	2.29	403.2								403.2	15.
9	2.47	382.0								382.0	15.
10	2.84	339.5								339.5	15.

CONSUMPTION REGION 11--MINNESOTA

1	1.31	813.2	2,181.4	58,61			1,368.2	12, 22, 23, 29			
2	1.43	790.8	2,121.3	58,61			1,330.5	12, 22, 23, 29			
3	1.54	767.8	1,687.9	61			920.1	12, 22, 23, 29			
4	1.66	745.4	1,124.9	61			379.5	22, 23, 29			
5	1.78	723.0	1,506.4	61			783.4	12, 22, 23, 29			
6	1.90	700.0	2,891.8	60,61			2,191.8	2, 5, 12, 22-24, 29			
7	2.02	677.6	1,930.5	61			1,201.0	8, 12, 23, 29			
8	2.20	643.8	1,639.5	61			1,295.7	8, 12, 22, 23, 29			
9	2.38	609.9	3,206.9	60,61			2,597.1	2, 8, 12, 22, 23, 29			
10	2.73	542.1	1,454.2	60,61			912.1	12, 22, 23, 29			

CONSUMPTION REGION 12--WISCONSIN

1	1.27	881.9								881.9	11.
2	1.38	857.7								857.7	11.
3	1.50	832.7								832.7	11, 15.
4	1.61	808.4								808.4	15.
5	1.73	784.2								784.2	11, 15.
6	1.84	759.2								759.2	11.
7	1.96	734.9								734.9	11.
8	2.13	698.2								698.2	11.
9	2.30	661.5								661.5	11.
10	2.65	588.0								588.0	11.

TABLE 5.—Oil meal requirements, production, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price		Require- ments	Production				Exports		Imports	
	Soybean	Cotton- seed		Soybeans		Cottonseed		Quantity	Importing con- sumption regions	Quantity	Exporting con- sumption regions
				Quantity	Production regions	Quantity	Production regions				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

CONSUMPTION REGION 13-IOWA

	Dollars	Dollars	1,000 tons	1,000 tons		1,000 tons		1,000 tons		1,000 tons		1,000 tons
1	1.32		1,642.5	3,752.8	55			2,110.3	1, 14			
2	1.44		1,597.3	1,597.3	55							
3	1.56		1,559.8	1,550.8	54							
4	1.68		1,505.6	1,532.2	54							
5	1.80		1,460.5	2,019.3	54			26.6	20			
6	1.92		1,413.9	1,954.9	46, 54			558.8	20			
7	2.04		1,368.7	3,072.6	46, 54			541.0	20			
8	2.22		1,300.3	3,705.4	46, 54			1,703.9	8, 14, 20			
9	2.40		1,231.9	2,276.5	40, 55			2,405.2	4, 8, 14, 20			
10	2.76		1,095.0	2,361.0	40, 55			1,044.6	14, 20			
								1,266.0	14, 20			

CONSUMPTION REGION 14—MISSOURI

1	1.31	28.50	1,270.5						1,270.5	13.
2	1.43	31.19	1,235.5						1,235.5	15, 21.
3	1.54	33.70	1,199.5						1,199.5	15, 21.
4	1.66	36.32	1,164.6						1,164.6	15, 21.
5	1.78	38.91	1,129.7						1,129.7	21.
6	1.90	41.50	1,093.7						1,093.7	21.
7	2.02	44.05	1,058.7		2.9	26.50			1,055.8	13, 21.
8	2.20	47.94	1,005.8						1,005.8	13.
9	2.38	51.78	952.9						952.9	13, 21.
10	2.73	59.51	847.0						847.0	13.

CONSUMPTION REGION 15-ILLINOIS

1	1.36		2,006.9	6,302.9	45,47,53			4,296.0	3-7,10	
2	1.48		1,951.7	7,875.4	45,47,53			5,923.7	1,3,7,10,14	
3	1.61		1,894.8	7,827.8	45,47,53			5,933.0	1-7,10,12,14	
4	1.73		1,839.6	7,952.4	45,47,53			6,112.8	1,3,7,10,12	
5	1.85		1,784.4	6,468.7	47,53			4,684.3	1,3,7,10,12,14	
6	1.98		1,727.6	6,316.5	47,53			4,588.9	2-4,6,7,10	
7	2.10		1,672.4	5,659.5	47			3,987.1	1-4,7,10	
8	2.29		1,588.8	5,701.4	36,47			4,112.6	2-4,7,10	
9	2.47		1,505.2	5,069.5	36,47			3,564.3	2,4,7,10	
10	2.84		1,337.9	7,892.6	45,47,53			6,554.6	2-4,6,7,10	

CONSUMPTION REGION 16-ARKANSAS

1	1.31	28.30	543.1							543.1	21.
2	1.43	30.88	528.2							528.2	18,21.
3	1.54	33.45	512.8			137.7	25			375.1	18,21.
4	1.66	35.96	497.9			319.4	25,127			178.5	18.
5	1.78	38.52	482.9			319.3	25,127			163.6	18.
6	1.90	41.09	467.6			356.0	25,127,130			111.6	18.
7	2.02	43.61	452.6			356.0	25,127,130,144			96.6	18.
8	2.20	47.46	430.0			319.4	25,127			110.6	18.
9	2.38	51.26	401.4			319.4	25,127			88.0	18.
10	2.73	58.91	362.1			137.7	25			224.4	18.

CONSUMPTION REGION 17-LOUISIANA, MISSISSIPPI

1	1.28	28.02	4,342.7							4,342.7	21.
2	1.40	30.57	4,223.3							4,223.3	21.
3	1.51	33.11	4,100.3							4,100.3	21.
4	1.63	35.59	3,980.8							3,980.8	18,21.
5	1.75	38.13	3,861.4							3,861.4	18,21.
6	1.86	40.67	3,738.4							3,738.4	18,21.
7	1.98	43.17	3,618.9							3,618.9	18,21.
8	2.15	46.98	3,438.0							3,438.0	18,21.
9	2.33	50.74	3,257.0							3,257.0	18,21.
10	2.68	58.32	2,895.2							2,895.2	21.

TABLE 5.—Oil meal requirements, production, and transportation at various price levels, by consumption region, in feed units, 1975—Continued

Solution	Price		Require- ments	Production				Exports		Imports	
	Soybean	Cotton- seed		Soybeans		Cottonseed		Quantity	Importing con- sumption regions	Quantity	Exporting consump- tion regions
				Quantity	Production regions	Quantity	Production regions				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CONSUMPTION REGION 18—TEXAS											
	<i>Dollars</i>	<i>Dollars</i>	<i>1,000 tons</i>	<i>1,000 tons</i>		<i>1,000 tons</i>		<i>1,000 tons</i>		<i>1,000 tons</i>	
1	1.23	28.30	1,915.1	403.9	97, 98	1,511.2	95-97, 102, 103, 137, 139, 140				
2	1.34	30.88	1,862.5	250.0	98	1,743.3	95-97, 102, 103, 137, 139, 140	139.8	16		
3	1.45	33.45	1,808.2	259.0	98	1,830.7	95-97, 100, 102, 103, 133, 137, 139, 140	281.5	16		
4	1.56	35.96	1,755.5	259.0	98	1,830.7	95-97, 100, 102, 103, 133, 137, 139, 140	334.2	16, 17		
5	1.67	38.52	1,702.9	259.0	98	1,830.7	95-97, 100, 102, 103, 133, 137, 139, 140	386.8	16, 17		
6	1.79	41.09	1,648.6	259.0	98	1,837.5	95-97, 100, 102, 103, 132, 133, 136, 137, 139, 140	447.9	16, 17		
7	1.90	43.61	1,596.0	259.0	98	1,837.4	95-97, 100, 102, 103, 132, 133, 136, 137, 139, 140	500.6	16, 17		
8	2.06	47.46	1,516.2			1,743.0	95-97, 102, 103, 133, 137, 139, 140	226.9	16, 17		
9	2.23	51.26	1,436.4	259.0	98	1,598.6	95-97, 102, 103, 133, 137, 139, 140	421.3	16, 17		
10	2.51	58.91	1,276.8			1,501.2	95-98, 103, 137, 139, 140	224.4	16		
CONSUMPTION REGION 19—OKLAHOMA											
1	1.21	27.45	606.2	311.2	134, 135					295.0	21.
2	1.32	29.04	589.5	311.2	134, 135					278.3	21.
3	1.44	32.44	572.3	311.2	134, 135	158.9	94			102.2	21.
4	1.55	34.87	555.7	311.2	134, 135	158.9	94			85.6	21.
5	1.66	37.35	539.0	311.2	134, 135	158.9	94			68.9	21.
6	1.77	39.84	521.8	311.2	134, 135	158.9	94			51.7	21.
7	1.88	42.29	505.2	311.2	134, 135	158.9	94			34.9	21.
8	2.04	46.02	479.9	311.2	134, 135	158.9	94			9.4	21.
9	2.21	49.71	454.6	311.2	134, 135	62.1	94			81.3	21.
10	2.54	57.13	404.1	311.2	134, 135					92.9	21.

CONSUMPTION REGION 20—KANSAS

1	1.23		628.5	628.5	88						
2	1.34		611.2	611.2	88						
3	1.45		593.4	593.4	88						
4	1.50		576.1	549.5	88						
5	1.67		558.8							26.6	13.
6	1.79		541.0							558.8	13.
7	1.90		523.7							541.0	13.
8	2.06		497.5							523.7	13.
9	2.23		471.3							497.5	13.
10	2.57		419.0							471.3	13.
										419.0	13.

CONSUMPTION REGION 21—NEBRASKA

1	1.25		593.2	8,105.4	74,78,79,80			7,512.2	5,16,17,19,24,28,30,31		
2	1.37		576.9	8,105.4	74,78,79,80			7,528.5	14,16,17,19,24,28,30,31		
3	1.48		560.1	7,138.2	74,78,79,80						
4	1.60		543.8	6,847.4	74,78,80			6,303.0	14,17,19,24,31		
5	1.71		527.5	6,855.1	74,78,80			6,327.6	14,17,19,24,31		
6	1.82		510.7	6,832.1	74,78,80			6,321.4	5,14,17,19,25,28,30,31		
7	1.94		494.3	6,806.2	74,78,80			6,401.0	1,5,6,14,17,19,24,28,30,31		
8	2.11		469.6	6,901.5	74,78,80			6,431.8	1,5,6,17,19,24,28,30,31		
9	2.28		444.9	6,842.0	74,78,80			6,397.0	1,5,6,14,17,19,24,28,30,31		
10	2.62		395.5	4,446.0	74,80			4,050.3	5,17,19,24,28,30,31		

CONSUMPTION REGION 22—NORTH DAKOTA

1	1.25		32.0							32.0	11.
2	1.37		31.1							31.1	11.
3	1.48		30.2							30.2	11.
4	1.60		29.3							29.3	11.
5	1.71		28.4							28.4	11.
6	1.82		27.5							27.5	11.
7	1.94		26.7	26.7	65					26.7	11.
8	2.11		25.3							25.3	11.
9	2.28		24.0							24.0	11.
10	2.62		21.3							21.3	11.

CONSUMPTION REGION 23—SOUTH DAKOTA

CONSUMPTION REGION 24—MONTANA, IDAHO

1			154.7						154.7	21.
2			150.4						150.4	21.
3			146.0						146.0	21.
4			141.8						141.8	21.
5			137.5						137.5	21.
6			133.2						133.2	21.
7			128.9						128.9	21.
8			122.5						122.5	21.
9			116.0						116.0	21.
10			103.1						103.1	21.

CONSUMPTION REGION 25—WYOMING

1.....			68.7						68.7	21.
2.....			66.8						66.8	21.
3.....			64.8						64.8	21.
4.....			62.9						62.9	21.
5.....			61.1						61.1	21.
6.....			59.1						59.1	21.
7.....			57.2						57.2	21.
8.....			54.4						54.4	21.
9.....			51.5						51.5	21.
10.....			45.8						45.8	21.

CONSUMPTION REGION 26—COLORADO

1.....			288.8						288.8	21.
2.....			280.9						280.9	21.
3.....			272.7						272.7	21.
4.....			264.7						264.7	21.
5.....			256.8						256.8	21.
6.....			248.6						248.6	21.
7.....			240.7						240.7	21.
8.....			228.6						228.6	21.
9.....			216.6						216.6	21.
10.....			192.5						192.5	21.

CONSUMPTION REGION 27—NEW MEXICO, ARIZONA

1.....		30.59	515.3						515.3	21.
2.....		33.37	501.2						501.2	21.
3.....		36.16	486.6			322.3	142		164.3	21.
4.....		38.86	472.4			322.2	142		150.2	21.
5.....		41.63	458.2			424.2	112, 141, 142		34.0	21.
6.....		44.41	443.6			424.2	112, 141, 142		19.4	21.
7.....		47.13	429.4			424.2	112, 141, 142		5.1	21.
8.....		51.30	408.0			424.2	112, 141, 142			
9.....		55.40	386.5			336.1	112, 142	16.2	28	
10.....		63.68	343.5			332.2	142		50.4	21.
									21.3	21.

CONSUMPTION REGION 28-UTAH, NEVADA

CONSUMPTION REGION 29—WASHINGTON

1			328.0						328.0	11.
2			319.0						319.0	11.
3			309.7						309.7	11.
4			300.7						300.7	11, 21.
5			291.6						291.6	11, 21.
6			282.3						282.3	11.
7			273.3						273.3	11.
8			259.7						259.7	11.
9			246.0						246.0	11.
10			218.7						218.7	11.

CONSUMPTION REGION 30—OREGON

1			225.3							225.3	21.
2			210.1							210.1	21.
3			212.8							212.8	21.
4			206.6							206.6	21.
5			200.4							200.4	21.
6			194.0							194.0	21.
7			187.8							187.8	21.
8			178.4							178.4	21.
9			169.0							169.0	21.
10			150.2							150.2	21.

CONSUMPTION REGION 31—CALIFORNIA

1		31.16	803.1							803.1	21.
2		34.00	781.0							781.0	21.
3		36.83	758.3			368.2	121			368.1	21.
4		39.59	736.2			368.1	121			368.1	21.
5		42.41	714.1			400.0	121, 143			314.1	21.
6		45.24	691.3			400.0	121, 143			291.3	21.
7		48.01	669.3			400.0	121, 143			289.3	21.
8		52.25	635.8			368.1	121			267.7	21.
9		56.44	602.3			368.1				234.2	21.
10		64.87	535.4			170.2	91			359.1	21.

TABLE 6.—Cotton lint requirements and production at various price levels, United States, 1975

Solution	Requirements (500-lb. bales)	Price per pound	Production (500-lb. bales)
	<i>Bales</i>	<i>Cents</i>	<i>Bales</i>
1	21,164.8	20.08	5,111.8
2	19,666.2	21.94	7,117.6
3	18,273.8	23.79	10,865.8
4	17,080.7	25.49	12,270.3
5	15,908.8	27.29	12,270.3
6	14,817.4	29.08	13,628.1
7	13,768.2	30.94	13,768.2
8	12,212.0	33.69	12,212.0
9	10,842.7	36.39	10,862.7
10	8,448.5	41.80	8,448.5

Solution 1

The first solution assumes national average prices of \$0.45 a bushel for wheat, \$0.39 a corn-equivalent bushel for feed grain, \$1.32 a bushel for soybeans, and \$28.59 a ton for cottonseed. Only a few producing regions have costs such that production is profitable at these prices. Consequently, only a few production regions are brought into production and much of the demand for these products is left unsatisfied.

At these prices Kansas, Nebraska, and Colorado produce enough wheat to meet their own requirements.⁵ Some wheat, but not enough to meet requirements, is produced in Washington, Oregon, and California (table 3). In Kansas, Washington, and Oregon, wheat is transferred into feed grains in amounts sufficient to satisfy regional feed grain requirements. In Florida, Arkansas, Montana-Idaho, Wyoming, and New Mexico-Arizona, all of which are consumption regions whose initial position is one of "surplus" wheat from nonprogrammed areas, wheat requirements are met from the nonprogrammed areas and no production regions are brought into production.

Direct production expenses for feed grains are high enough to prohibit the growing of feed grains in all production regions at Solution 1 prices (table 4). In Kansas, Washington, and Oregon, however, wheat satisfies the feed grain demand. Part of the demand is also met by wheat in Florida, Arkansas, Montana-Idaho, Wyoming, New Mexico-Arizona, and California.

In this solution, oilmeal requirements are met in all consumption regions (table 5). Soybeans are produced in Indiana, Iowa, Illinois, Minnesota, Nebraska, Kentucky, North Carolina, Ohio, Texas, Oklahoma, and Kansas. The first five States are exporters of oilmeal, and supply the oilmeal requirements of consumption regions producing no oilmeals. Only Texas produces cottonseed for oilmeal, and none is transferred to other regions.

Solution 2

Wheat increases to a national average price of \$0.60 per bushel in Solution 2. At this price, wheat becomes a profitable enterprise in two additional production regions in Nebraska, two in Washington, and one in California. Also, production becomes profitable in some

⁵ Consumption regions are identified in this section by States. See fig. 2 and tables 3-5 for number designations. Also, consumption regions and production regions within their boundaries are listed on the inside of the back cover.

production regions in Texas and Montana-Idaho. These wheat prices still do not induce any interregional transportation of wheat.

Wheat requirements are satisfied in Florida, Arkansas, Kansas, Nebraska, Montana-Idaho, Wyoming, Colorado, New Mexico-Arizona, and California.

The national average price of feed grains increases to \$0.53 per bushel in Solution 2. Feed grains are produced at these prices in Indiana, Wisconsin, Missouri, Iowa, Illinois, and Texas. Requirements are satisfied in Illinois by feed grain production, and in Kansas, Washington, and Oregon by wheat for feed. No feed grain or wheat for feed is transported between regions in Solution 2.

National average prices of soybeans and cottonseed in Solution 2 are \$1.44 per bushel and \$21.94 per ton. With the higher prices and lower requirements in this solution, Indiana and Texas decrease their soybean production. Cotton production is profitable in the one production region in Florida. As would be expected, all of the oilmeal demand requirements are again met. The exporting States are the same as in Solution 1.

Solution 3

Production prices in Solution 3 are based on national average prices of \$0.60, \$1.56, and \$0.75 per bushel for wheat, feed grains, and soybeans, and \$23.79 a ton for cottonseed.

The higher wheat prices bring Indiana, Missouri, Minnesota, and Oklahoma into wheat production. One production region in Texas drops out and two are added. With these changes, Indiana and Oklahoma are added to the consumption regions in which wheat requirements are satisfied.

The higher feed grain prices in Solution 3 add Maryland, Kentucky, Minnesota, and Nebraska to the States where feed grain production is profitable. New areas are brought into production in Indiana, Iowa, Missouri, and Texas. Indiana, Missouri, Wyoming, and Colorado are added to the consumption regions whose feed grain requirements are met.

With Solution 3 prices, one production region in Minnesota drops out of soybean production. Arkansas, Oklahoma, and New Mexico-Arizona join the consumption regions producing cotton.

Solution 4

In Solution 4, national average prices are increased to \$0.90 per bushel for wheat, \$0.67 per bushel for feed grains, \$1.63 per bushel for soybeans, and \$36.32 per ton for cottonseed.

In this solution, production regions in Illinois, North Dakota, South Dakota, and Arizona are brought into wheat production, and new production regions are added in Missouri, Minnesota, and Texas. Wheat demands are now satisfied in Minnesota, Illinois, North Dakota, and South Dakota, as well as in those States whose demands were satisfied by Solution 3. Some wheat moves between consumption regions in this solution. Missouri and Iowa receive wheat from Kansas, and Washington receives wheat from Montana-Idaho.

Feed grains are added to production in Pennsylvania, Maryland, Virginia, North Carolina, Ohio, Wisconsin, Iowa, and Minnesota. Feed grain production is dropped from one production region in Missouri and one in Texas. Wheat production expands in each of these two regions, forcing feed grains out. There is some movement

of feed grains between consumption regions—feed is shipped from Kansas to Arkansas, and from Colorado to Wyoming.

The lower oilmeal requirements of Solution 4 relative to the previous solutions enables the oilmeal requirements to be met with two fewer soybean producing regions. Production regions in Kentucky and Nebraska are dropped from soybean production. A production region in Arkansas is added to the list of regions producing cotton. Several adjustments are made in the oilmeal flow patterns among consumption regions.

Solution 5

The national average price of wheat is \$1.05 per bushel in Solution 5. Wheat is introduced into production regions in Missouri, Colorado, and Montana. Wheat requirements are now met in Ohio, Wisconsin, Missouri, and Utah-Nevada. Ohio imports its wheat from Kansas and Colorado. Nebraska ships to Wisconsin, and Oklahoma ships to Texas. Colorado ships enough wheat to Utah-Nevada to meet the wheat requirements of that consumption region.

The feed grain price of \$0.74 induces production in production regions of New York, Virginia, Michigan, Minnesota, North Dakota, South Dakota, and Texas. The feed grain requirements are newly satisfied in North Dakota and South Dakota. The North Dakota requirements are met in part by production of feed grains and in part by the wheat-to-feed grain transfer. South Dakota produces some of its own feed grain but also imports feed grain from Colorado.

Proportionately more of the oilmeal requirements are met by cottonseed oilmeal than in the earlier solutions. This shift occurs because the national demand for cotton lint is not yet satisfied. As cotton comes in to fulfill this lint demand, the byproduct of cottonseed oilmeal is also produced. In Solution 5, production regions in Illinois and Kansas are dropped from soybean production while regions in New Mexico and California are added to cotton production.

Solution 6

The national average prices used in Solution 6 are \$1.20, \$0.81, and \$1.92 per bushel for wheat, feed grains, and soybeans, and \$41.50 per ton for cottonseed.

With these prices, production regions in Michigan, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Wyoming, New Mexico, and Utah are added to the regions producing wheat. Wheat requirements are met in two more consumption regions, Michigan and Texas. Minnesota replaces Colorado as a supplier of wheat to Ohio, and Wisconsin imports wheat from Illinois rather than Nebraska. Wheat production increases rather markedly in production regions in Indiana and Indiana ships wheat to the North Atlantic States.

Three production regions in North Carolina and one production region in Kentucky are placed in feed grains, while regions in Indiana, Minnesota, and North Dakota are dropped. Land in Indiana and North Dakota is shifted to wheat production.

Indiana exports feed grains to Kentucky-Tennessee, and Illinois ships to Wisconsin. Oklahoma and Kansas send feed grains to Texas to satisfy the feed requirements there. Colorado discontinues its shipments to South Dakota and Wyoming, and ships to Utah-Nevada and California instead.

Soybeans are brought into one production region in South Carolina. Oilmeals are imported by South Carolina-Georgia from Minnesota

and Nebraska, rather than Illinois. Tennessee produces soybeans and Indiana shifts from soybeans and feed grains to wheat. A production region in Iowa and one in Minnesota are also added to those producing soybeans. This increased soybean production is offset by sizable reductions in soybean production in Indiana and in another producing region in Iowa. Production regions in Arkansas and Texas initiate cotton production.

With the set of prices used for Solution 6, the quantities supplied of the various products nearly equal the stated requirements. The oilmeal requirements are supplied for every consumption region and the national requirement for cotton lint is met. Wheat requirements remain unsatisfied in New England, the North Atlantic States, the Middle Atlantic States, South Carolina, Georgia, Alabama, Kentucky-Tennessee, and Mississippi-Louisiana. Amounts of feed grains are not sufficient to meet the requirements in these consumption regions or in Florida.

Solution 7

Wheat production is added in production regions in South Carolina, Tennessee, Indiana, and Idaho at the \$1.35 price per bushel in Solution 7. Regions in Missouri, North Dakota, and Nebraska are dropped from wheat production. Wheat demands of the North Atlantic States, Middle Atlantic States, South Carolina-Georgia, and Kentucky-Tennessee are met in Solution 7.

With feed grains priced at \$0.95 a bushel, the demands for feed grains in the North Atlantic States, the Middle Atlantic States, Kentucky-Tennessee, and Mississippi-Louisiana are filled. Production regions in North Carolina, Alabama, Georgia, Mississippi, Kentucky, Illinois, Minnesota, North Dakota, Nebraska, and Texas are placed in feed grain production.

In this solution, soybeans are priced at \$2.04 a bushel, and cottonseed at \$44.05 a ton. A region in Illinois is dropped from soybean production while a region in North Dakota is added. In production regions in Missouri and Arkansas, some land is allocated to cotton production.

Solution 8

At the eighth price step, Solution 8, all of the demands are satisfied. The prices used in this solution are \$1.50 for wheat, \$1.09 for feed grains, \$2.22 for soybeans, and \$47.94 for cottonseed. They approximate the market clearing equilibrium prices discussed on p. 13.

Production regions in Indiana are dropped from wheat production, while regions in Georgia and Louisiana are added.

An additional production region in Missouri produces feed grains. The requirements in New England, South Carolina-Georgia, and Florida are met, leaving no feed grain demands unsatisfied.

A production region in Illinois is added to soybean production and regions in Indiana, North Dakota, and Texas are dropped. Production regions in Arkansas, California, Missouri, and Texas discontinue producing cotton.

Solution 9

Even though all demands are satisfied in Solution 8, we can go on and look at the production adjustments that occur as prices increase and quantities demanded contract. In Solution 9, national average

prices are \$1.65 for wheat, \$1.23 for feed grains, \$2.40 for soybeans, and \$51.78 for cottonseed.

With the increased wheat price, production regions in South Carolina, Georgia, North Carolina, Arkansas, Indiana, Illinois, South Dakota, and Kansas are added to wheat production. A producing region in Idaho is dropped. The new regions are added despite a decrease in requirements for wheat. This is largely due to an expanded use of wheat for feed. Increased transfers of wheat to feed occur in Oklahoma, Kansas, Nebraska, South Dakota, and Colorado. Relatively more wheat is fed in Solution 9 than in Solution 8.

The shipments of wheat to and from consumption regions also change between Solutions 8 and 9. Shipments from Illinois to New England and the North Atlantic States begin, replacing shipments from Kansas and Nebraska. Kansas is replaced by Kentucky-Tennessee as a supplier of wheat to Alabama, and by Oklahoma as a supplier to Louisiana-Mississippi. Iowa now imports wheat from Kansas instead of Nebraska.

The effect of the increased use of wheat for feed is seen in the adjustments made in the production of feed grains. Production regions in North Carolina, Illinois, Minnesota, and Nebraska are dropped from feed grain production. The exporting of feed grains from Illinois to Arkansas and Louisiana-Mississippi is stopped and the slack is taken up by Oklahoma and Kansas.

Soybeans are added to production regions in Minnesota and Texas. Downward adjustments occur in numerous other soybean production regions to account for these added regions. Iowa no longer ships oilmeals to South Carolina-Georgia and Ohio. Minnesota ships to the North Atlantic States and Nebraska is added to the consumption regions shipping oilmeals to Missouri.

Solution 10

Solution 10 is the last in the series of solutions—the situation with the highest prices and lowest demand requirements. National average prices are \$1.80 a bushel for wheat, \$1.51 a bushel for feed grains, \$2.76 a bushel for soybeans, and \$59.51 a ton for cottonseed. As the feed grain price increases \$0.28 a bushel over the price for solution 9 and the wheat price increases only \$0.15 a bushel, a marked adjustment occurs in the amount of wheat used for feed.

Wheat production regions are dropped in South Carolina, Georgia, North Carolina, Arkansas, Indiana, Illinois, South Dakota, Kansas, Oklahoma, Texas, and Arizona. Wheat-to-feed grain transfers are reduced in New England, South Carolina-Georgia, Minnesota, Texas, Oklahoma, Kansas, Nebraska, and South Dakota.

Feed grains are added in production regions in South Carolina, Georgia, Illinois, and Arizona, and are discontinued in regions in North Carolina, Missouri, Minnesota, and Kansas.

Soybeans are added in production regions of Indiana and Illinois, and are dropped from regions in Illinois, Nebraska, and Texas. Cotton shifts from New Mexico and Arkansas to California.

Production Location and Product Distribution

Demands of all consumption regions are first satisfied in Solution 8. At this set of prices and quantity data, the optimal (most profitable)

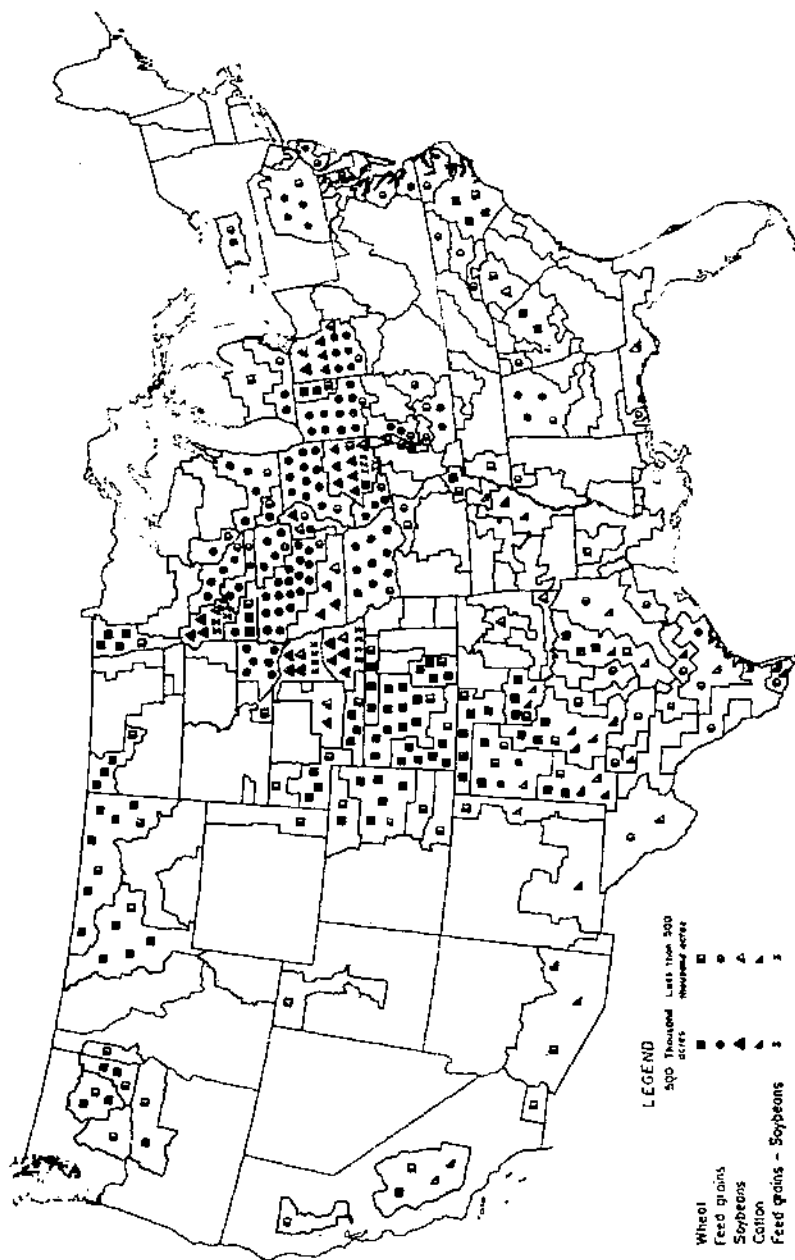


Figure 4.—Most profitable location of major field crop production, 1975.

regional location of production, and the associated distribution of products among consumption regions, are determined. The quantities of each commodity that would be produced in each production region, and the sources of supply for each consumption region, are also determined.

Figure 4 depicts the optimal location of production of each crop in Solution 8. This production pattern cannot be altered without some sacrifice in profit. Figure 5 indicates the interregional transfers of wheat in the equilibrium situation, and also the transfers of wheat to feed grains in each consumption region. Figures 6 and 7 show the profit-maximizing flows of feed grains and oilmeals, respectively.

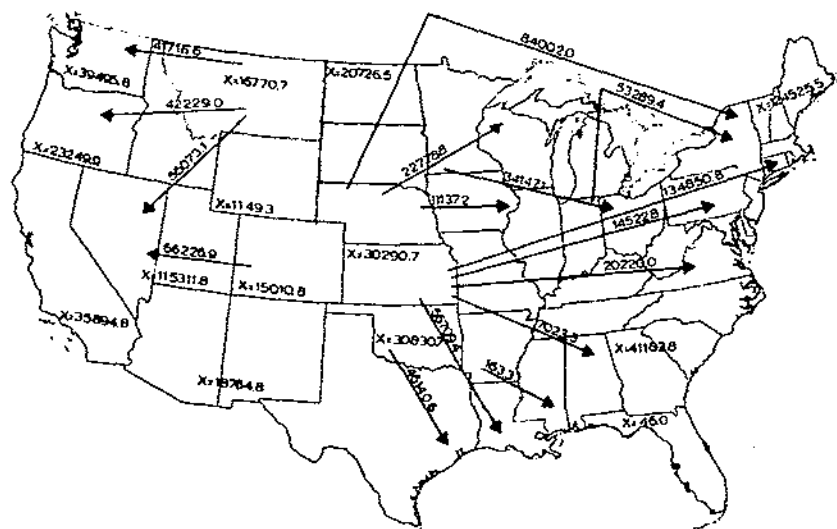


Figure 5.—Optimal interregional flows of wheat and intra-regional transfer of wheat to feed grains (X), Solution 8 (in thousands of bushels).

Land Rents and Product Net Returns

The linear programming solutions impute values to the limiting resources, which in this model are land resources. These imputed values are the net rents to land. Table 7 presents, for each production region, the acreage allocated in Solution 8 to wheat, feed grains, feed grain-soybean rotation, soybeans, and cotton, and the land left idle. The last three columns in the table show the equilibrium rents to the land allocated to each use.

Nonzero rents occur only if land is a limiting resource. In production region 1, for example, all land is allocated to feed grains, and another acre of land would, if allocated to feed grains, increase revenue by \$15.47. The value imputed to the marginal unit of land in production region 75 is \$6.29. In production region 14, total land has an imputed value of \$0.95 and soybean land has an imputed value of \$0.07 per acre. These values are often referred to as location rent.

Also forthcoming from the linear programming solutions are equilibrium net returns per unit of each of the commodities considered (table 8). The net return per unit was determined in each consumption region for each of the products—wheat, feed grains, soybeans, and cottonseed.

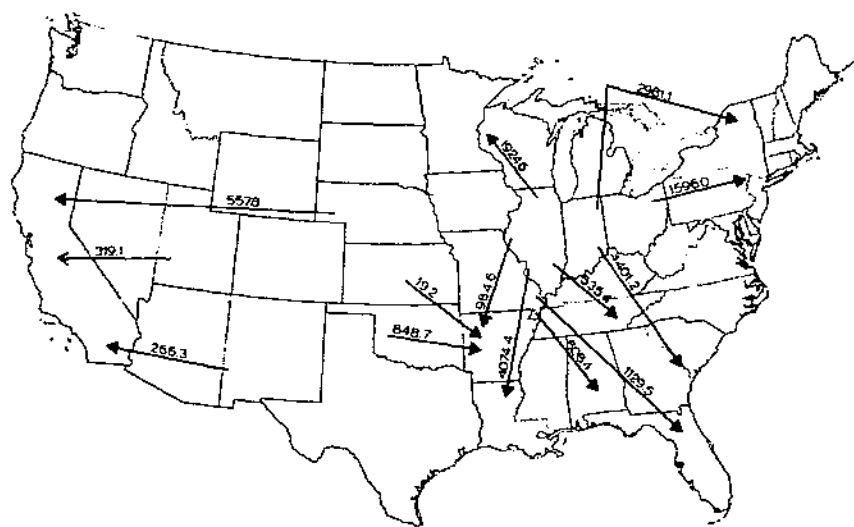


Figure 6.—Optimal interregional flows of feed grains, Solution 8 (in thousands of tons).

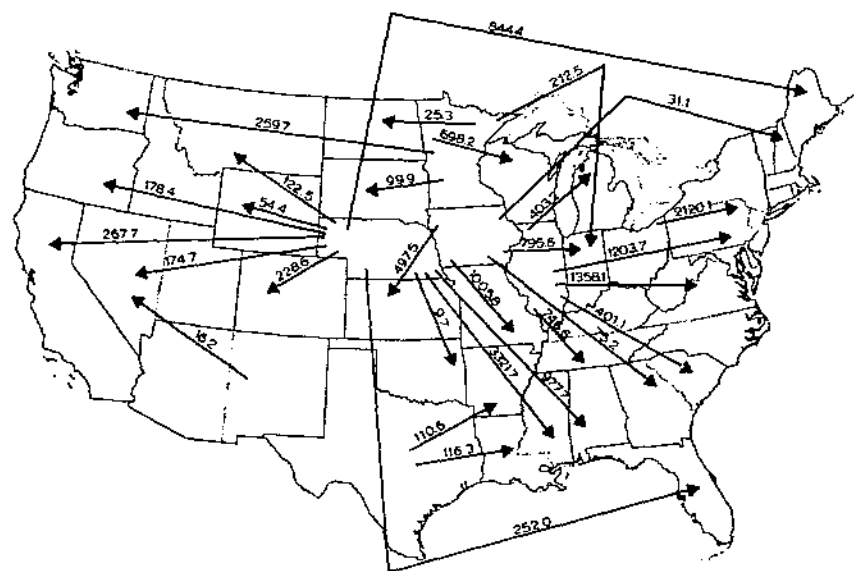


Figure 7.—Optimal interregional flows of oilmeals, Solution 8 (in thousands of tons).

**TABLE 7.—Summary of land use, by production region,
Solution 8**

Production region	Wheat	Feed grain rotation	Feed grain-soybean rotation	Soybeans	Cotton	Idle	Equilibrium land rent per acre		
							Total land	Cotton land	Soybean land
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Dollars	Dollars	Dollars
1		602.0					15.47		
2		2,422.0					24.63		
3		598.0					42.93		
4		331.5					35.06		
5		312.3					16.59		
6		877.5					28.85		
7		241.0							
8		430.8				94.1	9.59		
9	1,052.3						15.94		
10						470.7			
11						336.8			
12						4,673.4			
13		332.2					6.83		
14	289.1			289.2			0.95	0.07	
15						140.5			
16		190.4			59.9	558.1			23.74
17							2.13		
18						1,088.4			
19		1,934.3					1.58		
20		140.9					4.45		
21						2,381.0			
22						1,223.6			
23	390.1					816.2			
24		311.0					1.23		
25					398.8	562.2			24.01
26	739.4					528.1			
27		1,069.0					6.23		
28						288.2			
29		329.4					9.54		
30						593.3			
31						414.8			
32						1,161.6			
33		3,308.7		2,545.0			1.08		
34						829.5			
35		337.3					20.92		
36		719.8		26.7			69		
37		1,453.8					11.90		
38		5,889.1					8.92		
39	1,216.1						12.43		
40		1,374.7							
41	290.9					356.5			
42						2,025.8			
43		2,297.1				993.8			
44		504.0					9.40		
45		5,987.1					19.95		
46		945.5					6.27		
47	806.2		2,385.7	3,192.0			.59	.73	
48							10.92	1.57	
49						1,717.9			
50	419.7	335.9				1,471.1			
51							5.78		
52		4,546.3				1,802.7			
53		1,690.1					7.77		
54				1,970.4			7.30		
55		9,352.1				2,481.4			
56	1,213.7	56.8					2.50		
57		2,044.9				1,554.9			
58		1,931.5				694.8			
59		758.7					8.71		
60		2,131.5					8.84		
61			1,512.7	1,512.7			2.40		
62							2.12	.12	
63	2,311.5					1,308.3			
64							7.26		
65						2,011.7			
66	1,772.1					6,040.0			
67						95.2			
68						4,021.6			
69						100.4			
70						1,751.0			
71						3,917.5			
72	54.3					1,352.4			
73		3,000.5				911.9			
74			1,950.5	1,950.4		650.5	1.82	3.71	

**TABLE 7.—Summary of land use, by production region,
Solution 8—Continued**

Production region	Wheat	Feed grain rotation	Feed grain- soybean rotation	Soybeans	Cotton	Idle	Equilibrium land rent per acre		
							Total land	Cotton land	Soybean land
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Dollars	Dollars	Dollars
75	244.2						6.20		
76	1,838.2						7.94		
77	734.1						6.73		
78				914.5		914.4		1.20	
79	1,939.7						7.11		
80			1,572.0	2,302.7				1.98	
81						730.6			
82						1,231.7			
83						1,005.6			
84						883.2			
85	1,579.8					1,095.4			
86							2.12		
87	2,320.0					1,311.2			
88	5,440.5						.02		
89	3,310.9						8.20		
90							9.39		
91						447.8			
92	2,518.5					2,617.6			
93							3.01		
94						497.1			
95	1,701.1				880.3		2.35		4.53
96	1,444.3	1,279.7			425.3		17.56		100.37
97	1,827.0				1,693.2		10.44		21.95
98	1,330.4				1,452.8		13.16		77.29
99	401.6						5.67		
100		220.7					10.28		
101	1,730.2				785.6		12.02		
102	100.0						14.37		
103		293.1			249.6		14.51		9.39
104	3,809.7	917.3			496.1		20.13		20.32
105	2,113.3						3.91		
106						419.0	2.59		
107						413.0			
108	24.1					508.9			
109	2,508.8						6.37		
110	407.7						.07		
111	222.0						6.39		
112	318.9				47.2		5.15		1.96
113						1,749.7			
114	283.7						3.04		
115	446.7						3.55		
116	968.7						36.50		
117	1,427.1						20.76		
118	1,467.8						24.75		
119	316.9						17.34		
120	375.7						43.68		
121	973.6				709.8		29.48		75.59
122						209.1			
123	1,041.4						.31		
124						402.9			
125						1,366.1			
126						1,520.8			
127					607.7		1,273.8		11.39
128						330.7			
129	121.4						1.17		
130						391.2			
131						28.2			
132		64.6					8.59		
133		495.6			405.4		4.95		7.32
134				86.7		86.7		16.02	
135				115.3		115.2		5.13	
136		217.3					2.34		
137		140.6			599.4		15.44		31.60
138		115.3					10.02		
139		10.7			9.2		9.69		16.87
140		22.3			200.7		18.88		69.97
141					192.6	30.6			4.25
142	295.6				527.7		14.83		44.41
143	161.1						50.31		
144						51.0			
Total	55,241.6	64,609.5	7,420.9	15,851.8	9,831.3	71,000.4			

The net return in an importing consumption region is the difference between the value of the product per unit in that region and the cost of producing a unit in the consumption region from which the commodity is imported. Consider the equilibrium net return per bushel of wheat in Kansas, which is \$0.868. Production regions 85, 87, 88, and 89 in Kansas all produce wheat. Region 87 has the highest production costs (or lowest net return) of these four regions. Gross returns per acre of wheat in region 87 are equal to the estimated yield of 27.4 bushels times the wheat price of \$1.52 assumed for Kansas in Solution 8, which is \$41.65. Per acre production costs of \$17.84 are deducted from gross returns, giving a net return of \$23.81 per acre. Dividing net return per acre by per acre yield ($\$23.81 \div 27.4$) gives \$0.87, the net return per bushel of wheat in this production region. This is also the net rent per bushel of wheat in Kansas.

Alternatively, the net rent can be thought of as the difference between selling price and production cost. The production cost of wheat in region 87 is \$17.84 divided by 27.4, or \$0.651 per bushel. The selling price is \$1.52 minus \$0.65, or \$0.87.

In Solution 8, New England imports its wheat from Kansas. The net rent per bushel in New England is the difference between the net return of \$0.87 on a bushel of wheat in the lowest producing region in Kansas and the cost of transporting a bushel of wheat from Kansas to New England. Transportation costs are not presented in this report, but the cost in this case is \$0.75 per bushel. Thus we have \$0.87 minus \$0.75, which equals \$0.12, the bushel rent for wheat in New England.

TABLE 8.—Net returns, by consumption region, Solution 8

Consumption region	Wheat, per bushel	Feed grains, per bushel (corn equivalent)	Soybeans, per bushel	Cottonseed, per ton
	Dollars	Dollars	Dollars	Dollars
1 New England.....	0.124	0.161	0.937	-----
2 New York, Pennsylvania, New Jersey, Maryland.....	.178	.187	.988	-----
3 Virginia, West Virginia, North Carolina.....	.154	.227	.957	24.27
4 South Carolina, Georgia.....	.247	.113	1.073	26.87
5 Alabama.....	.121	.149	1.130	30.40
6 Florida.....	.230	.092	1.076	27.95
7 Kentucky, Tennessee.....	.298	.248	1.185	31.34
8 Indiana.....	.508	.498	1.181	-----
9 Ohio.....	.451	.462	1.190	-----
10 Michigan.....	.405	.412	1.103	-----
11 Minnesota.....	.091	.402	1.397	-----
12 Wisconsin.....	.469	.387	1.240	-----
13 Iowa.....	.483	.377	1.240	-----
14 Missouri.....	.641	.531	1.239	30.15
15 Illinois.....	.815	.591	1.320	-----
16 Arkansas.....	.438	.316	1.192	30.73
17 Louisiana, Mississippi.....	.219	.183	1.165	29.59
18 Texas.....	.333	.306	1.393	34.38
19 Oklahoma.....	.615	.574	1.239	30.20
20 Kansas.....	.898	.567	1.173	-----
21 Nebraska.....	.847	.593	1.420	-----
22 North Dakota.....	.772	.386	1.169	-----
23 South Dakota.....	.668	.370	1.181	-----
24 Montana, Idaho.....	.771	.722	.899	-----
25 Wyoming.....	.628	.498	1.192	-----
26 Colorado.....	.774	.590	1.273	-----
27 New Mexico, Arizona.....	.397	.451	1.130	29.28
28 Utah, Nevada.....	.240	.434	.899	-----
29 Washington.....	.411	.360	.906	-----
30 Oregon.....	.321	.356	.890	-----
31 California.....	.090	.111	.899	24.02

Values are imputed to the land in regions which are not marginal producing regions, that is, which have no idle land. These land rents are functions of the difference between production costs of producing regions within a consumption region. The land rents for Kansas production regions 85, 88, and 89 are \$2.12, \$8.20, and \$9.39, respectively (table 7). Dividing the per acre rents by yields gives per bushel rents of \$0.07, \$0.28, and \$0.37, respectively. These are the per bushel opportunity costs of not being able to produce more wheat in each of the regions mentioned. Thus, the net return of \$0.87 per bushel in the least profitable production region in Kansas, region 87, plus \$0.07, the opportunity costs of not producing another bushel of wheat in region 85, is \$0.94. This is the net return per bushel in region 85. Similar operations show the net returns per bushel in production regions 88 and 89 to be \$1.15 and \$1.24. Production region 87 also has a small land rent, but this rent when translated into bushel rent is insignificant; hence, opportunity costs are negligible.

The above method of calculating net return per bushel by looking at opportunity costs illustrates the rent imputation process. Net return per bushel is best found, however, by taking the difference between the selling price and production costs. For region 85, this is \$1.52 minus \$0.58, or \$0.94.

The examples here deal with wheat. The procedures for establishing the relationships between production costs, yields, land rents, and bushel rents are the same for the other crops.

Price Steps and Surplus Value

In this analysis, the price increases from one solution to the next were fixed in advance. In Solution 7, some demand requirements were not met and we proceeded to Solution 8. The price increases in Solution 8 were more than sufficient to satisfy all demand requirements. If the price step from Solution 7 to Solution 8 had been just sufficient to satisfy all demands, the bushel rent in the marginal consumption regions would have been zero. For each commodity, the marginal consumption region is the one that requires the highest price before production within the region or shipments from outside the region will meet its needs. In Solution 8, California has the lowest bushel rent for wheat. For feed grains, the marginal region is Florida. Four regions have the marginal bushel rent for soybeans—Montana-Idaho, Utah-Nevada, Oregon, and California. California is the marginal region for cottonseed.

The national average wheat price in Solution 8 is \$1.50 per bushel. All wheat demands could have been satisfied had the wheat price been about \$0.09 lower than in Solution 8—then the marginal region would have had a zero bushel rent. For feed grains, the national average price in Solution 8 is \$1.09 but could have been \$1.00. At soybean and cottonseed prices of \$1.30 per bushel and \$23.92 per ton, respectively, oilmeal requirements would have been met. Thus, the equilibrium market clearing prices determined in this analysis are \$1.41 for wheat, \$1.00 for feed grains, \$1.30 for soybeans, and \$23.92 for cottonseed. The inflexibility of our analysis did not allow us to reach this point initially. The returns per bushel in the marginal consumption regions reflect the surplus values in the solution.

Supply Functions

The price and demand data in tables 3, 4, and 5 indicate the regional demand curves for each product. The quantity of each product supplied to each region at the prices assumed in each of the solutions is also obtainable from tables 3, 4, and 5. Thus, with the exogenously determined demand curves and the endogenously generated stepped supply functions one can draw a graph tracing the approach toward equilibrium of the quantity supplied and the quantity demanded of each product in each consumption region. Figure 8 is such a graph for feed grains in California.

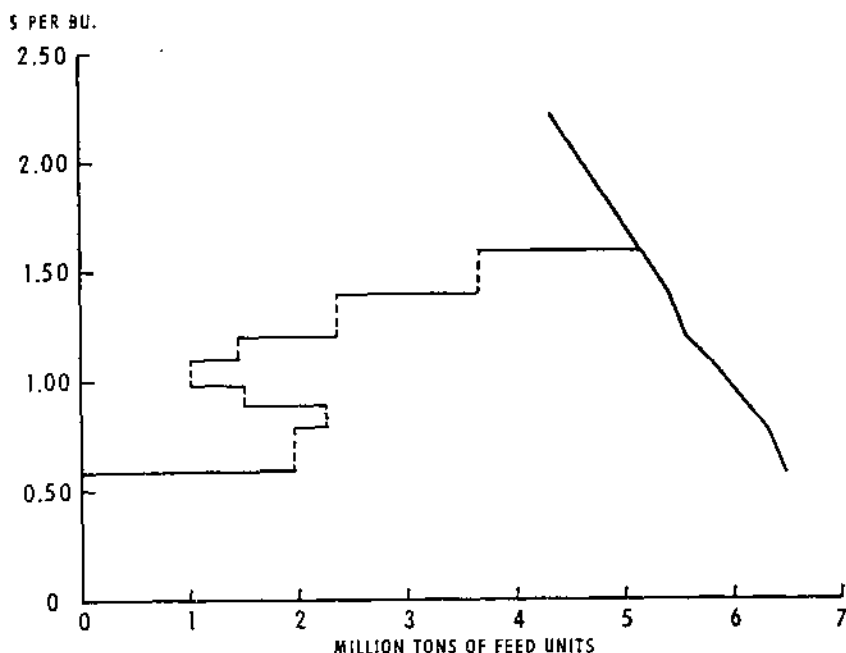


Figure 8.—Supply-demand relationship for feed grains, California, 1975.

The supply schedule is somewhat irregular. By referring to tables 3 and 4 we can gain insights into its nature. Feed requirements in California are met by the wheat-to-feed grain transfer activity. In table 3 we see that at the first step, with wheat priced at \$0.47, producing regions 120 and 121 produce feed grains via the wheat-to-feed grain transfer. With \$0.62 wheat, region 143 is added. At \$0.78 a bushel the amount of transfer is decreased; consequently, the backward slope of the supply schedule. A further reduction in wheat-to-feed grain transfers occurs at \$0.94 a bushel as some wheat is used to meet the wheat requirements.

Many of the supply functions would not reveal any steps because of the lumpiness of the producing region outputs. This is especially true of oilmeals, for which all demands were met in the initial solution.

Livestock Production and Prices

Our programming analysis enabled us to determine the equilibrium prices of the crops included in the study. The equilibrium prices of livestock associated with the estimated amounts of livestock required were calculated exogenously to the linear programming analysis.

The demand curves were generated by assuming certain quantities of livestock and calculating how much feed grain and oilmeal would be needed to support these quantities. The base quantities from which the other quantity and price data are derived are the quantities of Solution 7. In Solution 8 the quantities demanded are lower and prices slightly higher than those used in the base estimates (Solution 7).

From the data used to calculate the crop requirements for Solution 8, that is, the feed-livestock conversion coefficients, the livestock quantities underlying these demand estimates were found. Using statistical livestock price-quantity relationships, the livestock prices associated with these quantities of livestock were determined (2). The livestock price and quantity data associated with the feed requirements of the equilibrium solution are presented in table 9.

TABLE 9.—Estimated prices of livestock, and quantities produced, at equilibrium prices of wheat, feed grains, and oilmeals, by consumption region, Solution 8

Consumption region	Cattle		Calves		Hogs	
	Quantity	Price per cwt.	Quantity	Price per cwt.	Quantity	Price per cwt.
	Tons	Dollars	Tons	Dollars	Tons	Dollars
1 New England.....	272,400	16.66	72,782	21.49	63,302	19.16
2 New York, New Jersey, Pennsylvania, Maryland, Delaware.....	1,127,700	19.12	302,100	26.75	364,600	20.68
3 Virginia, West Virginia, North Carolina.....	693,320	19.42	121,750	28.53	568,460	19.81
4 South Carolina, Georgia.....	574,320	19.88	71,713	24.18	70,472	19.57
5 Alabama.....	515,630	19.64	71,177	23.83	359,170	19.15
6 Florida.....	448,560	19.34	60,474	22.70	127,880	18.88
7 Kentucky, Tennessee.....	1,165,500	20.54	150,350	26.84	955,000	19.67
8 Indiana.....	1,144,300	24.45	24,350	27.55	2,405,300	19.93
9 Ohio.....	867,780	22.78	47,630	28.10	1,308,700	20.33
10 Michigan.....	624,630	20.14	54,855	28.31	353,720	19.09
11 Minnesota.....	2,070,900	22.82	85,894	26.30	2,048,900	19.25
12 Wisconsin.....	964,200	17.55	270,800	25.04	1,085,700	18.91
13 Iowa.....	4,651,500	25.89	52,982	26.32	6,516,600	19.33
14 Missouri.....	1,702,000	23.69	93,654	25.94	1,967,300	19.72
15 Illinois.....	2,571,700	24.80	27,828	25.87	3,953,500	19.57
16 Arkansas.....	490,260	18.72	51,708	24.74	138,770	18.90
17 Louisiana, Mississippi.....	1,064,800	17.52	190,520	23.96	277,530	18.50
18 Texas.....	3,387,260	21.13	263,830	24.07	370,040	19.16
19 Oklahoma.....	1,333,100	21.83	68,302	25.68	193,180	19.24
20 Kansas.....	2,727,200	23.15	16,323	26.08	492,490	19.43
21 Nebraska.....	2,674,600	25.72	30,237	20.71	1,224,500	19.38
22 North Dakota.....	670,130	21.54	51,644	27.48	206,700	18.29
23 South Dakota.....	1,484,000	23.66	58,066	28.44	895,180	18.80
24 Montana, Idaho.....	1,473,600	22.36	93,387	28.38	108,840	19.63
25 Wyoming.....	549,180	23.95	22,209	31.26	13,605	19.54
26 Colorado.....	1,567,900	25.19	23,515	29.66	73,464	20.18
27 New Mexico, Arizona.....	1,500,800	23.75	56,995	28.69	24,488	19.71
28 Utah, Nevada.....	456,940	21.50	37,194	27.07	32,652	20.28
29 Washington.....	444,370	21.02	20,069	26.89	59,860	21.52
30 Oregon.....	456,940	21.05	35,856	27.08	73,464	21.72
31 California.....	2,251,200	25.41	121,220	27.27	149,650	22.53

TABLE 9.—Estimated prices of livestock, and quantities produced, at equilibrium prices of wheat, feed grains, and oilmeals, by consumption region, Solution 8—Continued

Consumption region	Sheep		Chickens		Turkeys	
	Quantity	Price per cwt.	Quantity	Price per cwt.	Quantity	Price per cwt.
	Tons	Dollars	Tons	Dollars	Tons	Dollars
1 New England.....	8,247	18.91	691,390	20.70	25,934	35.02
2 New York, New Jersey, Pennsylvania, Maryland, Delaware.....	37,700	17.72	1,489,800	21.28	78,200	34.58
3 Virginia, West Virginia, North Carolina.....	61,810	20.83	1,143,600	19.72	162,180	28.36
4 South Carolina, Georgia.....	4,827	14.82	1,569,900	19.14	35,310	30.61
5 Alabama.....	5,395	18.29	705,400	18.82	6,982	28.74
6 Florida.....	568	18.62	67,038	19.45	5,584	35.07
7 Kentucky, Tennessee.....	95,120	18.22	292,100	18.01	14,563	27.20
8 Indiana.....	60,290	18.60	287,170	18.80	76,405	20.70
9 Ohio.....	98,250	18.44	157,090	18.39	72,453	27.04
10 Michigan.....	34,927	18.67	79,045	18.61	31,120	26.24
11 Minnesota.....	141,420	12.71	138,080	12.71	204,930	26.81
12 Wisconsin.....	27,290	18.65	171,100	17.94	74,600	27.47
13 Iowa.....	249,890	19.85	233,130	16.80	170,540	26.13
14 Missouri.....	103,640	19.20	122,070	15.25	90,560	27.83
15 Illinois.....	104,500	19.06	675,380	14.43	58,251	27.04
16 Arkansas.....	3,408	16.40	358,320	19.15	6,783	28.98
17 Louisiana, Mississippi.....	8,963	12.28	552,310	19.21	101,740	25.79
18 Texas.....	200,180	16.73	53,030	16.00	28,927	26.13
19 Oklahoma.....	25,124	22.08	68,037	11.61	21,346	35.45
20 Kansas.....	101,080	21.21	75,042	11.58	28,928	26.82
21 Nebraska.....	135,170	17.65	28,016	14.28	19,757	27.94
22 North Dakota.....	70,423	19.18	48,027	14.28	19,757	27.94
23 South Dakota.....	145,100	19.26	37,022	18.57	6,284	26.08
24 Montana, Idaho.....	173,500	19.18	2,001	19.43	37,105	27.83
25 Wyoming.....	151,910	19.03	16,009	17.09	4,088	28.78
26 Colorado.....	231,430	19.13	9,005	18.13	74,800	26.79
27 New Mexico, Arizona.....	91,139	19.51	92,052	21.05	16,957	26.36
28 Utah, Nevada.....	139,420	20.16	67,038	19.62	40,068	25.91
29 Washington.....	29,532	20.89	368,200	19.82	372,840	26.92
30 Oregon.....	83,484					
31 California.....	215,240					

Consumption region	Eggs		Milk	
	Quantity	Price per dozen	Quantity	Price per cwt.
	Thousands	Cents	1,000 lbs.	Dollars
1 New England.....	41,243	63.28	56,097	6.95
2 New York, New Jersey, Pennsylvania, Maryland, Delaware.....	121,470	50.58	235,220	5.58
3 Virginia, West Virginia, North Carolina.....	47,464	51.15	52,789	6.06
4 South Carolina, Georgia.....	33,645	58.26	20,002	7.11
5 Alabama.....	14,533	52.19	12,332	6.74
6 Florida.....	11,930	51.70	14,438	8.07
7 Kentucky, Tennessee.....	28,490	42.15	58,054	4.68
8 Indiana.....	35,726	38.30	40,757	4.47
9 Ohio.....	35,635	41.00	63,918	4.91
10 Michigan.....	23,697	39.91	63,166	4.59
11 Minnesota.....	56,347	32.97	120,470	3.51
12 Wisconsin.....	33,917	38.56	217,470	3.69
13 Iowa.....	73,260	33.34	74,807	3.51
14 Missouri.....	28,309	36.50	46,322	4.24
15 Illinois.....	42,418	35.62	55,646	4.19
16 Arkansas.....	10,582	47.33	12,332	4.99
17 Louisiana, Mississippi.....	17,365	51.15	26,020	5.88
18 Texas.....	34,731	41.36	36,546	6.35
19 Oklahoma.....	11,034	36.38	18,348	4.81
20 Kansas.....	23,787	32.60	24,515	4.11
21 Nebraska.....	27,586	31.75	25,417	3.34
22 North Dakota.....	7,417	29.08	21,350	2.80
23 South Dakota.....	21,016	31.15	17,446	3.06
24 Montana, Idaho.....	7,778	43.87	25,116	4.12
25 Wyoming.....	9,962	45.75	3,406	4.20
26 Colorado.....	4,271	41.60	10,528	5.05
27 New Mexico, Arizona.....	3,613	51.88	8,121	6.23
28 Utah, Nevada.....	5,517	41.24	10,377	4.80
29 Washington.....	15,014	46.11	23,011	5.28
30 Oregon.....	9,225	48.42	13,837	5.40
31 California.....	75,069	43.31	95,800	5.50

Land Use

Table 7 shows the total acreage devoted to each crop activity in Solution 8. The wheat requirement is 1,064 million bushels, requiring about 55.2 million acres of land. A little more than half a billion bushels of wheat are fed to livestock. This is about one-third of all wheat. About 37.3 million acres of wheat are needed for the food wheat requirements; the remaining 18.0 million acres are for livestock feed.

There are 64.6 million acres in the feed grain rotation and 7.4 million acres in the feed grain-soybean rotation. Of the 7.4 million acres, about 6.5 million are in feed grains and 0.9 million are in soybeans. Thus, in the equilibrium solution there are 71.1 million acres of feed grains. Added to the wheat-for-feed acreage, this makes 89.1 million acres in feed crops.

The 0.9 million acres in soybeans in the feed grain-soybean rotation and the 15.9 million acres in soybeans total 16.8 million acres. Finally, about 9.8 million acres of cotton are required to meet the cotton lint requirements of the solution.

Seventy-one million acres of the 224 million acres available are not needed to meet the stated requirements. This idle land would be available for allocation to other uses under the conditions of Solution 8.

COMPARISONS WITH PREVIOUS RESEARCH

In an earlier publication, we reported results obtained with cost-minimizing models and discussed the use of these models (7). These cost-minimizing models employed the same set of basic production and demand data as the model discussed here.

In the earlier study, the cost-minimizing solution was found with the set of product requirements used here in Solution 7. In the present study, a profit-maximizing solution was not attained for the requirements in Solution 7. Several factors account for this apparent inconsistency. (1) The cost-minimizing model gives a more efficient pattern of production than does the profit-maximizing model, especially when used in conjunction with a transportation matrix. In the profit-maximizing model, regional prices are set; their relationships to one another are predetermined. In the cost-minimizing model, regional price differentials are functions of the imposed transportation rates. (2) Regional price differentials in the profit-maximizing models are different from transportation costs between regions. In most cases, transportation costs are greater than pre-specified price differences. (3) Our profit-maximizing model does not afford the flexibility of allowing the prices of the different products to change independently of one another. A more flexible approach would be to obtain the results to one solution, compare shadow prices on unfulfilled demands, and increase product prices accordingly.

The cost-minimizing solution to the set of demands represented by Solution 7 gives national average prices of \$0.98 a bushel for wheat, \$0.85 a bushel for feed grains, \$1.13 a bushel for soybeans, \$27.86

a ton for cottonseed, and 31 cents a pound for cotton lint. These prices are derived by weighting the regional product prices by the production within each region. Equilibrium prices in certain consumption regions (especially the importing regions) may be considerably higher than the national average. The prices in importing consumption regions will be greater by the magnitude of per unit transportation rates. For example, the equilibrium wheat price in New England in the cost-minimizing solution is \$1.41. New England receives its wheat from Illinois, where the wheat price is \$0.91. In the profit-maximizing model, the price difference is only 18 cents. Before prices are high enough to satisfy all the requirements in the maximizing model the equilibrium price from the minimizing solution must be at least equaled.

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APPENDIX TABLES

TABLE 10.—Estimated production costs per acre, by crop and production region, 1975

Production region	Wheat	Corn	Oats	Barley	Grain sorghum	Soybeans	Cotton
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1	45.23	50.79	48.75	47.20		39.10	
2	43.64	52.96	40.21	38.53		40.50	
3	42.82	48.12	39.43	39.73		43.26	
4	40.14	44.73	37.73	36.06		42.18	
5	46.04	60.87	46.92	48.13	52.19	50.37	
6	42.48	53.42	40.76	42.33	46.79	39.47	175.35
7	40.50	62.42	30.42	39.50	49.19	42.59	187.96
8	40.16	52.11	35.43	36.80	45.89	41.03	163.11
9	43.38	56.77	34.43	34.84	44.00	34.20	154.43
10	50.14	96.51	40.03	44.31	51.31	48.56	186.67
11	50.21	68.52	42.75	46.79	50.12	52.61	193.84
12	52.46	65.08	42.73	43.61	54.47	52.00	185.36
13	36.46	44.10	26.72	27.21	38.04	30.33	126.07
14	40.14	58.35	37.67	41.03	40.17	31.79	150.38
15	49.42	67.83	42.90	47.68	50.52	40.97	184.16
16		54.65	34.16			43.52	180.48
17		54.22	42.80		42.35	46.80	197.80
18		51.06	42.45		40.24	37.31	185.58
19		50.01	41.62		30.01	37.31	170.44
20		50.63	45.01	42.16	46.62	30.92	180.44
21	44.43	61.60	43.17		43.38	44.73	191.06
22	40.47	55.23	34.36	43.86	50.72	50.33	202.26
23	42.88	54.09	39.15	36.97	41.74	42.69	206.88
24	42.03	51.86	46.14		46.66	37.73	202.82
25	43.58	50.65	42.82		46.96	35.32	174.46
26	37.29	49.58	35.86	34.41	42.40	38.66	150.40
27	48.68	62.10	42.74	42.36	40.40	46.88	
28	45.37	57.19	43.04	43.37	50.49	47.20	188.19
29	48.70	61.88	47.82	45.95	56.37	50.44	
30	47.19	57.21	46.49	39.99		36.97	
31	53.94	60.67	40.98	43.73		38.09	
32	55.11	69.17	54.12	47.95		36.53	
33	46.81	58.83	43.99	39.37		33.58	
34	40.86	53.65	40.60	33.31	40.17	32.04	
35	34.67	39.34	31.59	26.15	37.23	26.05	
36	36.53	40.81	32.04	22.26	26.72	25.31	
37	34.91	38.02	33.50	20.32	35.08	24.07	
38	39.74	46.69	36.04	35.40		31.23	
39	36.47	45.76	33.23	27.41		20.81	
40	50.32	52.63	45.49	44.62		35.97	
41	49.51	54.11	47.46	48.47		30.30	
42	43.04	53.20	39.41	31.26		40.79	
43	42.49	52.18	34.90	30.88		36.72	
44	36.13	40.97	30.91	27.69		27.99	
45	36.83	46.69	32.90	28.73		31.58	
46	40.98	45.73	30.54	36.00	43.37	30.60	
47	31.67	44.30	24.89	22.71		24.38	
48	40.46	45.08	36.41	30.13	43.61	27.09	
49	38.17	44.19	29.20	26.46	43.11	27.84	
50	30.10	34.94	26.28	23.81	37.14	28.80	154.89
51	32.60	39.94	25.94	26.90	37.14	32.27	
52	30.77	36.54	25.79	29.11	40.37	28.50	
53	34.60	42.69	29.33	29.11	41.40	28.79	
54	35.00	41.43	32.51	31.30	36.47	27.62	
55	33.10	37.31	28.47	29.43	34.72	26.25	
56	30.67	36.87	29.61	27.67		30.70	
57	35.66	41.61	30.46	32.66	38.52	27.72	
58	30.60	35.54	31.72	28.43		23.00	
59	34.81	43.14	30.65	28.75		22.58	
60	32.76	41.13	32.15	27.22		20.49	
61	38.60	32.00	26.69	30.62		20.07	
62	26.43	38.08	25.22	21.11		20.37	
63	20.62	30.67	21.62	17.42		26.42	
64	19.34	24.97	19.09	16.71		22.84	
65	14.91	23.71	13.56	12.35		19.44	
66	13.26	25.82	13.52	12.43			
67	16.41	21.63	14.56	13.22			
68	18.73	21.50	15.77	14.41		21.19	
69	16.82	19.72	14.34	17.10	17.80	19.78	
70	19.74	19.89	11.50	18.11		20.22	
71	27.93	29.92	23.53	28.87	26.10	23.05	

TABLE 10.—Estimated production costs per acre, by crop and production region, 1975—Continued

Production region	Wheat	Corn	Oats	Barley	Grain sorghum	Soybeans	Cotton
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
72	19.14	19.72	18.11	21.65	18.44	23.00	
73	27.63	29.13	17.46	27.45	25.46	19.74	
74	23.60	33.26	17.31	19.10	29.93	17.86	
75	14.47	33.52	19.81	18.83	28.10		
76	14.17	46.78	22.82	24.92	36.50		
77	10.86	43.26	16.61	19.40	30.28		
78	20.66	43.15	27.16	26.05	32.25	25.55	
79	12.94	39.41	20.62	19.04	28.51	19.34	
80	28.12	40.59	19.94	18.60	26.57	20.52	
81	33.02	36.33	27.55	28.01	33.93	32.87	
82	35.55	44.10	28.77	29.40	36.40	32.17	
83	37.07	45.39	30.08	38.24	34.19	28.19	
84	31.30	39.94	24.87	32.63	35.67	25.42	
85	17.31	32.78	24.33	22.14	30.45	21.68	
86	21.07	37.43	24.02	23.56	31.33	22.14	
87	17.54	38.95	20.60	21.01	28.63	21.67	
88	10.60	22.66	17.17	17.22	21.71	19.53	
89	7.29	34.74	12.51	13.81	18.45		
90	34.96	36.94	29.89	27.83	37.31	33.20	
91	21.36	20.50	17.30	15.00	35.86	31.64	
92	13.80	24.61	13.87	12.10	18.94		
93	24.61	35.82	21.53	20.38	36.01	32.21	
94	17.14	31.25	15.06	13.49	22.26		82.09
95	11.81	30.08	8.03	9.16	29.35	28.47	102.20
96	13.13	15.10	8.09	11.37	17.13		82.70
97	12.16	28.20	7.08	10.30	19.38	20.04	68.36
98	16.73	17.01	9.22	12.05	18.21	16.99	90.53
99	12.30	12.66	8.39	12.05	18.21		90.58
100	16.95	18.71	12.77	14.66	28.69	24.14	77.80
101	11.30	19.25	9.98	13.70	28.71		105.08
102		21.68	18.04	17.89	29.10		57.22
103	14.93	17.44	16.97	16.09	22.45		102.38
104	9.18	98.11	10.46	15.65			
105	12.30	109.60	20.49	18.94			
106	12.24	104.47	18.19	20.56			
107	16.07	136.11	27.13	18.41			
108	18.60	79.43	25.94	16.14			
109	8.47	20.55	11.81	21.84	21.29		
110	11.75	48.83	18.71	12.62	38.96		
111	5.56	30.81	12.79	12.62	28.16		
112	12.44	44.11	34.14	30.88	46.72		171.91
113	21.20		36.44	28.78			
114	18.34	112.67	45.66	43.83			
115	25.19		23.67	23.32			
116	21.13		23.85	22.99			
117	19.60	108.11	57.82	19.16			
118	13.05	104.22	18.19	20.56			
119	16.69	132.44	38.32	31.56			
120	12.33	92.17	15.27	18.38	50.55		
121	11.24	71.81	10.73	18.28	20.10		234.82
122	44.46	66.02	40.88		54.52	58.12	190.64
123	12.04	63.27	43.31	42.55	47.34	54.19	201.94
124	43.64	65.63	40.63		53.70	59.77	178.21
125	59.76	64.53	52.27		50.55	46.72	266.19
126	40.38	60.69	46.98		42.68	30.51	186.61
127	46.68	59.28	33.41		51.16	38.54	109.81
128	43.67	59.02	32.46		49.86	36.69	160.53
129	42.08	56.51	37.82		47.07	50.44	185.03
130	46.89	60.02	44.78		44.63	40.70	140.15
131		62.42	34.19		28.24	46.46	144.59
132		21.59			28.88		107.80
133		25.82	10.08		28.46	24.32	94.18
134	20.34	23.55	15.11	29.60	23.05	21.11	98.02
135	26.51	40.37	24.00	21.49	35.47	23.71	98.28
136	26.57	23.39	11.15	16.13	28.87		58.70
137		38.97	13.09		32.61		112.42
138	14.84	17.76	7.10	12.00	22.26		101.96
139	12.11	12.58	8.28	12.19	18.00		80.20
140		40.15	17.70	27.15	40.49	37.44	217.52
141	36.58	81.60	37.69	32.58	61.19		265.78
142	34.78	60.64	32.30	30.02	44.00		301.95
143	26.13	77.81	22.23	22.12	41.83		275.21
144	44.12	57.73	32.64		51.21	30.51	149.02

TABLE 11.—Estimated yields per acre, by crop and production region, 1975

Production region	Wheat	Corn	Oats	Barley	Grain sorghum	Soybeans	Cotton
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Lb.
1.	37.4	70.0	68.0	41.2		14.8	
2.	34.5	72.2	53.0	50.1		30.3	
3.	30.6	74.0	46.4	46.9		33.5	
4.	28.3	69.0	47.9	45.3		32.8	
5.	36.1	66.8	55.9	50.0	41.4	27.6	
6.	40.3	70.7	54.4	45.2	56.3	35.2	367.6
7.	34.2	53.2	45.9	46.7	45.7	27.3	308.9
8.	33.1	58.9	44.6	48.0	40.5	27.4	323.6
9.	37.4	62.0	50.1	44.6	43.5	31.2	296.8
10.	33.9	44.7	43.4	41.9	39.9	37.6	386.7
11.	38.2	41.3	40.1	34.5	23.9	32.8	404.8
12.	20.9	36.3	45.4	43.8	30.6	31.5	448.3
13.	30.6	43.3	40.4	46.6	49.1	23.8	330.1
14.	31.3	39.7	40.9	41.7	34.4	28.6	370.1
15.	31.0	51.1	39.7	37.2	44.7	31.2	397.1
16.		37.5	39.1			26.2	442.1
17.		48.1	38.2		40.4	43.4	556.2
18.		31.5	42.1		26.1	36.0	423.0
19.		35.3	43.2		31.3	35.8	463.2
20.	30.8	38.5	51.9	47.1	40.9	25.1	500.3
21.	19.5	40.1	43.0		34.3	28.1	520.5
22.	29.2	45.2	37.9	23.2	44.4	26.5	521.5
23.	34.8	45.0	39.9	27.2	48.3	30.8	681.6
24.	27.4	41.0	50.9		33.5	28.4	612.9
25.	41.8	39.2	51.0		27.3	27.6	687.1
26.	45.0	64.4	41.7	37.4	63.4	30.1	481.6
27.	36.0	61.5	44.1	35.7	49.9	31.5	
28.	34.3	55.9	50.3	32.8	48.6	32.5	540.9
29.	31.7	59.6	50.1	39.0	43.6	31.4	
30.	26.9	76.7	44.2	40.3		28.5	
31.	33.2	77.5	54.9	50.9		27.8	
32.	37.3	79.1	60.5	52.5		30.8	
33.	30.2	86.2	61.9	47.8		33.2	
34.	34.7	71.2	46.4	58.0	49.7	28.1	
35.	35.2	66.2	46.2	38.2	44.9	30.0	
36.	37.9	69.3	39.2	31.8	45.2	26.8	
37.	39.8	74.5	47.3	41.5	49.7	29.3	
38.	49.1	89.8	58.6	37.6		35.9	
39.	51.4	88.8	57.3	42.9		35.7	
40.	41.5	82.0	53.4	45.3		30.9	
41.	44.4	78.1	53.2	43.6		28.7	
42.	33.1	66.4	56.2	43.0		16.4	
43.	43.6	88.8	68.6	48.8		21.5	
44.	38.7	91.7	65.4	43.4		18.8	
45.	40.1	97.0	60.3	36.8		30.7	
46.	31.1	90.5	51.0	42.7	56.8	34.4	
47.	48.7	97.0	54.5	37.1		38.0	
48.	38.5	59.8	36.4	33.0	55.6	27.2	
49.	40.8	68.4	40.0	33.0	55.6	28.6	
50.	43.3	69.8	40.1	39.3	73.5	28.4	518.9
51.	39.5	54.0	39.7	40.1	60.7	20.4	
52.	44.2	71.1	37.7	38.4	60.6	31.6	
53.	45.8	86.1	51.5	37.3	55.6	35.4	
54.	29.0	71.3	40.1	36.0	48.3	32.2	
55.	32.4	80.8	43.6	44.0	45.3	33.3	
56.	33.0	65.9	51.2	31.6		26.6	
57.	29.8	82.9	69.1	41.1	48.3	28.9	
58.	36.5	82.4	60.4	35.4		31.1	
59.	34.5	76.9	58.0	42.0		20.8	
60.	31.0	81.1	58.5	34.1		27.3	
61.	26.0	64.7	52.0	32.1		23.9	
62.	30.0	49.7	48.7	35.4		18.8	
63.	21.8	33.0	38.1	32.4		19.7	
64.	17.2	28.2	31.3	27.5		19.5	
65.	16.2	22.1	27.5	23.7		20.1	
66.	14.0	22.5	26.9	19.9			
67.	14.1	32.1	33.6	22.4		20.9	
68.	18.9	21.0	27.3	23.9	26.9	11.2	
69.	16.6	27.0	31.6	22.5	35.7	11.0	
70.	18.0	39.0	37.7	28.6	53.1	14.9	
71.	21.7	27.7	29.2	22.7	39.3	11.6	
72.	18.8	47.7	35.5	27.6	49.2	19.3	
73.	30.8	64.2	31.4	33.5	91.2	33.9	
74.							
75.	32.3	39.8	28.1	27.9	35.1		

TABLE 11.—Estimated yields per acre, by crop and production region, 1975—Continued

Production region	Wheat	Corn	Oats	Barley	Grain sorghum	Soybeans	Cotton
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Lb.
76	34.4	81.0	32.0	30.7	38.0		
77	26.8	94.0	37.6	37.5	41.2		
78	28.5	66.1	26.4	26.3	82.1	38.9	
79	31.2	51.4	12.9	27.9	50.9	34.2	
80	31.3	66.0	28.6	32.5	59.7	32.8	
81	36.7	50.8	34.3	39.9	69.9	28.3	
82	39.5	41.0	34.6	41.4	58.0	24.3	
83	35.9	50.9	30.8	35.1	54.3	22.1	
84	37.5	53.8	32.4	37.3	56.5	23.3	
85	29.8	43.2	25.3	29.6	42.1	21.3	
86	29.8	44.3	25.4	34.1	49.6	23.1	
87	27.4	42.5	23.4	30.1	43.9	21.4	
88	29.3	42.3	25.0	32.2	41.8	24.0	
89	25.6	57.4	18.0	28.1	39.0	30.9	
90	32.0	39.3	29.3	31.5	39.7	19.0	
91	28.5	32.0	31.6	31.7	37.8	18.8	
92	22.6	25.4	25.7	9.7	30.0		
93	27.3	36.9	28.9	28.3	38.4	26.0	
94	26.2	53.9	29.3	23.9	41.3	27.7	386.8
95	25.0	55.0	20.3	25.6	62.5	35.1	931.8
96	20.2	19.5	23.8	18.7	39.2	21.6	396.9
97	21.7	31.5	26.1	23.4	41.2	25.1	648.2
98	19.2	19.7	12.5	18.8	31.5	33.4	275.2
99	17.0	19.1	27.5	18.0	39.4		294.9
100	25.6	28.8	26.7	24.5	53.2	17.0	369.3
101	22.0	23.3	26.2	21.4	51.7		408.6
102	16.3	39.1	25.2	27.9	49.8		453.1
103	16.8	31.0	27.8	16.5	62.0		581.3
104	20.5	42.6	32.3	27.0			
105	23.4	61.5	33.3	20.1			
106	16.4	40.1	27.5	18.8			
107	23.4	110.6	46.8	28.5			
108	24.1	65.4	28.6	27.2			
109	22.6	38.4	21.7	21.7	23.0		
110	18.0	82.5	33.7	26.7	35.2		
111	18.2	40.7	27.1	20.5	21.0		
112	16.1	31.6	44.6	34.3	18.0		593.0
113	35.6	70.2	51.7	27.4			
114	18.1	108.2	57.1	45.7			
115	45.7	43.7	45.1	31.4			
116	46.0	98.7	37.8	45.7			
117	36.4	118.6	51.8	40.2			
118	34.1	128.3	33.8	35.9			
119	30.7	107.8	50.8	32.7			
120	35.1	126.7	34.9	27.2			
121	27.7	101.8	39.5	33.3	55.7		
122	29.6	20.6	37.6		50.4		949.5
123	32.5	35.7	45.5		24.9	19.7	337.0
124	30.9	26.7	41.1		44.0	20.6	455.1
125	32.9	35.9	31.2		26.8	24.5	318.3
126	24.5	46.3	32.9		39.4	33.8	667.9
127	43.7	41.7	51.9		38.3	29.3	443.0
128	40.9	35.0	48.1		28.1	28.5	595.1
129	35.3	23.7	33.8		20.0	20.1	459.4
130	30.0	32.9	45.2			32.8	429.3
131		27.7	33.6		30.5	22.0	470.1
132		20.4			28.1	17.2	355.1
133		29.8	27.8	23.1	33.7		422.6
134	23.8	32.0	25.9	22.5	46.1	20.5	433.4
135	29.1	33.6	27.4	28.3	34.5	46.3	218.4
136	19.0	24.0	22.9	18.8	34.5	35.1	219.1
137		41.4	32.3		40.5		221.8
138	17.6	20.7	28.7	23.6	61.5		648.7
139	10.7	34.8	26.7	26.5	54.0		395.5
140		51.5	44.6	46.0	31.5		417.9
141	23.8	59.8	66.7	69.6	70.9	37.9	1,233.7
142	64.2	67.3	85.6	41.8	42.7		624.3
143	52.0	101.0	39.3	37.7	46.6		1,221.2
144	39.7	36.8	48.4		38.6		1,038.6
					28.9	24.7	496.1

STATE IDENTIFICATION OF CONSUMPTION REGIONS AND PRODUCTION REGIONS CONTAINED WITHIN CONSUMPTION REGIONS

<i>Consumption Regions</i>	<i>Production Regions</i>
1. New England.....	None
2. New York, New Jersey, Pennsylvania, Maryland, Delaware.....	1-5
3. Virginia, West Virginia, North Carolina.....	6-9, 13
4. South Carolina, Georgia.....	10-12, 14, 15, 20, 123
5. Alabama.....	17-19, 122, 124
6. Florida.....	16
7. Kentucky, Tennessee.....	22, 23, 27-29
8. Indiana.....	34, 35, 37-39
9. Ohio.....	30-33
10. Michigan.....	40, 41
11. Minnesota.....	56, 58, 60-63
12. Wisconsin.....	42-44, 59
13. Iowa.....	46, 54, 55, 57
14. Missouri.....	26, 50-52
15. Illinois.....	36, 45, 47-49, 53
16. Arkansas.....	25, 127, 128, 130, 144
17. Louisiana, Mississippi.....	21, 24, 125, 126, 129, 131
18. Texas.....	95-103, 132, 133, 135-140
19. Oklahoma.....	90-94, 134, 135
20. Kansas.....	81-89
21. Nebraska.....	74-76, 78-80
22. North Dakota.....	64-68
23. South Dakota.....	69-73
24. Montana, Idaho.....	104-107, 113, 115
25. Wyoming.....	108
26. Colorado.....	77, 109-111
27. New Mexico, Arizona.....	112, 141, 142
28. Utah, Nevada.....	114
29. Washington.....	117-119
30. Oregon.....	116
31. California.....	120, 121, 143

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