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the future for agriculture in Utah

Limited land resources, more people expanding industry will make greater demands on the food supply. Projection studies suggest desirable adjustments in production and use of agricultural resources

W. Preston Thomas

During the last decade and a half, the growth of the nation has been accompanied by a redistribution of population and supporting industry which has shifted markedly to the Western States. During this period, the population of Utah increased 44 percent and that of the Western States 66 percent compared with a 24-percent increase for the nation as a whole (table 1). Projections for 1975 for the Western States indicate an increase in population of about 70 percent and a corresponding increase in food requirements.

With the expected industrial and population growth in Utah and the West, most of the agricultural products grown in Utah in the future probably will be consumed in the West. Deficit products in this region will likely be meat, dairy and poultry products, processed vegetables, and some fruit and truck crops. Expansion in production of these commodities to meet local demands will mean more intensive use of land, water, labor, and other resources necessary for agricultural production.

Population growth

The population of the 11 Western States increased from 14 million in 1940 to 23 million in 1955, and estimates are that it may reach 39 million by 1975. The population of the 8 Mountain States was about 6 million in 1955; the projection is for 9.5 million by 1975. In 1955, the total population of Utah was 797,000; projections for 1975 range from 1,200,000 to 1,500,000 (see table 1 and figs. 1 and 2).

Industrial growth

From 1920 to 1940, the number of people employed in agriculture, mining, and industry in Utah remained about constant, although the population increased about 100,000, or 22 percent. The lack of opportunities for an expanding population resulted in the backing up of rural people on the farms, unemployment in the cities, and migration of large numbers of people from Utah to the Pacific Coast and other areas.

From 1940 to 1955, a large expansion occurred in industrial employment. In 1955, the total labor force in Utah was 278,000 as compared with 181,000 in 1940, an increase of 54 percent; the number of industrial workers increased from 81,000 to 153,000, or 89 percent (table 2). If the projected population for 1957 from 1.2 to 1.5 million is realized, the total labor force in Utah will increase to about 540,000.

During the war and postwar years, the economy of the state not only expanded; it also shifted from predominant reliance on agriculture to industry. Of the total employment in 1940 in the basic industries, 53 percent was in agriculture, 29 percent in manufacturing, and 18 percent in mining (table 2 and figure 3). However, by 1955, agriculture employed only 36 percent, manufacturing 45 percent, and mining 19 percent of the total. This enlarged industrial activity came
Table 1. Population in Western States and United States, 1940-55 and projected 1975

<table>
<thead>
<tr>
<th>Area</th>
<th>1940</th>
<th>1955</th>
<th>Increase 1940-55</th>
<th>Projected Increase 1975</th>
<th>Increase 1955-75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utah</td>
<td>552</td>
<td>797</td>
<td>44</td>
<td>1,200 to 1,500</td>
<td>51 to 88</td>
</tr>
<tr>
<td>California</td>
<td>6,980</td>
<td>12,961</td>
<td>86</td>
<td>23,000</td>
<td>77</td>
</tr>
<tr>
<td>Eight Mountain States</td>
<td>4,155</td>
<td>5,925</td>
<td>43</td>
<td>9,584</td>
<td>62</td>
</tr>
<tr>
<td>Eleven Western States</td>
<td>13,961</td>
<td>23,185</td>
<td>66</td>
<td>39,000</td>
<td>68</td>
</tr>
<tr>
<td>United States</td>
<td>131,954</td>
<td>233,185</td>
<td>66</td>
<td>39,000</td>
<td>68</td>
</tr>
</tbody>
</table>

† Projections for Utah based on Stanford Report, footnote 1; unpublished estimate prepared by U.S. Bureau of Census for Bureau of Public Roads; Current population estimates series P-23, No. 160; and Utah Economic and Business Review, Bureau of Economic and Business Research, University of Utah, Vol. 17, No. 12, and Vol. 18, No. 1.

about through a change from production and processing of agricultural products to the manufacturing of steel and chemicals, the refining of metals and oil, and the manufacturing of supplies, machinery, and equipment for industry and government. The projected number of workers employed in basic industries by 1975 is 59 percent in manufacturing, 24 percent in agriculture, and 17 percent in mining.

From 1940 to 1955, the income and value of products from agriculture, manufacturing, and mining increased by $578 million, or 298 percent. During this period, retail trade increased from $171 million to $842 million, and personal income increased from $269 million to $1.2 billion (table 3). Of the total increase of 362 percent, about 114 percent resulted from price changes and 248 percent from factors other than price. In 1940, the per capita income for Utah was $487 as compared with $1,553 in 1955. The projected per capita income for 1975 is $2,085 (table 4).

Water and power development

In 1957, the capacity of electric power plants in operation and under construction in Utah was about 900,000 kilowatts. It is estimated that for a population of 1,500,000, the state will need more than 2,000,000 kilowatts of electric capacity. Development and use of
power from the Colorado River Storage Project and from large coal deposits should provide ample electrical energy.

Two of the 11 irrigation projects—Central Utah and Emery County—authorized under the Colorado River Storage Project, are located in Utah. Land to be irrigated from these 2 projects totals 184,460 acres. This includes 32,170 acres not now irrigated and 152,290 acres now irrigated that will receive a supplemental supply of water. The Weber River Basin Project will supply water to 74,888 acres of land in Utah, of which 50,500 acres are non-irrigated and 24,388 acres will receive additional water. The Colorado and Weber projects together will supply water to 259,348 acres of land.

Until recent years, most Utah cities have been short of water. During years when precipitation was low, water for domestic and industrial use was greatly restricted. A guarantee of a firm water supply for industry could not be given. This situation retarded the expansion of existing industries and discouraged new ones. The lack of water was a major factor in retarding industrial and population growth of the state.

The enlarged demand for water during World War II and the postwar years for use in military plants and by private industries made the water shortage problem more acute. To provide needed water, cities began programs to develop additional water from their own water resources. The federal government assisted by authorizing new reclamation projects, and by greater sales of water from old and new projects to cities and communities. In recent years, as a result of these programs, the larger cities of the State have been able to provide needed water for industrial development.

Impacts of industrial and population growth on agriculture

Increases in industry and population will affect vitally the agriculture of Utah. In 1955, food production in Utah was about 2 billion pounds; consumption was about 1.5 billion pounds (Table 5). A population of 1,200,000 would consume about 2.3 billion pounds of food, or 57 percent more than was consumed in 1955. A population of 1,500,000 would consume about 2.9 billion pounds, 96 percent more than 1955 consumption, and nearly 1 billion pounds more than total food production in 1955.

By 1975, consumption of all meat is expected to equal or exceed 1955 production in the state. In 1955, Utah produced about 112 million pounds of beef, and consumed 73 million pounds. Estimates of needs for the state in 1957 range from 112 to 141 million pounds, depending on population estimates.

Table 2. Labor force by kinds of employment, Utah, 1940-55 and projected 1975

<table>
<thead>
<tr>
<th>Item</th>
<th>1940</th>
<th>1955</th>
<th>Increase 1940-55</th>
<th>Percent change 1940-55</th>
<th>Projections 1957</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population*</td>
<td>552</td>
<td>797</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor force:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees in basic industries:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>32,700</td>
<td>29,000</td>
<td>-3,700</td>
<td>-12</td>
<td>29,000</td>
</tr>
<tr>
<td>Mining</td>
<td>11,300</td>
<td>14,000</td>
<td>2,700</td>
<td>24</td>
<td>20,000</td>
</tr>
<tr>
<td>Total</td>
<td>61,900</td>
<td>73,500</td>
<td>11,600</td>
<td>18</td>
<td>119,000</td>
</tr>
<tr>
<td>Government</td>
<td>21,600</td>
<td>35,100</td>
<td>13,500</td>
<td>64</td>
<td>60,000</td>
</tr>
<tr>
<td>All other</td>
<td>97,500</td>
<td>146,550</td>
<td>49,050</td>
<td>51</td>
<td>253,000</td>
</tr>
<tr>
<td>Total labor force</td>
<td>181,000</td>
<td>278,000</td>
<td>97,000</td>
<td>54</td>
<td>433,000</td>
</tr>
<tr>
<td>Percentage employed in basic industries:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>18</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>29</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>18</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

‡ Projections for 1975 are based on the percentage that the labor force was of population in 1955. Number employed in basic industries based on trend, 1940 to 1955.
§ A general decrease per unit of output is expected in employment in agriculture. But it is assumed that this decrease will be offset by increased intensification in agriculture and greater total acres of irrigated cropland.

Table 3. Income, value of products, and wages, Utah, 1940 and 1955

<table>
<thead>
<tr>
<th>Sources of income</th>
<th>1940</th>
<th>1955</th>
<th>Increase 1940-55</th>
<th>Percentage increase 1940-55</th>
<th>Increase resulting from</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>million dollars</td>
<td></td>
<td></td>
<td></td>
<td>Price increases</td>
</tr>
<tr>
<td>Agricultural income*</td>
<td>46</td>
<td>146</td>
<td>100</td>
<td>217</td>
<td>52</td>
</tr>
<tr>
<td>Manufactured products†</td>
<td>44</td>
<td>300</td>
<td>256</td>
<td>582</td>
<td>50</td>
</tr>
<tr>
<td>Mining‡</td>
<td>104</td>
<td>326</td>
<td>222</td>
<td>213</td>
<td>119</td>
</tr>
<tr>
<td>Total wages of insured industrial workers:</td>
<td>103</td>
<td>556</td>
<td>433</td>
<td>440</td>
<td>117</td>
</tr>
<tr>
<td>Retail trade§</td>
<td>171</td>
<td>842</td>
<td>671</td>
<td>392</td>
<td>195</td>
</tr>
<tr>
<td>Personal income</td>
<td></td>
<td>269</td>
<td>1,238</td>
<td>969</td>
<td>360</td>
</tr>
<tr>
<td>Total</td>
<td>737</td>
<td>3,408</td>
<td>2,671</td>
<td>362</td>
<td>839</td>
</tr>
</tbody>
</table>

¶ Based on increase of 114 percent in U. S. wholesale prices from 1940 to 1955.
Production of lamb and mutton amounted to 32 million pounds in 1955, and consumption to about 7 million pounds. By 1975, annual consumption of these products is expected to equal 35 to 45 percent of the 1955 production.

In 1955, 697 million pounds of milk were produced. Based on a projected population of 1.5 million in 1975, 1.1 billion pounds will be needed. About 172,000 cows will be needed to produce this milk, or an increase of 60,000 cows (figure 4). With present crop yields, feed production for 172,000 cows would require about 600,000 acres of land, or an increase of 54 percent in irrigated land used for dairy production. This acreage would be more than half of the irrigated land in the state in 1955.

During 1955, 50 million pounds of eggs were produced in Utah. During the same year, 40 million pounds were consumed. Estimated consumption in 1975 will exceed consumption in 1955 by at least 60 percent.

In 1955, 7.4 million pounds of chickens were produced and 17 million pounds were consumed in the state. Consumption for 1975 is estimated to range between 25 and 33 million pounds above 1955 production.

Utah produced 3 million turkeys in 1955, or 35 million pounds eviscerated weight. Consumption was 4 million pounds. By 1975, between 6 million and 9 million pounds will likely be consumed.

Sugar beets have a high cash return per acre. With additional water for new and presently irrigated lands of the state, production of sugar beets probably will increase.

Except for apples, more fruit was produced in 1955 than was consumed in the state. Consumption of all fruits, except apricots and cherries, will be above 1955 production by 1957.

Utah is the major canning-vegetable producer among the Mountain States. The recent increase in population in these states has cre-

(Continued on page 80)

Table 4. Personal income and retail sales, United States, Western States, and Utah, 1940, 1955, and projected 1975

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit 1940</th>
<th>1955</th>
<th>Projections 1975</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population, Utah</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>552,000</td>
<td>797,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>Personal income per capita*</td>
<td>487</td>
<td>1,553</td>
<td>2,065</td>
</tr>
<tr>
<td>Utah</td>
<td>Dollars</td>
<td>487</td>
<td>1,553</td>
</tr>
<tr>
<td>Western States</td>
<td>Dollars</td>
<td>595</td>
<td>1,810</td>
</tr>
<tr>
<td>United States</td>
<td>Dollars</td>
<td>595</td>
<td>1,847</td>
</tr>
<tr>
<td>Retail sales, Utah†</td>
<td>$1,000</td>
<td>171,000</td>
<td>842,000</td>
</tr>
</tbody>
</table>

* Projected per capita personal income for Utah and the Western States is based on percentage change projected for United States. Daly, Rex F. The Long-Run Demand for Farm Products. Agric. Econ. R. 8:73-91. July 1956.
† Projection based on per capita sales for 1955.

Table 5. Production and consumption of farm products, 1955, and projected population and food requirements, 1975, Utah

<table>
<thead>
<tr>
<th>Item</th>
<th>1955 Production</th>
<th>Consumption</th>
<th>Projected food requirements 1975</th>
<th>Increase in requirements 1955-1975</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>Population (1,000)</td>
<td>797</td>
<td>797</td>
<td>1,200</td>
<td>1,500</td>
</tr>
<tr>
<td>Total red meats†</td>
<td>132,054</td>
<td>133,400</td>
<td>213,960</td>
<td>267,450</td>
</tr>
<tr>
<td>Beef and veal</td>
<td>115,554</td>
<td>172,800</td>
<td>141,000</td>
<td>54.9</td>
</tr>
<tr>
<td>Mutton and lamb</td>
<td>32,200</td>
<td>7,400</td>
<td>11,160</td>
<td>13,950</td>
</tr>
<tr>
<td>Pork</td>
<td>8,300</td>
<td>53,200</td>
<td>90,000</td>
<td>111.5</td>
</tr>
<tr>
<td>Total poultry‡</td>
<td>43,917</td>
<td>21,041</td>
<td>38,640</td>
<td>48,300</td>
</tr>
<tr>
<td>Chickens</td>
<td>7,379</td>
<td>17,056</td>
<td>32,400</td>
<td>40,500</td>
</tr>
<tr>
<td>Turkeys</td>
<td>35,538</td>
<td>3,985</td>
<td>6,240</td>
<td>7,800</td>
</tr>
<tr>
<td>Total all meats</td>
<td>194,971</td>
<td>154,441</td>
<td>252,600</td>
<td>315,750</td>
</tr>
<tr>
<td>Total livestock prod.</td>
<td>747,211</td>
<td>597,750</td>
<td>928,320</td>
<td>1,160,400</td>
</tr>
<tr>
<td>Dairy products§</td>
<td>679,000</td>
<td>557,900</td>
<td>864,000</td>
<td>1,080,000</td>
</tr>
<tr>
<td>Eggs§</td>
<td>50,211</td>
<td>39,850</td>
<td>64,320</td>
<td>80,400</td>
</tr>
<tr>
<td>Total livestock and products</td>
<td>942,182</td>
<td>752,191</td>
<td>1,180,920</td>
<td>1,476,150</td>
</tr>
<tr>
<td>Total fruit</td>
<td>88,618</td>
<td>158,603</td>
<td>284,400</td>
<td>355,500</td>
</tr>
<tr>
<td>Total vegetables†‡**</td>
<td>275,944</td>
<td>165,059</td>
<td>288,000</td>
<td>360,000</td>
</tr>
<tr>
<td>Total field crops</td>
<td>550,282</td>
<td>294,322</td>
<td>405,600</td>
<td>507,000</td>
</tr>
<tr>
<td>Wheat*</td>
<td>230,150</td>
<td>137,084</td>
<td>192,000</td>
<td>240,000</td>
</tr>
<tr>
<td>Potatoes*</td>
<td>178,232</td>
<td>80,497</td>
<td>102,000</td>
<td>127,500</td>
</tr>
<tr>
<td>Sugar</td>
<td>141,900</td>
<td>76,751</td>
<td>111,600</td>
<td>139,500</td>
</tr>
<tr>
<td>Total all crops</td>
<td>914,844</td>
<td>617,994</td>
<td>978,000</td>
<td>1,222,500</td>
</tr>
<tr>
<td>Other food‡</td>
<td>50,000</td>
<td>99,386</td>
<td>146,160</td>
<td>182,700</td>
</tr>
<tr>
<td>Total food</td>
<td>1,097,026</td>
<td>1,469,571</td>
<td>2,305,080</td>
<td>2,881,350</td>
</tr>
</tbody>
</table>

* U. S. Agr. Market. Serv. Agricultural Statistics, 1955. Production for 1955 was used, except for fruit, canning crops, wheat, and potatoes, and was based on a 5-year average, 1951-55.
++‡ Includes other grain products, fats, oils, beans, and rice. See footnote † above.
Ellis W. Lamborn and Roche H. Anderson. Consumer demand for fruit. H. O. Doty. The distribution of lamb and mutton for consumption in U. S.
Rural families in southern Utah listen to their radios early in the morning (6:00 - 8:00 a.m.) more than at any other time of the day. Evening listening comes a close second where TV reception is poor or impossible. Noontime listening rates third, but still involves almost 50 percent of rural families (fig. 2).

This is quite different from the national pattern of rural radio listening. Nationally, more rural families listen to their radios at noon than at any other time of the day. Early morning and evening listening rate second and third. Factors associated with "off the farm" living in Utah probably account for a smaller percentage of Utah farmers listening to their radios at noon than is the case nationally.

By a wide margin, news and weather are the most preferred program ingredients to which southern Utah rural families like to listen (fig. 4).

Music, sprinkled with short news or information items, tops the list for the kind of radio programs preferred by both men and women.

Five to seven minute talks or interviews were preferred over full fifteen minute programs, and also over shorter, two to four minute programs (fig. 5).

Radio stations, extension agents, advertising agencies, and commercial people, who are interested in reaching and influencing rural people, frequently ask, "When do rural families listen to their radios? What kind of programs do they prefer? No one in Utah seemed quite sure of the answers, so the extension agents in ten southwestern Utah counties (fig. 1), in cooperation with the three radio stations serving the area, and the Utah State University extension...
radio-TV specialist conducted a mail survey to get the answers to these questions.

When TV first appeared on the American scene, "many were about to consign radio to a minor role in our communications system," writes Joseph Tonkin, chief of the Audio-Visual Branch of the Federal Extension Service. "... for a time this appeared to be true. Radio was on the defensive. Then the tide began to change... There were things that radio could do that TV could not do. People wanted them both... Listenership is greater in some areas now than it was before TV. . . ."

At the time this study was made (1957) TV had invaded only one of the ten southwestern counties—Sanpete—to any great extent. Today, most of these ten counties have access to television through booster stations or translator transmitters. Therefore, the listening patterns in these counties are probably somewhat different now than they were at the time of the survey.

The radio listening pattern in Sanpete County (fig. 3) is probably a more accurate picture of the situation in most of these counties today. The men's peak listening time is still about 7:00 a.m., with the second peak at noon, with a much smaller increase in radio listening by both men and women in the evening. The listening pattern for homemakers is about the same, with the exception of a greater decrease in the number who listen in the afternoon and evening.

A homemaker program adjacent to a regular news show or a comedy or quiz show would likely draw the largest listening audience. A farm show next to a regular news broadcast would probably catch more farmers as indicated by the overwhelming preference for news and weather programs (fig. 4).

Twelve Utah State University county agricultural agents and six to eight home agents appear regularly on stations KSVC and KSUB. In addition, the extension agents in Washington County also appear on a regular show over KDXU. Agents from Beaver, Iron, Washington, Kane, and Garfield Counties regularly send radio tapes to KSUB. Each county averages one radio program a week. The extension agents' programs are heard weekdays at about 6:30 a.m. Millard, Sanpete, Sevier, Piute, and Wayne County extension agents appear weekly at about 6:30 a.m. on KSVC.

One phase of this survey was to determine what percentage of farm families hear their county extension agent on the radio regularly, occasionally, or never. The results were as follows:

<table>
<thead>
<tr>
<th></th>
<th>KSUB</th>
<th>KSVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regularly</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Occasionally</td>
<td>69</td>
<td>63</td>
</tr>
<tr>
<td>Never</td>
<td>13</td>
<td>25</td>
</tr>
</tbody>
</table>

The probable reason that a high-
Dr. D. W. Thorne, director of the Agricultural Experiment Station and in charge of University research, has just returned from a month's tour of the USSR. He went as a member of a team of soil scientists to study the soils in various parts of the Soviet Union. He earlier spent two months in Iraq as an advisor on problems relating to crops and soils. He left Iraq just a week before the revolution.

FARM AND HOME SCIENCE

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Agricultural Experiment Station
Gladys L. Harrison, Editor
As dairying is a major enterprise in Utah’s agriculture, many farmers are affected by what takes place in the dairy industry. Many changes have occurred during the last two decades. One of these is the bulk handling of milk, or the collecting and holding of milk in a refrigerated tank on the farm and subsequent transfer to a tank which hails it to a processing plant. Information which follows is based on a study of systems of handling milk on farms recently conducted at the Utah State University.

1 How do labor and investment requirements compare between handling milk by bulk and can systems for producers with grade A base? The total man labor hours per cow for milking, and preparing and cleaning equipment on farms with herds averaging 18 cows using cans to handle milk averaged 67.8 man hours. On comparable sized farms using bulk tanks 63.2 hours were required.

Milk can coolers ranged in size from 4 to 12 cans in capacity, costing an average of $450 for the 4-can cooler and $850 for the 12-can cooler. The typical farmer handling milk in cans had a 6-can cooler costing $525 and milk cans costing $10.50 each.

Bulk tanks in the Utah survey ranged in size from 100 to 800 gallons, 80 percent of which were between 150 and 350 gallons. The cost averaged $1384 for 100 gallon tanks and $4475 for 800 gallon tanks. The typical farmer handling milk in bulk had a 200 gallon tank which cost $1783.

2 What are the advantages and disadvantages in using bulk tanks for milk? Inherent in the bulk handling of milk are some net advantages that may be realized both in the receiving plant and on the farm:

- Improved quality of milk and reduced bacteria count.
- Less loss of milk in handling, conservatively estimated at 2.4 cents per hundredweight of milk sold.
- The farmer may inspect the amount of milk he sells and observe the sample of his milk collected for testing.
- Reduction of labor while performing dairy chores, equal at least to 3.3 cents per hundredweight of milk sold.
- A net saving of the cost of handling milk on the farm

3 What considerations or standards can farmers and others use to determine the most desirable and economical method of handling milk on the farm? A partial answer to this question involves the following principle: To make the highest profits a producer must reduce costs per unit without reducing output and maximize receipts for goods produced.

Answers to the following questions will be of assistance in following the preceding principle:

- As an alternative to installing a bulk plant is there possibility of selling milk in cans to other dairies receiving can milk? It appears that bulk handling of milk will eventually be adopted by the major dairy plants in Utah and to sell to other dairies receiving milk in cans will provide only a temporary solution to the problem.

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Knowledge of the soils of an area is basic to all land use planning. Richfield area survey has recently been released

**Soils of the Richfield Area**

LeMOYNE WILSON

Soils in the Richfield Area of Utah are comparatively rich in soluble minerals. They may be fairly high in phosphorus, but this is often not available to crops in sufficient quantities to meet their needs and phosphate fertilizers must be used for high yields. Many of the soils contain excessive quantities of soluble salts. Gypsum (calcium carbonate) is a common part of all the soils.

The Richfield Area has little rainfall (average rainfall Scipio 13.46, Richfield 8.41 inches) and a high rate of evaporation; consequently certain soils contain salt or alkali, or both, in amounts that significantly affect their use. Some of these soils are in low-lying places.

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Profile of Mellor loam. Note the thin light colored surface soil and the thick dark clay subsoil. About 5 miles north of Fayette.

Profile of Ralston gravelly loam about 2½ miles west of Monroe. This shallow gravelly soil is capability class III. Frequent light irrigations and heavy applications of fertilizers are required for good production on this soil.

Profile of Denmark loam about 4 miles west of Fayette. Note the thick lime hardpan with only 1 foot of soil above it. This soil is in capability class III.

LeMOYNE WILSON, associate professor of agronomy, is in charge of the Soil Survey work for the Utah Station.
where stream waters have evaporated and left deposits of salt and alkali. Others were derived from rocks that contained appreciable quantities of soluble salts or alkali. In places poor drainage is a contributing cause.

This general information along with specific information on soil types and their capabilities to grow crops is given in the Soil Survey of the Richfield Area, issued in February 1958, by the U. S. Department of Agriculture. The field work was done by personnel of the Utah Agricultural Experiment Station and the U. S. Soil Conservation Service. Copies of the report may be obtained from either of these agencies.

The area surveyed contains about 511 square miles or 327,117 acres located in the central part of the state. The major portion is in the lower Sevier River Valley from the vicinity of Joseph northward to the Sanpete-Juab County line, and a smaller area in eastern Millard County comprising Scipio Valley (Round Valley) and Upper Round Valley (fig. 1).

How to find out about the soils on your farm

The report describes each kind of soil in the area, and tells how to manage it and what crop yields can be expected. The soil map which accompanies the report shows the location and extent of each kind of soil.

If you are a farmer, or if you work with farmers, you probably want to know about the soils of a particular farm. First, you must find the right place on the soil map. The map shows township and section lines, towns, roads, streams, most of the houses in rural areas, and other landmarks. The map scale is 2 inches to the mile, so that an inch on the map is a half mile on the ground.

Each kind of soil is marked on the map by a symbol made up of two letters; for example, the symbol Ab identifies Annabella gravelly sandy loam, 2-5 percent slopes.

On the margin of the map are printed the names of all the soils mapped in the Richfield Area, the symbols that identify them, and the color in which each is shown on the map. Look up the symbols in the map legend to find the names of your soils. Then you can refer to the soil description in the report to find out what kind of soil you have.

The suitability of the soils for crop production and other uses

A general idea of the nature of the soils and their suitability for various uses is presented in the section, Soils of the Richfield Area. This section describes how soils are placed in capability groups and gives the capability class and subclass for each soil mapped. The capability grouping is an arrangement of soils according to relative suitability for crops, grazing, forestry, or wildlife. The estimate of suitability is made by several persons who know the soils and work with them. Class I soils respond to intensive cultivation, without special practices to control runoff or erosion, and are highly productive under good management. Classes II and III are suitable for tillage, but have erosion risks and other limitations. Class IV soils are usable for tillage, but only under special management, because of severe risks and limitations. Classes VI, VII and VIII are unsuitable for tillage, but are valuable for grazing, forestry, and wildlife.

Information of special interest to newcomers

A newcomer to the area, especially if he considers buying land, will want to know about the climate, types and sizes of farms, principal farm products and how they are marketed, kinds and conditions of farm tenure; availability of water, roads and railroads, and location of towns and population centers. Information about these will be found in the sections, General Nature of the Area, Agriculture and Irrigation.
Country Living

GEORGE T. BLANCH

The major advantages of rural living for non-farm people are not economic, nor are rural homes important as a place to train children for work. Parents do most of the work until the size of farm operations requires more labor than they can perform. Then the children are required to help. The main satisfactions from rural living are the feeling of spaciousness and independence that such living gives the home owner.

From the point of good land use for agricultural purposes, however, zoning of open country, for rural non-farm residences shows substantial inefficiency. Utah County has such an ordinance which requires that a permit be obtained before construction of any residence in the open intensive agricultural portion of the county and that the applicant have a minimum of one acre for a building site. Even the non-farm residents living in this area admitted that units of an acre or more were inefficient from the point of agricultural use.

These conclusions are the result of a study of some of the effects of the zoning ordinance in Utah County mentioned above. From 1942 to early 1953 more than 300 permits were granted complying with this ordinance. A sample of 66 heads of families living in such homes provided most of the data for this study. Three fourths of these men and women had lived previously in rural areas.

To limit the study to rural non-farm residents, only those with small land holdings were included; 22 of these had one acre or less (in two cases a part of the minimum of one acre was sold after the house was constructed), 25 had more than one acre but not more than 2.5 acres; 19 had more than 2.5 acres but less than 11 acres. Only 2 had more than 10 acres.

Use of land

The 66 homesteads had a total of 188.42 acres or an average of 2.86 acres each. Before the land was used for residences, all but 15.6 acres was arable cropland or orchards. Most of the 15.6 acres was pasture though a small part was idle land. When the study was made, 12 percent of the land was occupied by homes, lawns, and driveways, 20 percent by orchards and vegetable gardens, 41 percent by field crops (grain and forage), and 27 percent was idle. Most of the crops were raised on the larger units. But even in these units nearly a quarter of the land was idle (fig. 1). In comparison, 35
percent of the smallest holding and 36 percent of the medium size holdings were idle.

Idle land usually produces weeds, the seeds of which are scattered over adjacent farms by wind, water, and animals. Since these residential holdings were interspersed among full time farms the weeds constitute a serious problem. On these small holdings orchards were not well cared for and intensive cash crops were not produced.

Value of farm produce

One of the reasons frequently given by these non-farm residents for living in a rural area is to increase their net income or to reduce living costs by producing a part of their food supply. To find how important this is in actual practice, the value of farm commodities produced and used by the families was obtained, along with receipts from sales. The price used in valuing produce used was the cost if bought at a retail store.

Forty-six of the 66 residents grew products for home use; only 25 sold any. Sixty percent of those with an acre of land raised food for the family table, but only 30 percent sold any produce. Nearly 80 percent of those with more than 2.5 acres produced for family use, and 60 percent had some sales.

More families (33) produced vegetables for home use than any other type of product. Twenty-two produced fruit, but only ten sold any. Other commodities sold included dairy products, poultry and eggs, and meat animals. One unit sold horses.

The total value of all products sold and used by the family was $348 (table 1). The value of products used in the home averaged $163. In these estimations, no account was taken of inventory changes, thus the figures probably overstate the actual value of the produce.

Although there was an association between the value of farm products raised and the size of land holdings there was considerable variation as to the amount raised. In the groups with the largest land holdings (2.5 to 11 acres) three produced nothing and another three produced less than $100 worth of produce. At the other extreme, one unit had farm products valued at $3300 and two others had products valued between $2000 and $3000. On the one acre units one produced farm products worth $400. Seven of these 22 land holders produced no products.

Costs of production

When costs of production were taken into account, however, the value of farm products raised was greatly reduced. No attempt was made in this study to determine all costs, but only those directly associated with farm activities. Such costs as interest on investment, depreciation of equipment, and family labor were not considered.

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Table 1. Value per homestead of agricultural production, cash costs and returns to land, capital, and family labor by size of rural non-farm land holdings

<table>
<thead>
<tr>
<th>Item</th>
<th>1 acre or less</th>
<th>2.6—11.0 acres</th>
<th>1.1—2.5 acres</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of home use</td>
<td>57</td>
<td>109</td>
<td>357</td>
<td>163</td>
</tr>
<tr>
<td>Value of sales</td>
<td>19</td>
<td>72</td>
<td>527</td>
<td>185</td>
</tr>
<tr>
<td>Total value of production</td>
<td>76</td>
<td>181</td>
<td>884</td>
<td>348</td>
</tr>
<tr>
<td>Direct cash costs</td>
<td>61</td>
<td>158</td>
<td>589</td>
<td>250</td>
</tr>
<tr>
<td>Returns to land, capital</td>
<td>15</td>
<td>23</td>
<td>295</td>
<td>98</td>
</tr>
<tr>
<td>and family labor</td>
<td></td>
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</tbody>
</table>
Are Utahns neglecting their civic responsibilities in favor of more immediate personal satisfactions?

Civic organizations get little support in Utah

Civic, economic, and educational organizations find little support in two Utah communities where a study was made of organizations, while religious and social organizations are important to most of the people. Only two of 334 adults questioned were not members of some religious organization. These findings may be typical of other communities in Utah. They show that the organizations filling spiritual, cultural, and social needs (and particularly religious organizations) have large participation compared to those focused on community development. In social and religious organizations fall all church organizations, literary clubs, ball teams, card or sewing clubs, and similar groups. Though these groups may have some bearing upon community improvement, their main concern relates to individual growth.

A second type of organization focuses on community improvement. Depending upon their objectives, these organizations are subdivided into civic, economic, or educational. These may be the only means through which certain problems can be attacked.

Yet we have found that civic, economic, and educational organizations have little manpower in the two Utah communities we studied. Attendance and participation in organizations filling spiritual, cultural, and social needs is high compared to participation in those focused on community development. These findings are understandable in view of the fact that people probably try to fill their personal needs first.

Our concern here, therefore, is not whether there is too much participation in religious and social organizations but whether there is so little time left for participation in civic, economic, or educational organizations that effective community life is deterred.

We have found an impressive array of unsolved problems in Utah communities which may be suggestive of many more. It is probable that no community is free from civic, economic, and educational problems, and that none is successfully working on all aspects of its needs. Increased participation in civic, economic, and educational organizations might be one way to bring about an increase in the number of satisfactory solutions to current problems.

Townpeople of the two communities we studied appear to be aware that strong civic, economic, or educational organizations are lacking. When asked which type of organization in their opinion needed to be developed more than at present in their communities, four out of five sample adults named civic, educational, or economic organizations.

A look at the membership and participation records of the 334 sample adults in the two communities reveals that these types of organizations get little of people's time. As measured by four degrees of participation (membership, attendance of at least one meeting the previous year, attendance of at least eleven meetings the previous year—roughly one a month—and leadership positions) participation was found to be strikingly low in civic, economic, and educational organizations.

Civic organization

Only 3 out of every 20 sample adults was a member of some organization primarily concerned with improving the community (civic). Only 1 of every 20 attended meetings of civic organizations at least 11 times during the year previous.

This leaves 17 out of every 20 persons who were not involved in a civic organization in any way, and 19 out of 20 who had not participated actively.

Of all leadership positions found among the sample adults, only 1 in 10 was in civic organizations.

Economic organizations

Three-fourths of the sample adults were not members of some organization mainly concerned with helping people make a living or to make a "better" living (economic). Three-fourths had not attended at least one meeting, while 95 percent had not attended eleven or more meetings during the year.

Only 8 percent of all leadership positions was found in economic organizations.

Educational organizations

Of the sample persons 84 percent were not members of some
organization in which people learn new skills, attitudes, and information (educational); 85 percent had not attended any meetings; only 1 of each 100 had attended meetings at least 11 times.

Only 2 out of every 100 leadership positions were found in educational organizations.

**Social organizations**

More people belong to and participate in social organizations than in civic, economic, or educational, but the proportion, when compared to that of religious organizations, is low. About one-third of the sample adults were members of some social organization; 1 of every 5 had attended at least 11 meetings, while only 7 percent of all leadership positions was found in social organizations.

**Religious organizations**

Only 2 of the 334 sample adults were not members of some religious organization; 86 percent had attended at least 1 meeting during the past year, while 80 percent had attended at least 11 meetings; 72 percent of the leadership positions were in religious organizations.

**Questions raised**

These data raise the following questions, which, if answered, might help explain the reasons for low participation in civic, economic, and educational groups.

Are rural people uninterested in working on community problems through groups, either by lack of concern or by lack of training to be alert to community matters? Or perhaps they have not learned how to participate in these types of organizations?

Are a person's needs for spiritual, social, and cultural well-being so great that filling these needs takes all his energy, with community needs that require group effort seemingly remote and unimportant?

Are economic, civic, and educational problems already being attacked by government, religious, or social organizations so effectively that participation in these groups is unimportant?

Perhaps the moral worth of an individual in a rural Utah community is not judged enough upon his interest and participation in community type organizations? The admonition “You should go” may not not be applied to meetings of civic, economic, and educational organizations; thus people may not

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What a place for a farm! That's what a Utahn exclaimed when he climbed down from a Chinese Air Force plane to put his feet on the red sand of Quemoy. For that dumbbell-shaped isle in Formosa Strait has been dubbed "the most bombarded island in the world." Communist batteries on the mainland have battered the Nationalist fortress for four years now, sometimes lobbing thousands of shells a day at Quemoy.

Observers marvel that the offshore stronghold holds out. But a greater wonder is this: during those four years the islanders have made remarkable progress in agriculture, health, and education. They have multiplied their production of pork, vegetables, and other foods in a well-nigh incredible rehabilitation venture.

Americans who suspect that our foreign aid program consists mainly of lining the pockets of parasitic bureaucrats abroad or pouring dollars down insatiable ratholes should have taken that flight with me to Quemoy. The outlay there has been small except for a wealth of wisdom from American and Chinese scientists, but the returns have been abundant, despite war and disease, meager soil and wind and drought.

The Commando skimmed low over the choppy strait: no sense enticing Red gunners on the Fukien coast. But before we settled down behind the island's hump, I glimpsed the Communist-held port of Amoy huddled among hills to the west. As we circled for landing, I saw three chief elements of the landscape—the gun emplacements and other fortifications, the waste areas of sand and rocky hills, and

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Below: With the installation of wells and the introduction of pest control plus a supply of reliable seeds, the farmers of Kinmen can grow excellent vegetables. Vegetable gardening on Kinmen has now increased forty fold. Vegetables had to be imported five years ago. The local breed of hog has a hanging belly. Berkshire boars have now been imported to Kinmen and have been used to cross with the local hog breed, producing a healthy and quick-growing hybrid.

Right from top to bottom: Health stations have been strengthened on Kinmen and a hospital added to take care of the sick. The general health of the population has improved through public health work. With the help of army physicians plague has been completely controlled. Thousands of water wells have been dug on Kinmen for drinking and irrigation purposes. Wells like this can be seen throughout the island. New houses built by farmers spring up every day. With the development in agriculture a new prosperity has made the people more determined to fight the communist menace across the straits on the mainland.

The island was denuded of its timber supply several hundred years ago when Koxinga ordered a fleet to be built for the invasion of Taiwan. It has remained a treeless island until recently when a large scale afforestation plan was put into effect by the JCCR. All kinds of trees were planted throughout the island and have thrived. Trees have also helped in soil conservation.
Cows prefer pasture hay to pasture silage

GEORGE E. STODDARD
GEORGE Q. BATEMAN
AND C. H. MICKELSEN

Cows prefer their grass-legume mixtures as hay rather than silage. Such was the answer obtained from a recent trial at Utah State University. The cows consumed more nutrients, produced more milk, and maintained body weight better when fed hay instead of silage. Grass-legume silage when fed in place of corn silage was quite satisfactory.

Harvested feed from hay or silage similar

As a follow-up of a three-year study comparing alfalfa hay with alfalfa silage (see Utah Farm and Home Science, December 1957) a study was conducted to compare a grass-legume pasture mixture for winter feed when harvested as hay or silage.

In 1957, a 7-acre pasture (Utah Agr. Exp. Sta. Bul. 382, 1956) which had been seeded the previous year, was divided into four strips of approximately equal size. Each strip was alternately harvested as hay and silage for the three harvests.

Samples taken before harvest of each crop indicated a similar yield of hay and silage per acre. Acre yields were estimated from samples to be 46,135 pounds of green forage from the hay plots and 47,850 pounds from the silage plots. There were 9227 pounds of dry matter from the hay plots and 9470 from the silage plots. Forage (dry weight) available for feeding during the subsequent winter amounted to 9120 pounds of hay and 7849 pounds of silage per acre. Dry matter losses in the silage amounted to 17.1 percent. Hay losses were negligible (1.2 percent).

Cows fed pasture hay, consumed more feed, produced more milk, and maintained their body weight better than cows fed pasture silage.

Cows eat more nutrients from hay than silage

Cows were paired into three groups so as to make the level of milk production, stage of lactation, and body weights as similar as possible.

Group 1 was fed a roughage consisting of pasture free choice and corn silage

F ARM AND H OME S CIENCE
Fig. 1. Performance of cows group fed corn silage or pasture silage with alfalfa hay at the rate of 2½ pounds per hundred pounds of body weight.

Group 2 received pasture hay free choice and pasture silage according to body weight.

Group 3 received pasture silage free choice and corn silage according to body weight.

All cows received grain in accordance with production (1 pound daily for each pound of butterfat produced weekly) adjusted every two weeks. Water and a 1:1 mixture of iodized salt and steamed bone meal were available free choice.

During a preliminary period of two weeks, all cows received pasture hay and corn silage as described for group 1. During a two week period at the end of the experimental period, cows were also fed this same ration. The experimental feeding lasted for a period of 12 weeks.

The results are shown in table 1.

When cows were fed pasture silage in place of corn silage (group 2) they responded about as well as cows fed a hay-corn silage ration. However, when the pasture silage replaced pasture hay (group 3) they did not respond as well as the cows on ration 1.

Free choice roughage feeding tests palatability of forages

In a second trial, cows were given corn silage and pasture silage singly and in combination with each other as a supplement to alfalfa hay during different two week periods. Cows consumed about the same amount of nutrients with the various rations, although the consumption of the different roughages varied with each combination. When pasture silage replaced corn silage after a period of adjustment to the ration, hay consumption decreased and more pasture silage than corn silage was consumed.

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Irrigated Pastures—
a way to maintain beef production

Lorin E. Harris, Milo L. Dew, and
George Q. Bateman

Irrigated pastures offer a way to maintain or increase beef production in Utah. They produce an abundance of feed and cattle may be sold as fat beef at the end of the pasture season. With a reduction in the numbers of beef cattle permits on the national forests, irrigated pasture offers one way to maintain or increase feed and beef efficiency in Utah.

Bateman and Keller have developed a number of high yielding palatable grass-legume mixtures for irrigated land under Utah conditions. (Utah Agr. Exp. Sta. Bul. 382—1956). The best mixture consisting of Ranger alfalfa (3 lbs. per acre), ladino clover (2), orchard grass (3), smooth brome-grass (4), red clover (3), and tall oatgrass (3 groated) has produced 20 tons of green forage per acre. Over the seven-year period 1951 to 1957 dairy cows grazing this mixture for a five month period, May to October, have produced an average of 8684 pounds of milk containing 324 pounds of butterfat. The pasture carried approximately two lactating Holstein cows per acre.

Dr. Lorin E. Harris is professor of animal husbandry, Milo L. Dew is in charge of the farm in Pleasant Grove, and George Q. Bateman is associate professor of dairy husbandry and in charge of the Experimental Dairy Farm at Logan. Dr. George E. Stoddard, professor of dairy husbandry, was in charge of planning the farm improvements before this spring.

The steers gained an average of 2.2 pounds per head each day for the first 9 weeks of the trial. If this keeps up each steer will gain an average of 330 pounds during the season, May 1 to October 1.

Since this pasture mixture had given such good results with dairy cattle it was thought desirable to test the mixture to determine how much beef could be produced per acre.

The project is a cooperative one

Approximately 22 acres of land in Utah County near Pleasant Grove is being used for the experiment. The land was bought by the Utah County Farmers Fluorine Committee. The Columbia Geneva Division of United States Steel Corporation is helping to finance the project. Representatives of the farmers, U. S. Steel Corporation, and the Utah Agricultural Experiment Station planned the experiment.

Present status of pastures

The farm was purchased in 1954, since the land was low in fertility and many weeds were present it was plowed and kept clean of weeds the first summer. In the fall it was seeded to Brevoort wheat. This is an excellent crop to control weeds as it starts to grow in the fall and consequently gets an early spring start before the weeds begin to grow. Eighty bushels of wheat per acre were harvested. During the fall of 1955 the land was leveled.

In the spring of 1956, in accordance with recommendations of the Soil Conservation Service, barley was seeded in order that the effectiveness of the leveling program could be checked. The land was diked at 23-foot intervals, using a home-made V-type diker. Yield of barley amounted to 61...
When pasture forage is abundant and gets ahead of the grazing animals, the pasture mixture should be made into hay. It makes a high yielding, palatable hay. The grass in the mixture helps to prevent bloat. The first cutting gave a yield of 2.0 tons an acre.

bushels per acre with 22 bales of straw.

Under recommendations of the Soil Conservation Service a drain was installed in the upper part of the farm in the fall of 1956.

In the spring of 1957 the farm was divided into eight pasture areas. Four of the pastures were seeded to the following mixture: Ranger alfalfa (3 lbs. per acre) ladino clover (2), orchard grass (3), smooth bromegrass (4), red clover (3), tall oatgrass (3).

The other four pastures were seeded to the above mixture plus reed canary grass (3). A companion crop of barley (50 pounds per acre) was seeded on all pastures. All pastures were manured and phosphated before seeding. The barley harvested contained many weed seeds; however, there was an excellent stand of pasture. Late in the fall the pastures were grazed with dairy animals for a total of 659 cow days or 30 cow days per acre.

In March of this year, 1958, the pastures were harrowed to distribute the manure dropped during the fall of 1957. Electric fences were put through each pasture to make a total of 16 pastures of about 1.25 acres each.

Grazing of yearling beef steers

Seventy-two Hereford yearling beef steers averaging 450 pounds in weight were placed on the pastures. It was soon found there was too much herbage for the number of cattle. Therefore, 36 additional steers were put on the pastures on May 27.

Since the cattle could not keep up with the pasture 6 plots and one-half of each of two other plots were cut for hay. The yield of pasture hay was 2.0 tons per acre. Part of the steers were fed the pasture hay for two weeks. The hay was palatable and was consumed with little or no waste. The steers gained 2.0 pounds per head per day while on the pasture mixture that was made into hay.

The steers maintained on the pasture gained 2.2 pounds per head per day for the first 9 weeks of the trial. These gains were made on pasture forage only; no gain supplements were fed.

These preliminary results indicate that this pasture will carry 4 to 6 450-pound steers per acre from May to the last of September. If steers continue to gain at present rates a steer would gain 330 pounds (2.2 pounds per day x 150 days). A carrying capacity of 4 to 5 steers would indicate a total beef production ranging from 1320 pounds to 1650 pounds per acre.

Pasture management

For maximum use of the forage and to prevent bloat pastures should be strip grazed using an electric wire. The plan is to have sufficient cattle to consume all the forage in a pasture in 3 to 5 days. This can be accomplished by moving an electric wire two to three times a day. With a large number of cattle concentrated on a small (Continued on page 80)
Will consumers pay a PREMIUM FOR LARGE APPLES?

ELLIS W. LAMBORN AND WILLIAM L. PARK

The level of consumer income affects the preference for different sizes of Red Delicious apples. Consumers in medium- and low-income areas in Salt Lake City preferred larger apples while consumers in the high-income area more nearly divided their purchases between 2½-and 3-inch apples.

Immediately before a holiday, such as Thanksgiving, customers preferred larger apples.

When 2½-inch Red Delicious apples were sold to the consumer at a discount of about 4 cents per pound below the price charged for 3-inch Red Delicious apples, the sale of the smaller apple was greatly increased. At the same time, the daily sales of the large 3-inch apple remained about the same. Under these conditions the retailer can substantially increase his gross margin even when he pays the same price per pound for apples of all sizes. Consumers who preferred 3-inch apples, when both sizes sold for 19 cents, continued to make that choice even when the price of small apples was reduced about 20 percent. The decreased price of 2½-inch apples attracted new customers and greatly increased sales of this size of apple.

Table 1. Pounds of 3-inch and 2½-inch apples sold per day when the price of 3-inch apples is held at 19c per pound and the price of 2½-inch apples varies between 8c and 19c, medium-income area, Salt Lake City, 1957

<table>
<thead>
<tr>
<th>Price per lb. for 2½-in. apples</th>
<th>Price differential</th>
<th>Number of days</th>
<th>Pounds sold per day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2½-in.</td>
</tr>
<tr>
<td>19</td>
<td>0</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>5</td>
<td>46</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>3</td>
<td>237</td>
</tr>
</tbody>
</table>

Returns for a particular product in a market. The practice is, of course, most common with manufactured or processed goods. This study has demonstrated that it is possible to price Red Delicious apples differentially on a basis of size and increase the total return for the crop. The Red Delicious apple is most commonly eaten out of hand, consequently, size is an important criterion used by the consumer as she is shopping. The success of the differential pricing mechanism as here applied, is due in part, to the fact that size is a characteristic in

Dr. Ellis W. Lamborn is associate professor of agricultural economics. William L. Park is a graduate student.
The calculated daily gross margin for a store in a medium-income area of Salt Lake City when small Red Delicious apples varied in price and the price of large apples remained at 19c per pound, 1957

<table>
<thead>
<tr>
<th>Price per lb.</th>
<th>Pounds*</th>
<th>Value of apples</th>
<th>Cost of apples @ 10c per lb.</th>
<th>Gross margin on apples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small apples</td>
<td>Small</td>
<td>Large</td>
<td>Total apples</td>
<td>Small apples</td>
</tr>
<tr>
<td></td>
<td>apples</td>
<td>apples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>12</td>
<td>28</td>
<td>40</td>
<td>$2.28</td>
</tr>
<tr>
<td>15</td>
<td>46</td>
<td>25</td>
<td>71</td>
<td>6.90</td>
</tr>
<tr>
<td>12</td>
<td>109</td>
<td>22</td>
<td>131</td>
<td>13.08</td>
</tr>
</tbody>
</table>

*The quantity sold at 12 cents per pound was calculated from the available data.

The calculated daily gross margin for a store in a medium-income area of Salt Lake City when small Red Delicious apples varied in price and the price of large apples remained at 19c per pound, 1957

The benefits growing out of the application of premium pricing of large apples (or discount pricing of small apples) are divided three ways—the retail grocer can increase his gross margin, the consumer can purchase more apples at lower prices, and the farmer can sell more apples without reducing price.

Tests made in three Salt Lake City supermarkets

In order to determine the preference and demand for different sizes of Red Delicious apples, a matched-lot experiment was conducted in three Salt Lake City supermarkets in the fall of 1957. The stores were nearly identical as to size, design, and layout, and were selected in three areas in the city to represent three levels of family income.

Consumers were given their choice of the size of apple to buy from separate displays of each size tested. In some cases two sizes of apples were tested while in a few instances three sizes were used in the experiment. In each comparison the display space allotted to each size of apple was the same and the displays were interchanged at intervals to avoid any preference due to location. These displays were not side by side but were usually separated by a small display of some other fruit, usually Golden Delicious apples, grapefruit, or dates (figure 1). Such an arrangement made it possible for the customers to see more readily the difference between the displays. Red Delicious apples grading U.S. extra-fancy were used. The displays of apples were comparable in every way except for difference in size of the apple.

Consumer preference

In the first phase of the experiment 2½-inch apples and 3-inch apples were displayed (both sized on the basis of 1/8 of an inch) in all three stores.

When both 2½ and 3-inch apples were offered for sale at the same price, about two-thirds of the apples sold were 3-inch and about one-third were 2½-inch size (figure 2). Customers in the high-income areas more nearly divided their purchases between 2½- and 3-inch Red Delicious apples.

The second phase of the experiment was conducted within a store located in the high-income area and three sizes (2½-inch, 3-inch, and 3½-inch) of Red Delicious apples were offered for sale at one time. When the price was held at 19 cents per pound for all three sizes, the 2½-inch apples accounted for 43 percent of the daily sales, the 3-inch apples accounted for 40 percent of the sales, while the 3½-inch apples accounted for 17 percent of the total sales of Red Delicious apples (figure 3).

During the three days before the Thanksgiving holiday, preference for different sizes was markedly altered. During this period extra-large (3½-inch) apples accounted for 52 percent of total sales (figure 3). Here again, as during previous comparisons, the price of all apples was maintained at 19 cents per pound. The shift from 17 percent during a regular week to 52 percent of sales during a weekend before a holiday such as Thanksgiving indicates that many consumers preferred extra-large apples during the holiday season.

Fig. 2. The proportion of different sizes of Red Delicious apples sold when all apples are selling at the same price in three income areas in Salt Lake City, 1957

Fig. 3. The proportions of different sizes of apples sold during the regular week compared with the three days before Thanksgiving when all apples are priced the same, 1957
Premium pricing of large apples

It has been shown that when consumers have a choice between 2½- and 3-inch Red Delicious apples at the same price per pound most of them prefer the larger apple. Preference in favor of 3-inch apples under equal price conditions suggests that greater returns to the retailer might accrue by increasing the price on large apples relative to small apples.

The store located in the medium-income area was selected as the place to experiment with differential pricing of 2½- and 3-inch Red Delicious apples. In the first instance, large apples were sold for 19 cents per pound and the price of small apples was reduced to 15 cents.

When the price for both sizes of apples was at 19 cents per pound, about two-thirds of the apples sold were of the large size. On a per day basis this amounted to 12 pounds of 2½-inch and 28 pounds of 3-inch apples (table 1). When the price of 2½-inch apples was reduced to 15 cents and the price of 3-inch apples remained at 19 cents, sales of small apples increased to 46 pounds per day or an increase of 34 pounds while sales of large apples decreased only 3 pounds per day—28 to 25 pounds. When the price of small apples was reduced further to 8 cents per pound, the level of sales increased to 237 pounds per day which accounts for 90 percent of apples sold from the two lots.

The small apples sold at 8 cents per pound may represent only a stocking up process by consumers. It is doubtful if this rate of sales could continue for an extended period of time.

It is evident that total pounds of apples sold can be increased by placing a reduced price on the least preferred size of Red Delicious apples. During this experiment the retail stores paid about 10 cents a pound for both sizes. With this assumption and with the large size selling for 19 cents per pound, the gross margin (sales less cost of goods) for the store over the range of prices charged for small apples can be calculated (table 2).

As the price of small apples decreased to 15 cents, the gross margin increased from $3.51 to $4.55 or an increase of $1.04 per day. Note that the calculated gross margin is higher when the small apples sell for 12 cents per pound than it is when they sell for 19 cents per pound, but 3 times as many apples were sold.

**PASTURES FOR BEEF**

(Continued from page 77)

area, there is little selectivity and use of forage can be 90 percent or more. When pastures are strip grazed with heavy stocking, the cattle eat all the plants—grasses as well as legumes—which helps to prevent bloat. Removing the forage quickly and moving the cattle to a new pasture allow a maximum period of time for regrowth.

Experience with dairy cattle shows that grazing should start early in the spring when pastures are 3 to 4 inches high. Enough cattle should be used to remove the forage quickly. They should then be moved to the next pasture. This will permit pastures to be at the proper stage of maturity for grazing throughout the season.

After the first grazing, pastures should reach a height of 12 or more inches with sufficient maturity before grazing the second time. Experiments show that yield is increased by grazing at a more mature stage. The mixture used in the present experiment is made up of tall, palatable, high yielding species. Even when the plants are two feet high they are eaten readily with little tendency for selective grazing. Steers have even been observed to graze while lying down. After the second or third grazing, pastures should be clipped to remove any unconsumed forage. Clipping removes the unpalatable forage, controls weeds, and insures more uniform grazing of the remainder of the grazing period.

It is well to have at least four pastures so that cattle can be rotated from one pasture to the other. This will make it possible to irrigate the pastures after the forage is removed and while they do not have cattle in them. This permits fast recovery and gives a maximum time for forage to grow. At times it may be necessary to subdivide the pasture using a movable electric fence. Pastures should be harrowed in fall and spring to distribute droppings and adequately fertilized with manure and phosphate every other year. If manure is not available a combination of phosphate and nitrogen should be used.

**CIVIC ORGANIZATIONS**

(Continued from page 71)

expect such participation of themselves nor of others?

Seeking answers to these questions can help clarify reasons for the low amount of participation in civic, economic, and educational organizations. It is certain that no answer will be a complete explanation.

Citizens might look around to note some of the problems facing their communities. They might inquire of themselves if low participation in civic, economic, and educational organizations could give one clue as to why civic, economic, or educational problems are not being more adequately solved.

**THE FUTURE FOR AGRICULTURE**

(Continued from page 61)

ated additional demands for processed vegetables. The projected increase of 62 percent from 1955 to 1975 would further expand the market for canned goods produced in Utah.

**Food production from additional water supply**

It is estimated that development of the Colorado River Storage and Weber Basin projects will increase annual food production in Utah by about 289 million pounds. Of this total, 174 million pounds would come from land under the Central
Utah and Emery projects, and 115 million pounds from land under the Weber Basin development program.

In 1955, 1,900 million pounds of food were produced in Utah. This amount plus the 289 million pounds anticipated from the land under the above projects, totals 2.2 billion pounds, which is 7 million pounds below the estimated requirement of 2.9 billion pounds for a population of 1.500,000.

Production and consumption of farm products in Western States

The estimated annual consumption of food for the Western States by 1975 is 75 billion pounds, 77 percent above consumption in 1955 (table 6). Consumption of livestock and livestock products by 1975 is estimated to exceed 1955 consumption by 77 percent, and 1955 production by about 19 billion pounds. Production of fruits, vegetables, and field crops in 1955 was above the projected requirements of these commodities by 1975.

Change in types of farming and use of agricultural resources

The expected increase in food requirements in Utah and other Western States, especially for livestock and livestock products, should provide producers with a more favorable local market. This increase in demand for farm products will probably change the type of farming and use of agricultural resources in many areas. The trend will be toward more intensification of agriculture for the production of deficit commodities for local and western markets.

Changes in Utah to meet the projected food requirements by 1975 will be primarily in production of commodities that have an economic advantage on the local market. Commodities that are likely to have such an advantage include dairy products, chickens and eggs, apples, peaches and pears, small fruits, processed vegetables, potatoes, and sugar beets. Some increase in beef production will result from more dairy cows. The demand on the local market and the competition from other areas will not be likely to support an increase in production of mutton and lambs, turkeys, and wheat. The demand for pork will be greatly increased during the next 20 years; however, production is not likely to increase to any extent because pork producers in Utah cannot compete with the Midwest where feed grains are more abundant.

Adjustments in agricultural production to meet increased requirements of local markets likely will be made through more intensification. This may be accomplished by shifting the acreage now in wheat and other extensive crops to more intensive uses, increases in yields, and by the use of about 500,000 acre-feet of water on new lands and on lands that now have a partial water supply.

The expected increased need for agricultural commodities in Utah does not mean, of course, that all of these commodities necessarily will be produced in the state. Some enterprises have distinct income advantages for irrigated farms in Utah. Opportunities are limited for expanded production of other commodities. Much food will continue to be shipped into and from the state. The above analysis does suggest desirable directions of adjustment in production and use of agricultural resources.

Table 6. Production and consumption of farm products, 1955, and projected demand for food, 1975, 11 Western States

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Production 1955</th>
<th>Consumption 1955</th>
<th>Increase in Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount (1000)</td>
<td>Consumption (1000)</td>
<td></td>
</tr>
<tr>
<td>Beef and veal</td>
<td>2,975</td>
<td>2,100</td>
<td>874.6</td>
</tr>
<tr>
<td>Mutton and lamb</td>
<td>346</td>
<td>214</td>
<td>363.6</td>
</tr>
<tr>
<td>Pork</td>
<td>241</td>
<td>1,536</td>
<td>792.4</td>
</tr>
<tr>
<td>Total red meats</td>
<td>3,562</td>
<td>3,850</td>
<td>80.6</td>
</tr>
<tr>
<td>Chickens</td>
<td>251</td>
<td>492</td>
<td>114.0</td>
</tr>
<tr>
<td>Turkeys</td>
<td>229</td>
<td>115</td>
<td>76.5</td>
</tr>
<tr>
<td>Total poultry</td>
<td>480</td>
<td>607</td>
<td>106.9</td>
</tr>
<tr>
<td>Total all meats</td>
<td>4,042</td>
<td>4,457</td>
<td>104.2</td>
</tr>
<tr>
<td>Livestock products:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy products</td>
<td>14,352</td>
<td>16,100</td>
<td>74.4</td>
</tr>
<tr>
<td>Eggs</td>
<td>921</td>
<td>1,150</td>
<td>118.7</td>
</tr>
<tr>
<td>Total livestock products</td>
<td>15,273</td>
<td>17,250</td>
<td>74.9</td>
</tr>
<tr>
<td>Total livestock and products</td>
<td>19,315</td>
<td>21,707</td>
<td>76.8</td>
</tr>
<tr>
<td>Total fruit</td>
<td>11,958</td>
<td>4,577</td>
<td>102.4</td>
</tr>
<tr>
<td>Total vegetables</td>
<td>13,995</td>
<td>4,763</td>
<td>96.5</td>
</tr>
<tr>
<td>Field Crops:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>14,153</td>
<td>3,956</td>
<td>57.7</td>
</tr>
<tr>
<td>Potatoes</td>
<td>7,987</td>
<td>3,232</td>
<td>42.7</td>
</tr>
<tr>
<td>Sugar</td>
<td>2,682</td>
<td>2,321</td>
<td>63.7</td>
</tr>
<tr>
<td>Total field crops</td>
<td>24,822</td>
<td>8,494</td>
<td>55.2</td>
</tr>
<tr>
<td>Total crop food</td>
<td>50,775</td>
<td>17,834</td>
<td>78.3</td>
</tr>
<tr>
<td>Other food</td>
<td>1,434</td>
<td>2,868</td>
<td>65.6</td>
</tr>
<tr>
<td>Total foods</td>
<td>71,524</td>
<td>42,409</td>
<td>76.7</td>
</tr>
</tbody>
</table>

† Per capita consumption based on rates used for Utah, table 5, and 1955, and projected population for Western States, table 1.
‡ Carcass weight.
§ Eviscerated weight.
|| Fruits include apples, cherries, peaches, pears, apricots, prunes, oranges, grapefruit, lemons, grapes, and miscellaneous fruits equal to 10 percent of total fruit consumption for 1955.
|| Production of other foods estimated at 50 percent of consumption for 1955, and includes other grain products, fats, oils, beans, rice, nuts.
Pasture silage was not consumed as rapidly as corn silage when the two were offered together or separately. Cows given access to both silages would generally consume the corn silage rapidly and then munch on the pasture silage during the day.

Body weight declined each time the cows were shifted from hay-pasture silage to a hay-corn silage ration. This probably reflected the amount of fill associated with rate of passage through the digestive tract although this factor was not measured. Milk production declined each time pasture silage was introduced into the ration.

Table 1. Forage dry matter consumed and milk (4% FCM) produced by three groups of cows

<table>
<thead>
<tr>
<th>Dry matter consumed</th>
<th>Milk produced</th>
<th>Body weight change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prol. per.</td>
<td>Exp. per.</td>
</tr>
<tr>
<td>Group 1</td>
<td>28</td>
<td>27.5</td>
</tr>
<tr>
<td>Group 2</td>
<td>26.6</td>
<td>27.9</td>
</tr>
<tr>
<td>Group 3</td>
<td>26.6</td>
<td>21.6</td>
</tr>
</tbody>
</table>

**COUNTRY LIVING**

(Continued from page 69)

Direct costs of operating these units averaged $250; $61 for small units, $158 for the medium sized units, and $589 for the large units (table 1). Although the large units had the greatest cash costs, these were probably a smaller part of total costs than those of the other units. Machine hire was less on the larger farms than on the other groups. These larger land holders probably have much more capital invested in machinery and equipment, the expense of which is not shown in this study.

More was spent on livestock feed than any other item. It amounted to $116. Hired labor was next at $48 per farm. The purchase of livestock amounted to $29 per farm; this included baby chicks, weaner pigs, and calves.

The smallest homesteads had an average return over cash costs of $15, the next larger group had $23, and the largest group, $295. Some of this latter group depended on farm operations for a significant part of their living.

Whatever value the smaller units derived from their agricultural operations was in recreation, better quality produce, and other satisfactions rather than in dollars. It also appears likely that the larger units would have little, if any, net returns were the costs of land and capital included. Economically the ventures in rural living were not profitable. Socially, physically, and aesthetically there may be much to commend them.

**Who did the work?**

The second most important reason given by the home owners for living in a rural area was to provide an opportunity for their children to learn to work. The answers implied that these people thought children should learn to work and that a small plot of land would provide the facilities for such training.

When later in the interviews the question of who did the work was asked, the replies showed that the father did 61 percent of the farm work, the mother 25 percent, the children 11 percent, and the remainder, 3 percent, was by hired and miscellaneous help. On the small units of one acre the children did less than 5 percent of the work, but on the largest units they did 16 percent (fig. 2). The proportion of work done by hired labor declined as the size of operation increased. It may be assumed that on the small units, jobs that required equipment not owned by homesteaders were hired done. The larger units probably owned the equipment which enabled them to do their own work.

**Reasons for rural residence**

The most common reason given by rural residents for living in the country was the space and independence it provides. Closely allied to this was the idea that a rural environment is a social and a physical advantage to children. Twenty-three residents mentioned lower taxes as a contributing reason for rural living, but not one gave it as a major reason.

The large majority of those interviewed liked living in the country.

The satisfaction of the rural home owners, however, leaves unanswered many problems of broad social and economic importance. Undoubtedly, the zoning ordinances that require a minimum of one acre for a homestead aid in providing space, privacy, freedom, and an opportunity for supplementing family living by producing foodstuffs for family use. They at the same time, create problems for agriculture. The reconciliation of the conflict between space for rural nonfarm family living and the preservation of good agricultural land for the efficient production of an essential food supply is not solved.
the farms with red-brick houses. Unlike Formosa, there were few rice paddies and almost no large trees on those 52 square miles of Quemoy.

When our Plymouth and James-town were pioneer villages, Quemoy teemed with 160,000 people who luxuriated in shady woods and windbreaks. But an oriental Napoleon ordered his forces to hew down the trees and fashion a fleet for invasion of Formosa. After the warrior and his horde departed, gales lashed the naked land, dunes crept over fields. Pirates came to harry the coasts. Insect pests and diseases plagued man and beast. The peasants became poor as temple mice. They turned into "remittance men" in reverse; their sons, economic exiles in far places, sent money back to maintain the family home.

Then in 1949 came stimulus in the guise of woe. After the government armies collapsed on the mainland, thousands of soldiers came fleeing across the narrow channel. They dug in, they fought off Red onslaughts. But how to feed them? Transportation from Formosa was dangerous, and Generalissimo Chiang Kai-shek had problems supplying his army there. If the Quemoy defenders could only become self-supporting, or nearly so, they could perhaps endure the siege.

Thus the garrison became an army of farmers. As I bumped in a jeep up a gulley to General Li's headquarters, I saw olive-drab clad fighting men tending vegetable patches. They had literally made many of their tiny terraced fields with their hands by laying up retaining walls of boulders and carrying soil in fiber baskets to make gardens behind the walls. Then from wells they would bear water in anything that would hold liquid, old oil tins and battered cans, halves of split volleyballs, jars. They would fertilize the little terraces with "night soil," for animal excreta was scarce.

Soldiers and civilians cooperated well to fight famine. But the Quemoy of 1950 could not come anywhere near supporting 44,000 civilians and as many fighters. Their toil, heroic as it had to be, was not enough. Help came from the Joint Commission on Rural Reconstruction. JCRR, which was succeeding on Formosa, sent in teams of Chinese and American scientists and technical experts.

After a swift survey they laid out a program. Tommy Hsu, who kept records for them, listed these as the cardinal points:

1. Afforestation. Millions of seedling trees were flown or sailed in, fast-growing trees such as bamboo, Indian seshania, Leucaena glauca, which grows three feet a year and is good for camouflage, windbreaks, feed for hogs and cows—and provides seeds with higher protein than bean cake.

2. Better seeds, new crops. JCRR induced Quemoyans to raise American onions, a crop which thrived and delighted the farmers' families. Other new crops which have become popular are watermelons, string beans, and chewing cane.

3. Importation of chemical fertilizers, conservation of animal and human wastes, and scientific use of all three.

4. Control of disease and pests through inoculations, sprays, and other means.

5. Swine improvement. The swaybacked, belly-dragging monstrosity of the Kinmen pig suffered from cholera and malnutrition. JCRR experts organized a campaign of inoculation. More abundant crops meant better diet. Berkshire boars were brought in to improve the breed.

Simple tools were provided in place of sharpened sticks and bare hands.

Wells, which furnish most of the irrigation water, were deepened and new ones dug. Better means of lifting or pumping the water were introduced.

Hog production responded spectacularly. In the six years following 1950, the number of hogs rose from 1100 to 23,022. Soldiers and civilians needed to import 400 or more hogs a month at first; now Quemoy can export pigs.

Traditionally the slaughter tax has been the chief source of revenue for the schools. With the tax multiplied a score of times, the 7000 school children and their teachers fare far better than they did. From 1950 to 1956, although the school population increased little, the budget increased nearly 25 times. Sometimes the alarm for a shelling sounds, and school is interrupted while the students run out to plunge into slit trenches. But in the main, education is going better.

Gratifying increases are noted annually in the production of the old standby crops, sweet potatoes, peanuts, soybeans, and sorghum. New crops such as American onions, sugar cane, watermelons, and the legume crotalaria are gaining favor.

How was all this achieved? Through lavish grants of money and gifts of equipment? No. Surprisingly small sums have been given outright. Modest loans have been made, but these are being repaid to a revolving fund to be recoined. It's pretty largely a "we'll help you help yourselves" deal.

JCRR experts operate mainly through farmers' associations. These had been organized in 1951, but they did not begin to function energetically until JCRR pumped new life into them. They received much technical and a little financial aid. Since 1954, services rendered by the Quemoy Farmers'
Association have included distribution of chemical fertilizer, sales of farm tools and supplies, allocation of superior breed livestock, improved seeds, pesticides, and feed. Further gains are expected from efforts of the expanding Quemoy Agricultural Experiment Station.

Quemoy even has 4-H clubs. Beginning in 1956, the clubs have enrolled nearly 400 boys and girls. Other information and educational activities are conducted by JCRR.

JCRR has also aided with rural health programs, land reforms, and fisheries development.

Considerable rice must still be imported. Equipment for transportation and some other uses is still meager. The monsoons and the Red guns beat upon the island. But much progress has been made. The people have learned that the bombardments follow certain patterns and they work elsewhere than “target area for today.” Despite all the obstacles and handicaps, Quemoy proves what Chinese energy, the indomitable human will, and modern science can do.

**BULK HANDLING OF MILK**

*(Continued from page 65)*

- If many producers change to bulk tanks, will costs remain constant for producers with cans? Most likely costs will rise for producers who continue to sell milk in cans. This is because there will be fewer and smaller producers who use cans, causing an increase in transportation and overhead costs.

- What financing facilities are available to dairymen contemplating conversion to bulk tanks? The commercial bank is the major source of credit to finance bulk tanks. Other sources available in some areas are government-sponsored agencies such as Federal Housing Administration, cooperatives, and milk plants.

- What allowance should be made in tank capacity for seasonal fluctuation in production? As the seasonal fluctuation is much less for bulk milk producers in Utah than producers in other areas, 2.25 times annual average daily production would be sufficient allowance. Most other areas allow 2.5 times annual average daily production for seasonal fluctuation in production.

- What size tank should be purchased for a given size of herd? When the anticipated size of herd and milk production per cow are determined for the next 15 to 20 years then the annual average daily production can be estimated. The estimated annual average daily production multiplied by 2.25 will give the approximate size tank required for that herd.

- What size herd is required to justify conversion to bulk tanks? Under average conditions found in the Utah 1956 dairy survey, a herd size of 9 cows would justify conversion to a bulk tank. With 9 cows the cost of handling milk on the farm was the same for bulk and can handling. More than 9 cows was associated with a saving in favor of bulk handling. It was determined in a study made in conjunction with this that under average conditions and performance, 25 to 50 cows per herd are needed to produce milk at a profit in Utah. The problem of size is, therefore, associated more with a minimum economic operating unit than with justification for conversion to bulk handling of milk.

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**CONTRIBUTIONS TO RESEARCH**

May 1 to August 1, 1958

- $64,226 for research on the effect of fluorine on plants and animals
- $8000 for a study of synovitis in turkeys
- $1200 for a study of synovitis in turkeys
- $1000 for a study of synovitis in turkeys
- $1000 for studies on mite control on fruit trees
- $500 for studies on the culture of tomatoes and lima beans
- $500 for study of the use of azomite as a feed stimulant for turkeys

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**FARM AND HOME SCIENCE**