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Division of Agricultural Science Organized

In an effort toward better coordination and increased effectiveness, the agricultural services of the Utah State Agricultural College have been brought together under one division, the Division of Agricultural Sciences, with Dr. R. H. Walker as dean and director. Dr. Walker was formerly dean of the School of Agriculture and director of the Experiment Station. This new division includes the School of Agriculture, the teaching unit; the Agricultural Experiment Station, the research unit; and the Extension Service, the unit that takes the results of research to the farmers of the state through its specialists and county agents.

Dr. D. W. Thorne has succeeded Dr. Walker as director of the Agricultural Experiment Station. Dr. Carl Frischknecht will remain as director of the Extension Service. Dr. Walker will continue to serve as dean of the School of Agriculture.

A native of Perry, Utah, Dr. Thorne obtained his B.S. degree in chemistry from USAC in 1933. He received both his M.S. and PhD degrees in soil science from Iowa State College in 1934 and 1936, respectively. He was on the faculty of Iowa State College, the University of Wisconsin, and Texas A and M College before joining the staff at USAC.

In his research, Dr. Thorne has been concerned with the problems of food production in arid regions. He has done extensive research on the causes of chlorosis and other nutrient deficiency diseases of plants.

The irrigation waters of Utah have been rather thoroughly characterized by Dr. Thorne. A modified system of classifying the quality of irrigation water was developed which gives weight independently to the concentration of salt and of sodium. This system served as a basis for the water classification system recently adopted by the seventeen western states.

Dr. Thorne is the author of many technical articles as well as a textbook on management of irrigated soils. This book was the first major treatise covering the interrelations of water, arid soils, and plant roots in attaining maximum yields from cropland.

He returned last October from a year's leave during which time he acted as head of the fertilizer division of the Tennessee Valley Authority.

Dr. Walker, new head of the Division of Agricultural Sciences, has been director of the Agricultural Experiment Station and dean of the School of Agriculture since 1938.

Dr. D. W. Thorne, new director of the Agricultural Experiment Station was former head of the Department of Agronomy.

Dr. Carl Frischknecht will continue his duties as director of the Extension Service.
WHEREVER alkali bees (Nomia melanderi Ckll) are abundant, alfalfa seed yields are likely to be high. Experience in Washington, Wyoming, Idaho, and Utah has proved that these bees, without help from other species, can pollinate large acreages. In most of the areas where alkali bees are important, alfalfa seed growers are interested in keeping them healthy.

Since alkali bees nest in the soil in dense aggregations (fig. 1), effective populations may occupy a limited acreage. Also, since they migrate readily to new nesting sites, effective populations may suddenly appear in favorable areas and build up rapidly from year to year. These characteristics make it feasible for growers having land favorable for nesting to attract aggregations and to maintain nesting sites without sacrificing much land. However, growers must understand the rather specific requirements of alkali-bee farming. Furthermore, they may find it necessary to compromise with what are generally recognized as efficient irrigation and drainage practices.

**Nesting Sites**

Districts favorable for alkali bees have certain characteristics in common: rainfall is low, midsummer temperatures are high, and the soil has a compact or "tight" structure. The land surface is characterized by alkaline, wet zones on low slopes or mounds. Such conditions occur principally in the lower land of the arid, treeless valleys of the West.

Before the development of irrigation in the West, alkali bees must have nested in naturally moist areas. However, populations were undoubtedly small since now nearly all of their forage consists of weeds along irrigation channels, alfalfa, and other introduced plants in irrigated fields.

Under modern conditions, extensive nesting sites may be found where the aquifers under broad valleys are subjected to artesian pressure. More restricted sites occur along certain natural watercourses where the river bottom is somewhat higher than adjacent land, or where a local high water table develops along the margins of cut-off ox-bow channels. Basic requirements for the occurrence of nesting in both of the above situations are (1) subsurface moisture (fig. 2), (2) alkalinity, and (3) freedom from flooding.

Today, by far the greatest numbers of nesting sites are found in seeped areas resulting from underground movement of excess irrigation water. The establishment of new irrigation districts, or the expansion of old ones, is often followed by a rapid increase in the number and size of alkali bee nesting sites. Such a development is now taking place in the Rosa area of Washington. Irrigation and the presence of new forage cause the bees to establish new holdings and expand their old ones. Increased seed yields resulting from increased pollination encourage the farmers to develop more seed acreage and more irrigation. Under such "snowballing" conditions alkali bees can easily keep pace with expanding seed acreage. The Wapato, Washington, and Riverton, Wyoming, seed districts bear witness to this.

(Continued on page 24)
Two New Department Heads Named

Howard B. Peterson

Dr. Howard B. Peterson has been appointed to succeed Dr. D. W. Thorne as head of the Department of Agronomy. Dr. Peterson has been a member of the staff since 1940 when he was appointed research associate in agronomy. He is a native of Redmond, Utah, and a graduate of the Brigham Young University and the University of Nebraska where he received his doctor of philosophy degree in 1940.

Dr. Peterson’s research has been in the area of soil chemistry and fertility. From the spring of 1949 until the fall of 1950 he acted as project leader of phosphate fertilizer investigations for the U. S. Department of Agriculture. He is joint author of the book “Irrigated Soils: Their Fertility and Management,” in collaboration with Dr. Thorne. In addition he has written a number of bulletins and technical articles. He has been active in national agronomic organizations. During 1940 he was president of the Western Society of Soil Science.

Arthur J. Morris

Arthur J. Morris, professor of dairy industry and assistant dean of the school of Agriculture, has been appointed head of the Department of Dairy Industry on the retirement of Professor George B. Caine from administrative duties, July 1.

Professor Morris obtained both his B.S. and M.S. degrees from USAC in 1923 and 1930, respectively. He has done graduate work in dairy manufacturing at the University of Wisconsin.

From 1923 to 1930, Professor Morris was on the staff of the Branch Agricultural College at Cedar City. He came to USAC in 1931 as assistant professor of dairy industry in charge of the creamery. He was appointed associate professor in 1934 and professor in 1942. The students he has trained in dairy manufacturing now hold positions of responsibility in industry and in land grant colleges throughout the nation.

Professor Morris has won national recognition for his teaching and his efforts to improve dairy products. He has taken an active part in the activities of the Utah and the American Dairy Association. In 1941 he was appointed chairman of the western division of the American Dairy Science Association, in 1944 he became state manager of the American Dairy Association in Utah, a position he still holds. In 1952 he was elected secretary of the manufacturing section of the American Dairy Science Association, in 1953 he became vice chairman, and he is now national chairman of the manufacturing sector.

ALKALI BEES

(Continued from page 23)

Decline of Populations and Destruction of Nesting Sites

Unfortunately, it seems that just when things are going at their best for the bees, trouble strikes, and populations of alkali bees decline. Nesting sites may dwindle gradually from year to year or virtually disappear in a single season. In Wyoming the opinion has developed among growers that alfalfa seed can be grown successfully in an area for only about five years. The fact that seed yields in the past have declined rapidly after a few years of high yield may have resulted partly from lack of lygus bug control, but the association in Wyoming of seed production and alkali bees makes one suspect that declining bee populations have been largely responsible. Such a decline seems to be taking place now in two of the newest and most successful “alkali bee seed areas” — South Pavilion and Hidden Valley, located on the Bureau of Reclamation project near Riverton, Wyoming.

Why do populations of alkali bees often decline so soon after a rapid increase? Expanding populations of insects are usually leveled off or reversed by one or more of four principal factors: (1) parasitism and disease, (2) weather, (3) reduction of food sources, and (4) use of insecticides. The first and the last of these are important in the case of alkali bees. A parasitid fly, Heterostylum robustum O.S., has nearly eliminated alkali bee from Cache Valley, Utah. Parathion has done likewise for certain nesting sites near Delta, Utah. However, neither factor appears to have played much part in the declining population of nesting site near Riverton, Wyoming, and For Hall, Idaho.

Nesting sites of alkali bees may be damaged or destroyed by (1) flooding, (2) ploughing, (3) encroachment of dense weed growth, (4) excessive seepage moisture, and (5) drying up. Flooding may... "(Continued on page 39)"
Profs in Potatoes

determined by yields, labor, and size of enterprise

Earneat M. Morrison
and W. Gordon Kearl

High yields of potatoes need fertile soils and adequate irrigation water

If you would make money growing potatoes you need high yields, but you must not spend too much time in needless effort in getting them. The most efficient use of labor appears to be on fields of about 20 acres in size.

This information comes from a study of 130 potato producing enterprises made in 1953. Enterprises included in the survey ranged from 1 to 35 acres in size. Average size was 9.1 acres with yields of 169 hundredweight per acre. Farms included in the survey averaged 144 acres, 98 of which were cultivated.

Potatoes Important Crop in Many Parts of State

The potato enterprise is important in providing a cash crop and a means of diversifying and intensifying farm operations on many of Utah's irrigated farms. It is particularly important in those areas where, because of short growing season or inadequate markets, other intensive crops cannot be produced economically.

In 1949, the most recent year for which data are available on a county basis, potatoes were produced in all 29 counties in Utah. Potatoes have accounted for about 2.5 percent of the total cash farm income and about 10 percent of the cash farm income from crop sales over the past several years. The gross value of the crop has been between four and five million dollars in 8 of the last 12 years from 1943 to 1954.

Except for a period during World War II, acreage of potatoes in Utah has fluctuated between 11,000 and 15,000 acres. Yields have increased rather steadily from 96 hundredweight per acre in 1939 to 1952 hundredweight in 1954.

Costs $1.10 to Produce 100 Pounds of Potatoes

The average total cost of producing potatoes in representative areas in Utah in 1953 was $186.16 per acre, $1.10 per hundredweight (table 1). This included cash costs plus appropriate charges for non cash costs such as operator and family labor, use of machinery, and interest on owned capital.

Labor is the Largest Cost

Man labor constituted the largest single cost and accounted for $65.39 per acre or 35.1 percent of the total cost of producing potatoes. It included cost of labor hired plus value of labor performed by the operator and his family. An average of 63 man hours of labor per acre was used on enterprises averaging 9.1 acres of potatoes and having yields of 169 hundredweight per acre. Land preparation, planting and growing operations, and harvesting accounted for 13.4, 35.4, and 51.2 percent, respectively.

(Continued on page 40)
Is It Necessary to Use the Limited Irrigable Land for Industrial and Urban Expansion?

GEORGE T. BLANCH

The major part of the population and of the economic activity in Utah is concentrated in the four counties of Weber, Davis, Salt Lake, and Utah. The 1950 census reported 68.4 percent of the state’s population as residents of those four counties. Census reports also show that this area has about 75 percent of all retail trade, 95 percent of the wholesale trade, and 75 percent or more of the payrolls in service industries, amusements, and manufacturing. Of the total value of farm products sold in 1949, this area received slightly less than one-third.

Current trends indicate that these counties are becoming progressively more important in the economy of the state. Between 1940 and 1950, population here increased 38 percent while in the remainder of the state the increase was only 4 percent. A number of counties lost population. Observation indicates that the same trend has continued since 1950 in population, commerce, industry, and agriculture.

Agricultural Land Diverted to Other Uses

Such changes cannot take place without social and economic effects.
that have profound significance to society and to many individuals and families. Among these is the change that takes place in the use of land. Considerable areas of land along the Wasatch Front that had been developed for use in intensive agriculture have been diverted to other uses during the past 15 years.

Much of the original development cost is lost to society in the new use.

By comparison of air-photos taken of most of the cultivated parts of the four counties in 1937 and again in 1952, together with data from maps, local inquiries, and observation from driving most of the roads of the area, it has been determined that approximately 27,545 acres of land was changed from agriculture to other uses between 1937 and 1952. An additional area of significant size has since undergone similar changes in use. All indicators point to a continuation of this important development.

Best Land Taken for Non-Agricultural Purposes

The 27,545 acres is only 1.5 percent of the total land area of the 4 counties but of this 16,651 acres was land under irrigation and amounted to 7.0 percent of the total irrigated land in the counties. It is probably safe to assume that essentially all the irrigated land was suitable for crop production. An unknown part of the balance was dry cropland. The remainder was grazing land—some farm pasture and some, probably a small part, foothill range or wasteland. The agricultural industry of the area is based in large measure on the irrigated land.

The 1950 census reported that all farms with irrigated land in these

(Continued on page 42)
Dense stands of aspen, fir, spruce, and Douglas fir covering extensive areas of mountain range and watersheds of southern Utah produce little forage.

Aspen, fir, and spruce stand thinned 50 percent in June 1953 after seeding to grass in the fall of 1952.

Aspen, fir, and spruce stand clear-cut June 1953 following fall seeding in 1952.

All pictures taken in September and October 1954.

Aspen Cutting
May Increase Feed Resources and Water Yield in Southern Utah

M. E. Robinson and D. H. Matthews

A once-productive aspen range of southern Utah, capable of supporting as much as one sheep to the acre during the summer, now contributes little to the grazing load. Dense stands of aspen, fir, and other trees, 25 to 30 years old, fully occupy much of this range, making it difficult in many areas to penetrate on horseback. What little grass remains is spindly and lacks vigor.

Tests are being conducted on these ranges to find means of restoring their productivity. Approximately 500 acres of range have been fenced and are being used in

Max Robinson is assistant professor of range management and Darrell Matthews assistant professor of animal husbandry at the College of Southern Utah at Cedar City. They are both working on the sheep management study being conducted in that area. Management of the range is an important part of this study.
Small plot work was begun in 1948. Many species of grass are being tested. The effect of reducing the competition of aspen by various means is being studied. Strips have been thinned and clear-cut by use of the power saw and the ax. Herbicides are being tested as a means of killing the trees while standing and for treating stumps and reproduction by sprouts.

More than 300 acres of range was seeded by air at the time of leaf fall during October 1953. Plans for further tests with the airplane for distributing seed and for spreading herbicides have been made.

Conclusions that may be drawn from tests made thus far on aspen ranges are:

- From a deteriorated condition furnishing less than one sheep month of feed per acre, range seeded to improved grasses and clear-cut of trees produced forage within two years sufficient to support 8 to 10 sheep months per acre.
- The airplane is a practical means of distributing seed and ensures more uniform and faster distribution than other means tested.
- Broadcast seeding at or before leaf fall appears to be the most suitable time for planting although good results have been obtained at both earlier and later dates.
- Protection from livestock grazing during the first few years while grass seedlings are becoming established is essential.
- Clear-cutting aspen and allowing the trees to remain on the

(Continued on page 44)
If this milk remains on the serving counter or in the cases at room temperature for many minutes it will be warmer than desirable when consumed.

These students like milk and drink several half pints with their school lunch.

Students at this high school are enjoying milk with their school lunch.

Merchandising Milk Through the School Lunch

Quality Here May Determine Future Habits of Students as Adults

A farmer producing milk for fluid use might well ask: Is my milk merchandised in a way most likely to please the consumer and increase fluid milk consumption?

A study was recently made of schools in Utah to determine if school children were getting the kind of milk they want in a manner most pleasing to them. Dairy leaders believe that the school milk market is one of the most important supplied by the dairy industry. This is because of the large number of children drinking milk in schools and because the habits learned in school are likely to carry over into adult and family life.

If drinking milk can be a pleasant experience in school then the student will likely drink milk as an adult. If the student is confronted with poor tasting milk, dispensed in an undesirable way, he is not as likely to drink it regularly in later life and will reduce his present consumption at home and school.

**Milk Served Too Warm**

Most of us like milk cold. Grade, junior high, and high school students are no exception to this rule. One sentence 7th and 11th grade pupils in the schools studied were asked to complete was: "Milk served in school yesterday would have better satisfied me if it had been ....". Of the 1,620 students who had consumed milk in school the day before, 44 percent replied that it should have been colder (table 1), while only 5 students or 0.3 percent of one percent answered that it was served too cold. Five percent said the milk was off flavor, and 51 percent replied they were well satisfied with the milk they drank at school the day before.

A temperature reading of the milk was taken at the beginning, half through, and toward the end of the meal. These readings showed why 44 percent of the students criticized milk as being too warm. A summary of the highest reading at each school showed that 70 percent of the students were drinking milk 45° Fahrenheit or warmer (table 2). Nearly half of the students, or 42 percent of them were drinking milk 50° or warmer. These data indicate a substantial number of students are having milk served them which is warmer than desirable. The general opinion in the dairy industry is that milk should be consumed under 45° for most popular acceptance.

**Reason for Warm Milk**

There were 2 major causes of milk being too warm at serving time:
- it was stored without refrigeration between delivery and serving.
- it was held on the serving counter or in the cases at room temperature for many minutes.

In making this study a total of 97 of the approximately 450 schools in Utah were visited. One or more schools in all but three districts was included in the sample. These 97 schools had a combined attendance of 54,277 students. Of these, 16,642 were senior high school (grades 10-12), 16,649 were junior high (grades 7-9), and 20,986 students were in grade school or kindergarten. The author, WELLS M. ALLRED, assistant professor of agricultural economics, believes that from a sample of schools and students of this size, the data obtained are representative of conditions throughout the school system of Utah.

<table>
<thead>
<tr>
<th>How milk could have been better</th>
<th>Number of students replying</th>
<th>Percent of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colder</td>
<td>704</td>
<td>44</td>
</tr>
<tr>
<td>Warmer</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Better flavor</td>
<td>81</td>
<td>5</td>
</tr>
<tr>
<td>Milk satisfactory or no reply</td>
<td>830</td>
<td>51</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,620</td>
<td>100</td>
</tr>
</tbody>
</table>

*Under 0.5 percent
Students who bring their lunch from home get cold milk at the high school lunch room.

WELLS M. ALLRED

counter or eating tables, at room temperature, for too long a period before consumption.

In 13 schools, where milk was iced down, average temperature toward the end of the meal was 45° (table 3). Milk stored under mechanical refrigeration averaged 47° compared with 52° for milk stored outside. The temperature readings of milk stored outside were taken during a mild period of the winter and probably would average above 52° in the fall and spring if handled the same.

There was also a relation between length of time milk was held on the serving counters or eating tables and its temperature toward the end of the meal. Where milk was taken directly from the refrigeration unit temperature averaged 42° toward the end of the meal (table 4). The temperature increased to 56° as length of time on the serving counter increased to 2 hours or more.

These conditions of improper storage and permitting milk to remain on the serving counter for too long a period can probably be corrected with proper cooperation between the school districts and the dairy industry.

Few Criticisms of Flavor

Except for warm milk, few criticisms were made by school children or testers. A flavor test of the milk was made at 92 schools. At 11 schools the milk was judged excellent, in 79 schools or 86 percent of them the flavor of milk was very good, and in 2 schools it was judged good. On the day the flavor test was made no milk was found with a flavor rating less than good. The students were somewhat more critical of the milk than the testers. Five percent of them replied that (Continued on page 43)

Table 2. Temperature of milk consumed by students during the meal, 90 schools, Utah, 1953-54

<table>
<thead>
<tr>
<th>Temperature range of highest of 3 readings per school</th>
<th>Number schools</th>
<th>Number students taking school milk</th>
<th>Percent students are of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 40°</td>
<td>3</td>
<td>462</td>
<td>2</td>
</tr>
<tr>
<td>40°-44°</td>
<td>23</td>
<td>5,283</td>
<td>28</td>
</tr>
<tr>
<td>45°-49°</td>
<td>30</td>
<td>5,191</td>
<td>28</td>
</tr>
<tr>
<td>50°-54°</td>
<td>16</td>
<td>3,887</td>
<td>21</td>
</tr>
<tr>
<td>55°-59°</td>
<td>13</td>
<td>3,446</td>
<td>18</td>
</tr>
<tr>
<td>60° and over</td>
<td>5</td>
<td>519</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>18,788</td>
<td>100</td>
</tr>
</tbody>
</table>

*A temperature reading was taken at the beginning, half through, and towards the end of the meal.

Table 3. Relation of temperature of milk towards end of the meal to place of storage after delivery, 90 schools, Utah, 1953-54

<table>
<thead>
<tr>
<th>Milk remains after delivery</th>
<th>Number schools</th>
<th>Average temperature towards end of meal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iced down</td>
<td>13</td>
<td>45°</td>
</tr>
<tr>
<td>Mechanical refrigeration</td>
<td>42</td>
<td>47°</td>
</tr>
<tr>
<td>On floor at room temperature</td>
<td>25</td>
<td>52°</td>
</tr>
<tr>
<td>Outside</td>
<td>7</td>
<td>48°</td>
</tr>
<tr>
<td>On serving counter</td>
<td>2</td>
<td>52°</td>
</tr>
<tr>
<td>Insulated room</td>
<td>1</td>
<td>60°</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>48°</td>
</tr>
</tbody>
</table>

FOR JUNE 1955
Breeding for

**Low Coumarin Sweetclover**

DEVERE R. McALLISTER

Sweetclover hay, silage, and pasturage should become more popular in Utah when the low-coumarin sweetclovers now being worked on at the Utah Agricultural Experiment Station become available.

Forage investigators have for years been concerned with the high coumarin content of the available sweetclover varieties. Coumarin is bitter to the taste and reduces the palatability of sweetclover. A second and more damaging effect is the "sweetclover sickness" or "bleeding disease" of animals caused by the eating of spoiled sweetclover hay or silage. During such spoilage the coumarin is changed to dicumarol which decreases the clotting power of the blood and increases the permeability of the capillary walls. Affected animals (particularly ruminants such as cattle and sheep) may bleed to death from slight wounds or internal hemorrhages. The prompt injection of vitamin K is the only medication in severe cases.

All sweetclovers belong to the genus *Melilotus* of which the species *alba* (white sweetclover) and *officinalis* (yellow sweetclover) are of major agronomic importance, but both are high in coumarin content. Banat sweetclover (*Melilotus dentata*) has only a trace of coumarin in its vegetative tissue but is not desirable agronomically. All three species have the same chromosome number (16) and might appear to be cross compatible but such is not the case.

Transfer of the low-coumarin character from *dentata* to *alba*-like hybrids required a bit of plant breeding wizardry on the part of Dr. W. K. Smith at the Wisconsin Agricultural Experiment Station. Dr. Smith crossed the two species but found that the F₁ hybrid seedling was deficient in chlorophyll and would die as soon as the reserve food supply in the seed was exhausted.

Dr. Smith then grafted a number of these F₁ seedlings on year-old *officinalis* plants and was successful in growing some to maturity. Another problem to overcome was that only 20 percent of the pollen on the F₁ hybrid was functional. To remedy this he back-crossed to *alba* using the latter as a pollen parent. This back-crossing also established...
more desirable *alba*-like characters in the hybrid.

**Selecting for Desirable Characteristics**

Six small lots of seed from these crosses were obtained by the Utah Station in 1951. These were started in the greenhouse and transplanted to the Evans Forage Experimental Farm in the spring of 1952. Being biennials they did not flower until 1953. To prevent the introduction of foreign pollen the crossing blocks were caged (fig. 1) and small bee colonies enclosed to effect pollination.

Mature seeds from each plant were collected and threshed separately. These were replanted in the greenhouse in 1954 and set out in the field. Selected lines were set in crossing blocks as in fig. 2. During the summer and fall of 1954, a graduate student checked every plant for coumarin content. Most of the plants had a low-coumarin content, a few were of medium content, and a few high. Only those of low content will be retained after rechecking in the spring of 1955.

Progeny of the original cross are now separating into many types with regards to size and shape. Some represent the original *alba* parent (tall and rank), while others are similar to the *dentata* parent (low-growing and small). These are illustrated in fig 3. From this (Continued on page 41)
Reed Canarygrass
A Forage Plant for Sanpete County

Withstands spring floods and summer droughts and can be established by drilling in bottom of furrows in late fall

GORDON A. VAN EPPS

REED canarygrass (Phalaris arundinacea L.) is the only cultivated forage plant known at present that can withstand the spring flooded and summer drought conditions found in the highly organic soils west of Ephraim and Manti in Sanpete County. Results from experimental plots and other observations indicate that this grass can be established in this area by drilling in the bottom of furrows late in the fall. Vegetative plantings also have possibilities.

Reed canarygrass is a high yielding perennial with leafy stems that are quite coarse when mature. It grows in dense bunches that may be 3 feet or more across and generally 3 to 4 feet tall, spreading underground by means of short scaly rootstocks. It is especially adapted to soils of high moisture content and yet it is drought tolerant. Moving surface water does not appear to be detrimental to this grass during either the dormant or the growing season, but there is a considerable loss of plants when the water is deep ponded during the growing season. Reed canarygrass has a long life, a long growing season, and recovers rapidly from grazing or cutting producing a large quantity of succulent palatable forage, when utilized before it matures.

Problems of Low Wet Lands in Sanpete Valley

The black organic soils of the Sanpete Valley present problems

GORDON VAN EPPS is assistant professor of agronomy. He is stationed at Snow College and is in charge of the soil and fertilizer tests in the Sanpete County area.

Table 1. Living plants of reed canarygrass from 44 original slips planted June 12, 1953. Average of four replications

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average number of plants</th>
<th>Living percent of original planting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slips (few roots) with tops</td>
<td>25.0</td>
<td>56.8</td>
</tr>
<tr>
<td>Slips (few roots) tops removed</td>
<td>14.7</td>
<td>33.4</td>
</tr>
<tr>
<td>Slips (no roots) with tops</td>
<td>5.3</td>
<td>12.0</td>
</tr>
<tr>
<td>Slips (no roots) tops removed (1 or 2 nodes left)</td>
<td>4.3</td>
<td>9.8</td>
</tr>
</tbody>
</table>
Results from Planting Vegetative Slips

In Oregon and other areas where reed canarygrass is grown quite extensively, vegetative plantings are often made by chopping the vegetative growth, scattering it over the land with a manure spreader and then disking it under. This method does not appear feasible in the Ephraim area because of difference in climatic conditions. It is believed, however, that vegetative planting might be practical under certain conditions noted later.

Because of success in other places with planting vegetatively, slips with and without roots were planted, as shown in table 1, on clean cultivated land in an organic soil area. The slips with roots were obtained by pulling separate stems away from the main growing plant while the slips without roots were cut off the stems above the ground level. Of the plant slips with tops and a few roots 57 percent lived, a substantially higher percentage of living plants than by any other method. Survival of slips planted by other methods was too low to warrant their use. This method has promise where seeding will not take, as in sods of wiregrass, or may have practical value when planted early in the spring on undisturbed sod that has not been plowed.

A sweet potato vegetative type planter or a tree planter consisting of a coulter to cut the sod, a narrow furrow opener to drop the slip in, and a press wheel on each side to compress the soil around the slip would probably be an economical method of distributing the slips in the field. It would be inadvisable to graze the field the first year, but it could be harvested for hay. This method needs further study, but from a few exploratory trials it appears feasible.

Drill Seeding in Bottom of Furrows Gives Best Results

In the fall of 1953, a study was established on clean plowed and harrowed organic soil using four methods of seeding with planting dates in the fall and spring (table 3). Individual plots other than broadcast consisted of seven or eight rows depending on planting method, with rows one foot apart and twenty feet long. The following major factors appear to be responsible for the excellent stand obtained from drilling in the bottom of the furrow:

- Improvement of soil moisture relations in that the furrow bottom stays moist for a longer period of time making a better environmental condition over a longer period for seed germination and seedling growth;
- Protection from frost: In organic soils, which are poor retain-
planting on the organic soils, reed plants grew on the spring seeded square left rough. This would be prepared more the seeds too deep for emergence with reduced moisture in the soil result from 1954 on land plowed in the fall and comcs morc important later in the growing season than at time of germination. Secondary factors that enter into the problem of obtaining a satisfactory stand are plant competition from weeds and grasses, soil crusting, and heat damage.

Approximately one third of the plants died when they were drilled on top of the ridge in the fall, and several of the plants died in the fall planted regular flat drilling method. The roots of the dead plants were short and matted together just below the soil surface. The cause is not definitely known, but it could result from salt accumulation along with reduced moisture in the soil surface zone before the roots could penetrate to a lower depth for adequate moisture.

Sloughing off of slopes because of rain and snow thereby covering the seeds too deep for emergence may be a hazard in planting in the bottom of furrows. This would be more likely to occur in a seedbed prepared by plowing and harrowing than where the furrows were made in a grain stubble field.

In another small exploratory planting on the organic soils, reed canarygrass was broadcast in the fall of 1953 and in the spring of 1954 on land plowed in the fall and left rough. On the fall seeded plot approximately 1 to 2 plants per square foot were growing. No plants grew on the spring seeded plot. Here again conditions under fall planting on rough plowed land might be similar to fall planting in the bottom of the furrow. The seed is protected by falling down in the cracks and crevices produced from turning over the soil in plowing.

On the basis of good stands obtained from some deep furrow plantings in 1949 on unplowed land, Curtis Rasmusson, Ephraim, during the fall of 1953, planted a thirty acre grain stubble field to a mixture made up of reed canarygrass, tall fescue, and sweet clover which was drilled in furrows 28 inches apart with no other seedbed preparation. To make an adequate furrow in the stubble field, a specially built 2 row shovel tiller was used. Attached was a two drop drill with drops having the same width spacing as the shovels. This mechanism has been developed by the Intermountain Forest and Range Experiment Station for planting hard land surfaces. Even though sections of this planting were under water for some time, an excellent stand was obtained. In the fall of 1954, Mr. Rasmusson planted another 30 acres with the same mixture.

In grazing reed canarygrass it is best to leave the animals on until it is eaten down and then remove them until there is a good regrowth. Continuous grazing is not recommended as it appears to be detrimental to the plant. There may be a need for nitrogen to maintain yields on old stands which have become more or less sodbound. No fertility studies have been made on these soils with reed canarygrass.

Yields from 3 to 5 tons per acre can be expected from uniform stands when cut for hay. Better quality hay is produced if cut when the first heads begin to appear. Reed canarygrass becomes coarse and quite unpalatable with wastage by the animal when it is mature. For best results use new clean seed having a high germination (80 percent plus). Old seed which may be low in germination and vitality should be avoided. A seeding rate of 8-12 pounds per acre should give a solid stand in several years.

Planting late in the fall in the bottom of furrows offers the best chance of establishment of reed canarygrass in the organic soil area of Sanpete Valley.

| Table 2. Percent survival of reed canarygrass under four methods of planting in fall and spring |
| Method of planting | Date of planting | percent | percent |
| Drill in furrow bottom | May 8, 1954 | 96 | 28 |
| Regular flat drilling | Nov. 13, 1953 | 18 | 8 |
| Drill on top of ridge | | 2 | 0 |
| Harrow after broadcasting | | 1 | 0 |

NEW PUBLICATIONS


In this publication the authors maintain that phosphate is the most generally deficient nutrient of alfalfa in the state. Types of phosphate fertilizer, methods and time of application are discussed. Needs for other fertilizers are also discussed.


This bulletin points out that mule ear can be successfully controlled on mountain ranges with herbicides. Increase in the production of desirable forage plants on treated areas resulting from the eradication makes the practice a highly desirable and potentially profitable undertaking.

Copies of these publications will be sent on request to the Utah Agricultural Experiment Station, Logan, Utah.
How much does your family’s food cost? Are you buying a balanced diet with your food dollar? Last spring one of us (M.L.) became interested in these questions. Was the money spent for food by a young married couple attending college being spent wisely? Was she and her husband obtaining a balanced diet at a reasonable cost?

A three weeks’ study was conducted during March and April 1954 of all food used by this young married couple. An inventory of all food on hand was taken at the beginning and at the end of the record period, together with all foods used during the three weeks. The foods were divided into eleven groups: milk, cheese, ice cream; potatoes, sweet potatoes; leafy, green, and yellow vegetables; citrus fruits, tomatoes; other vegetables and fruits; meat, poultry, fish; eggs; dry beans and peas, nuts; baked goods, flour, and cereals; fats and oils; sugars, sirups, preserves; and condiments and spices.

The cost of all the purchased foods was calculated. Home canned fruits and vegetables and the skim milk were assigned a value equal to the cost at the grocery store. Total cost was then determined for the entire diet. Total cost of the diet would have been lower if only the cost of the raw fruit and vegetables plus the cost of canning them at home had been used for their cost. The cost of dry skim milk powder was used as the cost of the skim milk.

The average cost of the food per person per week was $4.28 (table 1) or an average cost of 20 cents per meal. The average grocery bill, that is, the cost of all food purchased exclusive of home canned fruits and vegetables and the skim milk was $3.30 per person per week. During the 3 weeks, 9 quarts of homogenized milk were purchased while 21 quarts of skim milk were used.

Dividing the food dollar according to the food groups (table 1), the 15 percent spent for meat included 2¼ pounds of ground beef, 8 ounces frankfurters, 12 ounces yellowtail, 2 pounds frozen fish, 3 pounds beef chuck roast, and 11 ounces liver. Baked goods, flour,
Before the days of commercial mixed poultry mashes back yard poultrymen often followed the practice of feeding carp as a supplement to the grain and table scrap diet of the chickens during winter months. The carp was boiled until the flesh was tender then hung on the wall of the poultry house for the chickens to pick at.

Since the feeding of balanced diets has become the accepted practice only a limited amount of meal has been made from carp for the feeding of livestock.

At the present time, carp is found in an estimated 100,000 acres of warm water within the boundaries of Utah. With an estimated annual harvest of 400 pounds of carp per acre and with fish meal prices ranging from $150 to $200 per ton there is a definite possibility of developing an industry that would be valued at several thousand dollars annually.

Since the feeding value of carp meal had not been reported, an investigation was initiated to determine its value when fed as the only protein supplement and when fed in combination with soybean oil meal.

How the Chicks Were Raised

Thirty-two lots of ten New Hampshire chickens were raised in comparable battery pens to sixty-one days of age.

A basal diet, consisting of ground grains, mineral, vitamin, and antibiotic supplement feeds, was mixed in sufficient quantity to supply approximately 70 percent of the experimental diets.

The experimental diets consisted of portions of the basal diet plus a fish meal or a combination of fish meal and soybean oil meal protein concentrate. Herring, tuna, menhaden, and carp meal were included alone or in combination with soybean oil meal as the protein supplements. The first three fish meals were selected to make a comparison with carp meal because they are commercial fish meals used in large quantities. Herring fish meal is used extensively by Utah feed mixers and is recognized as top quality fish meal.

All rations contained about 20.8 percent protein and adequate levels of calcium and phosphorus.

Carp Meal is an Excellent Feed

The average weight of four replicate lots of New Hampshire chicks at sixty-one days of age is shown in fig. 1. When fish meal supplied the only supplementary protein, the average chick weight ranged from 2.52 pounds for the menhaden fish meal groups to 2.83 pounds for the herring fish meal groups. The lots of chicks fed commercial Utah carp meal made gains in weight equal to the lots fed herring fish meal and they grew faster than the lots fed tuna and menhaden fish meal. All lots fed a combination of the two protein concentrates grew faster than those fed only fish meal as the protein concentrate.

The gains per pound of feed consumed are shown in fig. 2. The lots of chicks fed carp meal had a feed conversion factor equivalent to those fed herring or tuna fish meals and better than the lots fed menhaden fish meal. With the exception of the menhaden fish meal lots, all lots fed fish as the only protein con-
centrate had a better feed conversion factor than those fed the combination of protein supplements. The high fat level in fish meals would be expected to improve feed conversion.

The heavier weights of the chicks fed the combination protein supplement was undoubtedly a result of greater feed consumption as the lots fed only fish meal had a better feed conversion factor.

Thus the results of this investigation establish the feeding value of carp meal to be equal to or better than fish meals sold on the open market.

**Production of Carp Meal Still a Problem**

The economic problems connected with mass production of this fish meal must be investigated further. Of considerable importance is the amount of fish oil that can be recovered in the processing operation and the problems of purifying and marketing.

The amount and vitamin content of the oil are of major importance in the economy of processing the carp into meal.

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**ALKALI BEES**

*(Continued from page 24)*

be caused by overirrigation, or abnormally high rainfall. Destruction by ploughing, ironically enough, may be caused by the high yields which the bees bring about. When yields and prices are favorable, the grower, in his anxiety to place more land under cultivation, "destroys the goose that lays the golden egg."

Damage to nesting sites by excessive seepage moisture rarely has been observed. However, in one site near Flowell, Utah, and in several near South Pavilion, Wyoming, areas within nesting sites have become so moist that free water can be squeezed out by hand. This condition results in extremely late emergence of the bees and a general avoidance of the spot by nesting adults. In the cases observed at Riverton plenty of suitable areas remains around the wettest zones and it would probably be a mistake to attempt to reduce the moisture supply.

Drying of the soil in the nesting sites is the most common cause of nesting site abandonment. It is directly associated with drainage and irrigation practices and generally results from (1) construction of drainage ditches, (2) lining of irrigation ditches, or (3) drought. In the flat areas around Delta, Utah, a rising water table made necessary an extensive system of drainage ditches. However, as a result of these drains, the nesting sites were limited to a few remaining areas where deep confined water built up artesian pressure, upward ground water flow, and waterlogged overlying clays. The establishment and use of drainage pumping systems to eliminate the remaining seeped areas, would probably come close to eliminating the alkali bee as an important factor in the pollination of alfalfa.

**Effect of Efficient Irrigation on Nesting Sites**

Alkali bee areas around Wapato, Washington, Riverton, Wyoming, and the Uinta Basin in Utah are principally on low benches where waterlogging is caused by an underlying hard pan. Here, water in the seeped areas is derived principally from unlined irrigation ditches and canals a short distance away on higher ground. The seepage water is augmented periodically by deep percolation from fields under irrigation. In the Riverton area water loss through the sandy canal beds is unusually high and a ditch-lining program is under
way. In 1954 several formerly populous nesting sites were observed in which, as a result of ditch lining, the soil had become nearly dry and the alkali bees had declined or disappeared. If the trend continues, it may be only a question of time until alkali bees no longer exist in useful numbers and growers in the area give up production of alfalfa seed.

It is apparent that the making of proper recommendations for the preservation of alkali bees is a delicate matter. Where the water table under a large area rises to damaging heights, drainage is probably justified even if it means losing most of the alkali bees. However, within a large territory needing drainage, it might be feasible to set aside and preserve certain undrained areas known to harbor bees. In the case of seed-producing areas like those near Riverton, Wapato, and the Uinta Basin, complete ditch lining would almost certainly result in smaller rather than larger farm incomes.

Compromises Needed

There is an obvious conflict between efficient water management, and the preservation of optimum nesting condition for alkali bees. Compromises resulting in some sacrifice of water and tillable land will probably work to the advantage of seed growers. In planning such a program, farm advisors, reclamation engineers, and growers must keep in mind that in an alfalfa seed area the yearly return from an acre of ground supporting a dense population of alkali bees is many times that from an acre of the best farming land, and will more than offset the loss of many acre feet of irrigation water.

PROFITS IN POTATOES

(Continued from page 25)

Total labor required in producing potatoes varies with size of enterprise; and labor required for harvesting operations varies with yields. Total labor decreased from about 86 man hours per acre to about 55 as average size increased from 2.6 to 19.2 acres. Hours of labor per acre for harvesting operations increased consistently as yields increased; however, time required in harvesting operations decreased from 22 man hours to .16 man hours per hundredweight as yields increased from 101 to 273 hundredweight per acre.

Hired labor accounted for 47.1 percent of the total used in producing potatoes during 1953. It accounted for 81.4 percent of the total harvesting labor.

Power cost includes cost of tractor, truck, and horsepower used in producing potatoes. These costs amounted to $34.68 per acre or 18.6 percent of total cost of producing potatoes.

Principal requirements for power for potato production in 1953 were supplied by tractors. Tractor use averaged 13.6 hours per acre for all farms studied. Trucks were used for an average of 3.0 hours per acre, of which 2.6 hours were for hauling potatoes at harvest time.

Overhead Costs Were 15 Percent of Total Costs

Overhead costs amounted to $27.77 per acre or 14.9 percent of the total cost of production. These included interest on fixed capital investments, interest on money invested in the crop, building and equipment repairs and depreciation, and taxes on land, water, and drainage. Interest on fixed capital was the largest item of overhead cost, accounting for 9.4 percent of the total cost of production. Taxes on land, water, and drainage together accounted for 4.0 percent of the total cost of production.

Cost of Materials Amounted to a Third of Total Costs

Material costs amounted to $58.32 per acre or 31.3 percent of the total cost of production. These included the cost of fertilizer, manure, seed potatoes, sacks, chemicals, fees, and miscellaneous materials. Cost of seed potatoes was the largest material cost, accounting for 22.3 percent of the total cost of producing potatoes. Manure and fertilizers together accounted for 7.1 percent of the total.

Bliss and Pontiac Grown Most Widely

Bliss and Pontiac potatoes were the most common varieties grown in Cache, Box Elder, Weber, Davis, and Utah Counties. Preference was shown for the Russet variety in Millard, Iron, Sevier, Piute, and Garfield Counties. Four other varieties; Mesabi, White Rose, Kennebec, and Cobbler, were also produced on a few enterprises.

Advantages of Combine Harvesting

Data collected were analyzed to see what advantage, if any, there may be in using combine potato harvesters instead of harvesting by the methods that have been in use for many years. The 13 enterprises on which combine potato harvesters were used were compared with 30 enterprises similar in size and yields, and using conventional harvesting methods. That comparison indicated an average savings per acre of 6.0 man hours of labor, .5 tractor hours, and 1.7 truck hours on enterprises using the combine harvesters. Total harvesting costs were $45.17 per acre or $.24 per hundredweight for enterprises using the combines compared to $56.37 per acre or $.29 per hundredweight for enterprises using other harvesting methods.

Yields, Amount of Labor, and Size of Enterprise Most Important Factors in Financial Success

Of various factors associated with successful production of potatoes, yield per acre, efficient use of man labor, and size of enterprise as measured in acres of potatoes were the most important. Efficiency in these three factors is most conducive to economical production. A consistent association between yields per acre and cost of production was indicated. Yields ranged
from 12 to 300 hundredweight per acre. Average yield was 169 hundredweight. As average yields increased from 101 to 273 hundredweight per acre, cost of production decreased from $1.45 to $0.83 per hundredweight. All costs of a fixed nature were lower per hundredweight on a high than a low yielding crop because of the larger number of units to share the expense.

Apparently judicious and effective use of man labor in preharvest operations is important to success of the enterprise. Labor used in preharvest operations is a principal cost item that can be varied independently of other factors as the operator desires. Preharvest man labor ranged from 9.4 to 97.0 hours per acre. As average preharvest labor use increased from 19.9 to 59.2 man hours per acre, costs of production decreased from $1.37 to $1.44 per hundredweight. Preharvest manhours increased from .12 to .34 man hours per hundredweight between these two groups, indicating that yields did not increase proportionately with increased labor expended.

Labor used per acre in harvesting operations tended to be proportionate to yields, however, as yields increased harvesting labor per hundredweight decreased.

The 130 potato enterprises were from 1.0 to 35.0 acres in size. As average size of enterprise increased from 2.6 acres to 19.2 acres, cost of production decreased from $1.37 to $1.01 per hundredweight. Labor, machinery, materials, and overhead costs all tended to decrease as size of enterprise increased. Production was either more efficient on larger enterprises, or many unnecessary costs were incurred on smaller enterprises.

Efficiency in all three factors just described resulted in most economical production. Performance was average or better in all three factors on 14 enterprises. Average cost of production for this group was $0.85 per hundredweight. Twenty-nine enterprises were below average in all three factors. Average cost of production for these enterprises was $1.90 per hundredweight.

Better than average yields appeared to be the most important consideration in achieving low unit cost of production, with effective use of labor second, and size of enterprise next in importance.

### LOW COUMARIN SWEETCLOVER

*(Continued from page 33)*

Complexity of types will be chosen desirable plants (Fig. 4) with a biennial habit of growth and low-coumarin content. Several generations may be required to stabilize types and produce seed for farm use.

**Annual Sweetclovers**

Annual white sweetclovers with low-coumarin content are also desired. To obtain these the available high-coumarin annual white sweetclover varieties such as Humb and Emerald will be crossed with the desirable low-coumarin biennial plants now on hand. Crossing will be done in two ways, first by hand in the greenhouse and second by bees in the field.

Two final products should emerge from this program, first a biennial sweetclover of low-coumarin content and, second an annual white sweetclover of low coumarin content. Several different lines in each will probably result which will be tested for yielding ability and tolerance to saline and wet soil conditions. Only the best will be released for farmers’ use.

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**FOR JUNE 1955**
and cereals, milk, and cheese, and other vegetables and fruits were the other groups using 13 percent or more of the food dollar.

Actual food consumption was compared to recommended food consumption figures in table 2. Green and leafy vegetables measured by pounds per week were somewhat low. However, the vitamin A intake of the diet was adequate. The vitamin A in the liver, whole milk, butter, margarine, and yellow fruits made up for any deficiency in intake of green and yellow vegetables. The amount of meat, fish, or poultry was also low compared to that recommended. Nevertheless, the protein intake when calculated was fully adequate. It was met by the use of milk, peanut butter, cheese, eggs, and dry beans in addition to the meat. All other food groups were used in adequate amounts.

When the actual nutrient content of the diet was calculated, results show that this couple were receiving adequate amounts of all nutrients. The average daily nutrient intake was as follows: 3061 calories, 101 grams of protein, 376 grams of carbohydrates, 137 grams of fat, 1.3 grams of calcium, 16 milligrams of iron, 14,588 I. U. of vitamin A, 1.9 milligrams of thiamine, 2.8 milligrams of riboflavin, 22 milligrams of niacin, and 133 milligrams of ascorbic acid. Figuring that the adult man in this experiment was receiving one-sixth more than the woman, each would still have adequate nutrients. The fact that this couple were maintaining their normal weights of 175 for the man and 120 pounds for the woman indicated that the caloric content of the diet was adequate.

The results of this dietary survey show that a young married couple can be adequately fed at a reasonable cost.

### Table 1. Division of food dollar according to food groups

<table>
<thead>
<tr>
<th>Food group</th>
<th>Food dollar</th>
<th>Cost per person per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>percent</td>
<td>dollars</td>
</tr>
<tr>
<td>Milk, cheese</td>
<td>19</td>
<td>.83</td>
</tr>
<tr>
<td>Eggs</td>
<td>5</td>
<td>.22</td>
</tr>
<tr>
<td>Potatoes</td>
<td>1</td>
<td>.04</td>
</tr>
<tr>
<td>Leafy, green, and yellow vegetables</td>
<td>8</td>
<td>.33</td>
</tr>
<tr>
<td>Citrus fruits &amp; tomatoes</td>
<td>4</td>
<td>.16</td>
</tr>
<tr>
<td>Other vegetables &amp; fruits</td>
<td>13</td>
<td>.55</td>
</tr>
<tr>
<td>Meat, fish &amp; poultry</td>
<td>15</td>
<td>.66</td>
</tr>
<tr>
<td>Dry beans &amp; peas, nuts</td>
<td>5</td>
<td>.22</td>
</tr>
<tr>
<td>Baked goods, flour &amp; cereals</td>
<td>14</td>
<td>.61</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>9</td>
<td>.36</td>
</tr>
<tr>
<td>Sugar, sirup, preserves</td>
<td>6</td>
<td>.25</td>
</tr>
<tr>
<td>Condiments &amp; spices</td>
<td>1</td>
<td>.05</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>4.28</td>
</tr>
</tbody>
</table>

### Table 2. Actual food consumption compared to recommended food consumption for one week

<table>
<thead>
<tr>
<th>Food group</th>
<th>Recommended</th>
<th>Actual consumption</th>
<th>Recommended</th>
<th>Actual consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk, qts.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Eggs</td>
<td>6-7</td>
<td>7</td>
<td>6-7</td>
<td>6</td>
</tr>
<tr>
<td>Potatoes, lbs.</td>
<td>3-5</td>
<td>3¾</td>
<td>2-3</td>
<td>2</td>
</tr>
<tr>
<td>Leaf, green and yellow vegetables, lbs.</td>
<td>3¾-4</td>
<td>2%</td>
<td>3¾-4</td>
<td>2%</td>
</tr>
<tr>
<td>Citrus fruits &amp; tomatoes, lbs.</td>
<td>2¾-3½</td>
<td>2¾</td>
<td>2¾-3</td>
<td>2%</td>
</tr>
<tr>
<td>Other vegetables and fruits, lbs.</td>
<td>3-4</td>
<td>4½</td>
<td>3-4</td>
<td>4½</td>
</tr>
<tr>
<td>Meat, fish, and poultry, lbs.</td>
<td>3-3½</td>
<td>1%</td>
<td>2¾-3</td>
<td>1%</td>
</tr>
<tr>
<td>Dry beans, peas, nuts, lbs.</td>
<td>¼</td>
<td>¼</td>
<td>¼-1½</td>
<td>¼</td>
</tr>
<tr>
<td>Baked goods, flour, cereals, lbs.</td>
<td>3-7</td>
<td>5</td>
<td>2-4</td>
<td>2</td>
</tr>
<tr>
<td>Fats and oils, lbs.</td>
<td>1-2</td>
<td>1%</td>
<td>1-½</td>
<td>1%</td>
</tr>
<tr>
<td>Sugar, sirups, preserves, lbs.</td>
<td>1-1½</td>
<td>1½</td>
<td>½-1</td>
<td>1½</td>
</tr>
<tr>
<td>Woman</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### LAND USE CHANGES

(Continued from page 27)

counties averaged 32.1 acres of such land. Dividing the total irrigated land, 16,561 acres, by 32.1 indicates the equivalent of 519 average irrigated farms were lost to agriculture. Most of this change has taken place since 1942.

Of the total of 27,545 acres lost to agriculture, 92.5 percent or 25,491 acres has been surveyed and classified by soil technologists. Of the acreage classified, 23.4 percent was class I land. This means that for general crops it is the best to be found anywhere in the state. Another 23.1 percent was class II, and 17.6 percent was class III. Thus 64.1 percent was land definitely suitable for general crop production. In addition 4.0 percent was placed in class IV suitable for orchard production, and 6.2 percent as IV of questionable suitability for general crops. The balance, 25.7 percent, was suitable only for grazing purposes. For the entire state it has been estimated on the basis of all lands classified that not more than 6.0 percent is suitable for crop production. This is made
up of 1.0 percent class I, 3 percent class II, and 2 percent in class III. It is further estimated that much of this will never be used for arable crop production because of lack of water. From the long time point of view the land being taken from agriculture is a scarce resource and one that can not be replaced.

Approximately half of the 27,545 acres taken from agriculture is now used for residential purposes. This includes, in many cases, garden plots as well as landscaped yards, and in some cases there may be enough agricultural use to qualify as part-time farms but the dominant use in all cases is residential. Approximately a fifth serves industrial and commercial purposes and slightly less than a third is in military reservations.

Of the land lost to agriculture about one-third was within an incorporated town or city but was being used for agricultural production. The remainder was in unincorporated areas. Residential use accounts for about 80 percent of the land which changed in use in the incorporated areas. The other 20 percent was commercial and industrial. All the military and most of the industrial developments have taken place outside incorporated areas.

As more and more people earn their living by working in factories or in commerce or services, it is inevitable that concentrated residential areas—cities—will have to be expanded. It probably is inevitable and desirable that some of the expansion should be onto lands used for agriculture. It is also probably that whenever this type of expansion occurs, problems of considerable magnitude and importance are closely associated with it.

Some problems associated with such developments are physical, some social, some economic, some institutional, and most are a combination of all four. More specifically, there are problems associated with the displacement and uprooting of farm families, the loss of farm produce and farm income, idle farms or parts of farms that grow up to weeds, reduced efficiency of some remaining farms, social and economic conflicts between the old established and the new land users, financing of the additional facilities made necessary by the new developments such as domestic water supplies, sewage disposal, schools, roads, and sidewalks, organization and control of developments to protect the health, safety, and property values of old and new residents, and still protect the freedom and rights of property owners.

Is it Necessary?

Many people in Utah and elsewhere are much concerned about the expansion of urban and industrial uses at the expense of good farmland. They ask, "Is it necessary?" In these 4 counties of Utah, there are more than 24 million acres of land. Of this, less than 10 percent is, or probably ever will be, good irrigated cropland. Good irrigated cropland is a resource that is definitely limited. Not all of the other 90 percent is suitable for urban use but it has been suggested that with proper planning there is much more than enough to accommodate any foreseeable expansion. Much of the other area when developed would be more desirable than the farm land being used. If the good land now in agriculture could be saved for that use without unduly restricting other desirable developments, it would be a great contribution to the people of Utah. There are ways to do it.

MILK IN THE SCHOOL LUNCH

(Continued from page 31)

milk drank in school the day before should have been better flavor.

The school cooks were asked to recall the number of times poor quality milk was delivered and served during the school year. It was apparent that schools are not often delivered poor quality milk, but that it does occasionally happen. Thirteen schools reported they had had poor quality milk delivered once during the school year. Three schools reported it had happened to them twice and one school three times, one school four, and another eight. More than 78 percent of the school cooks said no poor quality milk had been delivered to their schools during the year.

There was little criticism of quality of service provided by the dairy. The dairies, according to the school cooks, are doing a generally good job. The cooks were asked to list specific ways in which the dairy should improve its service. Of the cooks replying to the question in 87 schools, 71 or 85 percent of them had no criticism to make. Six stated the milk should be delivered at a different time—generally closer to serving time, so the milk would not become warm. Two said the dairy should bring colder milk, and 2 said the bottles and cases were dirty. Six made general or miscellaneous criticisms.

Table 4. Relation of time between placing milk on serving counter and consumption and temperature at highest reading, 90 schools, Utah, 1953-54

<table>
<thead>
<tr>
<th>Time interval</th>
<th>Number schools</th>
<th>Average temperature towards end of meal</th>
</tr>
</thead>
<tbody>
<tr>
<td>No time interval</td>
<td>5</td>
<td>42°F</td>
</tr>
<tr>
<td>Under 0.5 hours</td>
<td>16</td>
<td>45°F</td>
</tr>
<tr>
<td>0.5-1.0 hours</td>
<td>35</td>
<td>48°F</td>
</tr>
<tr>
<td>1.0-2.0 hours</td>
<td>28</td>
<td>49°F</td>
</tr>
<tr>
<td>2.0 hours and more</td>
<td>6</td>
<td>56°F</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>48°F</td>
</tr>
</tbody>
</table>
ASペン CUTTING

(Continued from page 29)

Ground show promise of being most expedient means of establishing grass. On clear-cut plots, grass seedlings from 6 to 8 inches high were produced by the end of the first season and, by the end of the second year, these plants attained heights up to 6 feet and produced large quantities of seed.

Grass seedlings in uncut stands made growth from 2 to 3 inches during the first year and up to 6 inches by the end of the second season. Seedling survival was estimated to be one-third as great as on clear-cut range.

Grass establishment in aspen that had been thinned 50 percent was slightly better than in uncut stands. Native browse, forbs, and grasses on clear-cut range were greatly stimulated and in places dominated introduced species.

Grass species that have shown the greatest promise are various strains of orchardgrass (Dactylis glomerata), smooth bromegrass (Bromus inermis), intermediate wheatgrass (Agropyron intermedium), and tall oatgrass (Arrhenatherum elatius). Other grasses, showing some promise, include mountain bromegrass (Bromus marginatus), Kentucky bluegrass (Poa pratensis), and slender wheatgrass (Agropyron trachycaulum).

Orchard grass has done especially well. Shade, tolerance, and the ability to establish rapidly on clear-cut and other open sites have been demonstrated. Intermediate wheatgrass established well in the open areas. Tall oatgrass established early in most sites. Smooth bromegrass has been slower in establishing under all conditions but has produced vigorous plants by the end of the second year.

Problems that are still unanswered and that should be investigated include:

1. A study of the effects of cutting on water yield. Reports from studies on other areas have shown that under some conditions water yields can be increased from 30 to as much as 67 percent.

2. A means of controlling aspen reproduction following cutting. Controlled grazing following grass establishment is one method suggested by preliminary studies on this area and other forested pasture lands of the world. Selective herbicides to destroy mature trees or control reproduction should be further investigated.

3. A study of the economy of replacing aspen with grass.

4. The effects of aspen cutting on the cover and feed supply for deer and other wildlife.

The Utah Turkey Federation has contributed $9,200 to the research project on the control of staphylococcosis in turkeys. Part of these funds were contributed by the Utah Feed Manufacturers' Association, $1,500 by the Moroni Feed Company, and part by individual members. In addition the Moroni Turkey Hatchery and the Barlocker Hatchery furnished 3,000 turkey poults. Utah Poultry and Farmers Cooperative will furnish the feed.