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ALFALFA HAY OR SILAGE?

Does it pay dairy farmers in Utah to ensile their alfalfa? Scientists at Utah State believe their studies give the answer to this question.

GEORGE E. STODDARD, CHARLES H. MICKELSEN, GEORGE Q. BATEMAN

Cows in Utah prefer their alfalfa as hay rather than as silage. They consume more nutrients, produce more milk, and maintain their weight better when fed hay than when fed silage. This was shown in a 3-year study at the Dairy Experiment Station of the Utah Agricultural Experiment Station.

The interest in alfalfa silage in the United States and other countries has been stimulated by the difficulty of curing forage crops for hay where the humidity and rainfall are high and furthered by the development of new harvesting machinery. Farmers in Utah have read articles in farm journals and other places recommending this practice of converting hay into silage. Many of them fail to consider that location, among other factors, may limit the recommendations.

Feeding Studies in 1954

To compare alfalfa silage with alfalfa hay as a feed for dairy cows, scientists at the Utah Station paired 16 cows as equally as possible and placed one of each pair on a ration in which the sole roughage was alfalfa hay. They gave the other member of each pair a ration in which the roughage was alfalfa silage. They gave all cows water,
Salt, and steamed bone meal free choice and grain according to production.

Beginning in December 1954, they fed cows the experimental ration for 133 days. Cows that received silage ate 60.9 pounds a day (table 1). This contained 14.3 pounds of dry matter. Cows that ate hay consumed 28.8 pounds containing 26.7 pounds of dry matter.

Cows fed silage produced an average of 25.0 pounds of milk (4 percent fat corrected) a day, those fed hay produced 29.0 pounds. Cows on silage lost an average of 165 pounds in the 133 days, those on hay lost only 7.5 pounds during the same period.

These results indicate that cows do not eat silage as readily as hay. They do not maintain milk production as well and they lose more weight.

<table>
<thead>
<tr>
<th>Table 1. Forage consumption, milk production, and body weight changes of cows fed alfalfa silage or alfalfa hay, 1954</th>
</tr>
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<tbody>
<tr>
<td><strong>Hay group</strong></td>
</tr>
<tr>
<td>Cow days</td>
</tr>
<tr>
<td>Milk per day, lbs.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Forage consumed per day, lbs.</td>
</tr>
<tr>
<td>Dry matter, lbs.</td>
</tr>
<tr>
<td>Average loss of body weight, lbs., 133 days</td>
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</tbody>
</table>

Salt, steamed bone meal, and water were always available; grain was fed in all groups according to production.

Starting in December, the feeding trial continued for 26 weeks. Researchers kept record of feed consumption, milk production, and body weights for a two-week period before and following the experimental feeding period. Feed eaten and milk produced by the three groups of cows are shown in figure 1. Whenever alfalfa silage replaced either corn silage or hay, it was not eaten as readily as the other two feeds. When hay and corn silage were put back into the ration, feed consumption increased.

Milk production for the groups is plotted in figures 1 and 2. The average daily production before and during the feeding period is shown in figure 1. Note that although group 3 (alfalfa silage + corn silage) was producing the most milk at the beginning of the study, the cows in this group produced the least during the experimental period. Milk production is plotted for the entire period in figure 2. Note that as alfalfa silage replaced either alfalfa hay or corn silage, milk production declined more rapidly.

There were essentially no differences in body weight changes among the three groups of cows in 1956.

The researchers concluded from this 3-year study that if milk production is to be maintained at a high level, alfalfa hay is essential for dairy cows when either alfalfa silage or corn silage makes up part

(Continued on page 97)
Several new peach varieties were recommended for Utah peach areas by fruit growers, canners, county agricultural agents, and university horticulturists at the Howell Field Station near Ogden, Utah, this summer. Approximately 75 people sampled and evaluated 100 varieties of peaches on field days in August and September. The hundred varieties evaluated represented the better selections from 200 grown on the experimental fruit farm. The test was set up to eliminate the less desirable varieties of the many offered for sale by nurserymen all over the United States. The following varieties were selected by the panel of judges and are recommended for Utah conditions:

Canning and Shipping Peaches (yellow fleshed)

The earliest peach of this group is the RED HAVEN which ripens about August 7 at the Howell Field Station. It is an attractive peach, coloring several days before it is ripe. It is firm and a freestone when it is ripe but tends to cling if picked too green. The tree sets a heavy crop of fruit which must be adequately thinned to give good size (2¾ to 2½ inches) to the fruits which are left. The flesh is red around the pit, slightly stringy, and of good quality.

JULY ELBERTA ripens about August 24. It has a dark to medium red blush over an orange-yellow ground color. It is moderately attractive, 2¾ to 2½ inches in size. The flesh is medium yellow, slightly red around the pit, stringy, juicy, moderately firm, and of good quality. It is a freestone.

SUNHICH, which ripens about August 28, has an attractive fruit with a red blush over a yellow ground color. The halves are sometimes unequal and the flesh is light yellow with red around the pit. It is a freestone, 2¾ to 2½ inches in size, slightly stringy, juicy, and of good quality.

EARLY ELBERTA (Gleason or Lemon), which ripens about September 10, is an old and well-known variety. It has a moderately attractive fruit, 2 to 2¾ inches in size, with a dull red blush (10-40 percent) over a lemon yellow ground color. The flesh is yellow with red around the pit, slightly stringy, juicy, and of good quality.

JOHNSON EARLY ELBERTA ripens about September 12, and has a moderately attractive fruit, 2 to 2¾ inches in size, with dull red (50 percent) over yellow orange ground color. It colors well before it is ripe. The flesh is yellow with red around the pit and is quite firm. This peach is fair to good in quality.

REDSKIN ripens with Elberta about September 15. It has an at-tractive, 2¾ to 2½ inches in size, with a dull red blush (10-40 percent) over a lemon yellow ground color. The flesh is yellow with red around the pit, slightly stringy, juicy, and of good quality.

Seven varieties chosen by panel of experts as best for growing in Utah for canning and shipping

<table>
<thead>
<tr>
<th>PEACH VARIETIES AND THEIR CHARACTERISTICS</th>
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<tbody>
<tr>
<td>Variety</td>
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<tr>
<td>---------------</td>
</tr>
<tr>
<td>Mayflower</td>
</tr>
<tr>
<td>†Early East</td>
</tr>
<tr>
<td>Erli-Red-Fre</td>
</tr>
<tr>
<td>†Starking Delicious</td>
</tr>
<tr>
<td>*Red Haven</td>
</tr>
<tr>
<td>Raritan Rose</td>
</tr>
<tr>
<td>Fair Haven</td>
</tr>
<tr>
<td>Golden Jubilee</td>
</tr>
<tr>
<td>†Stark #751</td>
</tr>
<tr>
<td>*July Elberta</td>
</tr>
<tr>
<td>*Sunhigh</td>
</tr>
<tr>
<td>Triogem</td>
</tr>
<tr>
<td>Golden East</td>
</tr>
<tr>
<td>*Early Elberta (Lemon)</td>
</tr>
<tr>
<td>*Johnson Ea. Elberta</td>
</tr>
<tr>
<td>*Redskin</td>
</tr>
<tr>
<td>*Rio Oso Gem</td>
</tr>
<tr>
<td>*Commercial and shipping varieties</td>
</tr>
<tr>
<td>†Roadside and local market varieties</td>
</tr>
<tr>
<td>W—white-fleshed</td>
</tr>
<tr>
<td>Y—yellow-fleshed</td>
</tr>
</tbody>
</table>
tractive fruit with bright to dull red over an orange-yellow ground color. The flesh is medium yellow with a red tinge around the pit. It is stringy, juicy, slightly strong flavored, and good in quality.

RIO OSO GEM ripens about September 20. It has a light red blush over a yellow ground color. The halves are somewhat unequal and the fruit may be considered "rough looking," i.e., it is not smoothly round. The flesh is yellow with red at the pit and is very firm. The quality is good. The tree is not as vigorous as many other varieties.

Roadside and Local Market Peaches
(yellow fleshed)

All of the peach varieties listed in the canning and shipping group are included in this group. The earliest peach of this group is the EARLY EAST which ripens about July 25 at the Howell Field Station. Others of this group with their approximate dates of ripening are: STARKING DELICIOUS—August 3, FAIR HAVEN—August 14, and STARK #751—August 21.

Peaches for the Backyard
(yellow fleshed)

The three varieties of this group with their approximate dates of ripening are: GOLDEN JUBILEE

(Continued on page 100)
To make money in dairying a dairyman should have a minimum of from 25 to 30 high producing cows and qualify as a grade A producer.

Fig. 1. Division of costs of producing a pound of butterfat. The major cost is feed; operator and family labor is second. Dairying furnishes the farm operator an opportunity to sell his feed crops at market prices and employ himself and members of his family. If he adopts efficient methods his labor return will be as good or better than going wages.

**EARNEST M. MORRISON**

**Dairying a Profitable Business**

If you are a dairyman at heart and have facilities that can be reasonably well adapted to dairying you can make money in the business. You will make money if you qualify as a grade A producer, keep a minimum of from 25 to 30 cows, and maintain production per cow of at least 350 pounds of butterfat.

**Survey of 182 Milking Enterprises**

These statements are based on a study we made of milking enterprises on 182 farms in Cache and Sanpete Counties in the winter of 1956-57. We checked records of 61 dairy farms in Sanpete County and 121 in Cache County. In Cache County 73 were from grade A producers and 48 were of producers of manufacturing milk. Our study included only the milking enterprise. This means we charged the enterprise for each heifer that freshness at market value. We credited the enterprise for a sale whenever a cow was sold. We credited the enterprise for the value of a five-day-old calf according to...
its quality. We did not concern ourselves with the problems of raising replacements but do have replacement costs or herd maintenance costs included in our study.

Costs, Receipts, and Net Returns

We were interested primarily in finding total costs, receipts, and net returns from dairying. We also wanted to know what was associated with financial success in dairying.

In order that a producer might know what his costs were, we made a charge for everything that was required for production no matter who supplied it. All feeds, for example, were charged at market price at the farm whether grown on the farm or purchased. We credited the labor of the operator and his family at $1.10 per hour. We charged interest on all money invested in the dairy unit at 5 percent per annum for real estate capital and 6 percent for all other.

We included five items as receipts:

1. value of the milk sold,
2. farm market value of milk fed on the farm or used in the home,
3. value of the calf at five days of age,
4. value of manure calculated on the basis of fertilizer elements, and
5. total increase in inventory value where it existed.

With total receipts and expenses as we have listed them, we can measure returns in several ways. If we subtract total expenses from total receipts, the net return was $6.00 per cow or $.02 per pound of butterfat produced. This means that receipts were enough to pay all charges as we have itemized them, including the operator’s labor, market price for all feed he furnished, and a going rate of return for his capital, and leave him a margin of $6.00 per cow.

If we are interested in finding the return to the operator for his and his family labor from the milking enterprise, then we could add all expenses as we have listed them, except operator and family labor and subtract this total from receipts. This gives $93.00 per cow or $.27 per pound of butterfat produced. This means family labor earned $1.16 per hour.

If we assumed that the operator owned all the capital debt free and wished to find the return for family labor and capital, we would not allow a charge for these items as expense. The return was $128.00 per cow or $.37 per pound of butterfat.

On the cost side feed accounted for 46 percent of total cost; labor, 21 percent; interest on investment, 8 percent; hauling charges, 6 percent, and depreciation and repair of buildings and equipment, 5 percent. These five items accounted for 86 percent of total cost.

The detailed listing of all receipts and expenses is given in table 1. These are for an average of 24.5

(Continued on page 97)
How water moves in soil

These pictures may upset your preconceived notions of how soils absorb water

STERLING A. TAYLOR

Whenever irrigation water is applied to soil it moves downward and laterally to restore the soil moisture that has been removed by crops. It has taken many years of research by soil scientists to learn how fast this water moves and what causes it to move as it does.

A model consisting of a thin tank containing a glass front has been constructed at Utah State. Soils of different textures and structures have been packed in this model to represent situations that occur naturally. Water has been applied to the soil in a V furrow at the surface to indicate some principles of water movement. The "wetting front" is clearly visible behind the glass. The position of the "wetting front" at different time intervals following the application of water was marked on the glass and the photographs taken.

Photographs indicating some of the more interesting situations of water movement in soil are reproduced here. Studying them, irrigators may be led to change some of their practices.

A marked change in soil texture, such as gravel, sand, or clay underlying a loam will retard drainage.

A. Note that water penetrates the loam uniformly both laterally and vertically until the wetting front reaches the sand.

B. It will not enter the sand from the loam, but will accumulate in the loam until sufficient water is applied to nearly saturate the soil at the junction of sand and loam, then it will leak through at some point and move rapidly downward, as in

C. leaving much of the sand dry. The loam immediately above the sand is nearly saturated.

Water moves uniformly in loam until the soil is wetted laterally, as in A. Then it moves downward more rapidly between the furrows until the underlying clay is reached, B. Unlike sand, water penetrates clay even though it is held at high tensions, but the rate of penetration is retarded.
Water applied simultaneously to loamy fine sand and to fine loam moves more rapidly in the coarse soil while it is being applied as shown by the boundary line a. After the water source is removed, the movement in the fine loam increases and that in the loamy fine sand decreases until they are about equal in the interval a-b. As the drainage continues into dry soil and the forces retaining water continue to increase, the movement in the fine loam is greater than in the coarser soil.

Furrows should be spaced close enough that water will penetrate laterally and moisten all across the ridge before the wetting front reaches the moist soil below as shown in A. Water should be turned off at about the position of the wetting front shown by the broken line in B. After 48 hours of drainage, all except one little spot between the furrows was moist, this too was moist after 72 hours, indicating a good irrigation since only a negligible amount was lost by deep seepage.

Soils may contain a coarsely aggregated layer near the surface as a result of root action or tillage. This may be underlain by a fine or slightly compacted layer which is moist as seen in A. Water applied in furrows will move downward through the aggregated soil more rapidly than it will move horizontally as seen in B. Horizontal movement may be greatly increased on top of and in the fine soil of C, but this may not be sufficient to prevent moisture contact and deep percolation. If water is turned off as soon as moisture contact is made, there will be a continued moisture movement into the dry soil for 24 hours as shown by the line in D. During the next 24 hours there will be some additional movement, but there is a dry portion in the ridge that never becomes wetted even though much water is lost by downward penetration. Good irrigation practice requires closer spacing of furrows in these soils so that the water will wet the soil horizontally in the time it takes it to move downward to moist soil.

(Continued on page 100)
DAIRY farmers know far too little about the profitableness of individual cows on their farms and they are not doing much to inform themselves. This conclusion can be drawn from the fact that sound testing devices have been in operation for more than half a century and still less than 7 percent of the cows in the United States are in the Dairy Herd Improvement program where monthly production and feed data are provided (table 1). A few more operate under the owner-sampler system where dairymen take their own milk weights and samples. Utah has a better showing, but here only 12½ percent of the cows were tested for production in 1956.

Since that date, however, the number of cows in Utah on DHI has increased to 14,200 in September 1957 or 14 percent of all dairy cows. This represents more than 500 dairymen whose herds average 28 cows. The majority of dairymen in the state, however, still have no gauge with which to cull unprofitable cows or feed intelligently, nor do they have a basic guide for breeding better dairy herds.

Testing Initiated in 1906

A program for determining the milk and butterfat production of individual cows began in Michigan in 1906. The practice was intro-

Table 1. Average production of dairy cows in the United States and in Utah, 1956

<table>
<thead>
<tr>
<th>Number</th>
<th>Avg. milk prod.</th>
<th>Avg. f.b. prod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cows in United States</td>
<td>20,927,000</td>
<td>6,006</td>
</tr>
<tr>
<td>All cows in Utah</td>
<td>101,000</td>
<td>7,220</td>
</tr>
<tr>
<td>Cows on Dairy Herd Improvement, United States</td>
<td>1,406,306</td>
<td>9,718</td>
</tr>
<tr>
<td>Cows on Dairy Herd Improvement, Utah</td>
<td>12,673</td>
<td>10,243</td>
</tr>
<tr>
<td>Daughters in artificial breeding associations, United States</td>
<td>112,127</td>
<td>10,455</td>
</tr>
</tbody>
</table>

Fig. 1. Milk and butterfat records of 79 Holstein cows, Utah State University herd

LYMAN RICH and GEORGE E. STOODDARD

In the course of the chart, certain rates were adopted to be found in the Holstein breed. These rates are averages and constants, and they are based upon the best Holstein herds in the United States.

FARM AND HOME SCIENCE
duced in Utah at Richmond in 1910-11. In this early program a tester was hired to visit the farms monthly. It was first called “cow testing,” but since 1935 it has been known as “dairy herd improvement.” DHI associations have cooperated with the extension service of the land grant colleges from the beginning.

In some states dairymen take their own milk weights and samples to save expense. This is called the owner-sampler method.

Since both DHIA and owner-sampler testing were used by dairymen to test less than 10 percent of the cows in the United States the Dairy Husbandry Research Branch of the U.S. Department of Agriculture introduced the Weigh-a-Day program in 1956. It was an attempt to reach the more than 90 percent of cows not now on test. Under this plan dairymen take milk weights for individual cows on or about the 15th of each month, and the data are compiled, not through organized associations, but through the county extension agent’s office. No butterfat tests are made.

Official reports at the close of the fiscal year June 30, 1957, show 3,008 herds had enrolled 60,508 cows in 605 counties in the United States on the Weigh-a-Day Month plan (WADAM). These milk weights form the basis of data to be used in culling, feeding, and selecting for breeding. While the results of weight-a-day are not yet available for the first year, data from various sources show considerable reliability of milk weights as a guide, particularly where only one breed is involved.

Evaluating Weigh-a-Day-a-Month Plan

As a basis for evaluating the use of milk weights in the weigh-a-day plan, a study was made of 79 Holstein records from the Utah State University dairy herd. These rec-

(Continued on page 99)
New mobile seed cleaner, designed to operate at the harvesting site

New facilities aid . . .

FOUNDATION SEED PROGRAM

WADE G. DEWEY

The production of foundation seed of wheat, oats, and barley by the Experiment Station has been facilitated through the recent development of a portable field cleaner and by the addition of several new storage units.

The mobile cleaner has been adapted from a stationary model 116B Clipper cleaner. The unit is gasoline powered, trailer-mounted, and is designed to operate at the site of the harvesting operation. The grain is augered directly from the combine to the hopper of the cleaner, and the cleaned grain is bagged and weighed as it leaves the cleaner. Adjustable jacks at the corners of the trailer support the unit and reduce vibration during operation.

DR. WADE G. DEWEY is assistant professor of agronomy. This is his second year as a member of the staff. He is a graduate of Utah State University and Cornell University.

A field of Brevor, a new soft white winter wheat, grown in the foundation seed program.
Cleaning and bagging grain in the field combine into one operation what normally constitutes several separate processes. This results in a considerable saving in time and labor, but more important it reduces the possibility of seed contamination which enters in during each step of the usual bagging, cleaning, rebagging procedure.

Three new 1000 bushel steel granaries at the Greenville Experimental Farm provide rodent and insect-free storage for the foundation grain.

A Cooperative Service

The production and maintenance of clean seed stocks constitute a cooperative service to the farmer carried out by the Agricultural Experiment Station at Utah State University and the Utah Crop Improvement Association. The Experiment Station is responsible for the production of foundation seed, whereas the Crop Improvement Association is concerned with the distribution of this seed to qualified growers and with the subsequent production of certified seed.

Foundation seed of a cereal variety traces back to single “true-to-type” heads selected from the purest seed stocks available. These heads are grown in individual rows; rows which appear to be “off-type” are discarded. Seed from the remaining rows is harvested and increased in foundation fields 1 to 3 acres in size. If at harvest time this seed meets stringent purity and germination standards, it is accepted by the Crop Improvement Association as foundation seed. This seed constitutes the source of the commercially-grown “registered” and “certified” seed.

Assurance in Certification

The over-all purpose of such a program is to make available to the farmer new varieties as they are released by the Station and to provide stock seed of the standard varieties that is genetically pure. Benefits which accrue to the farmer from the foundation-certification program are many fold. Seed bearing the certified label guarantees the grower a high percentage germination. This is reflected in better stands and higher yields. The certification tag also assures the grower of seed that is virtually free from noxious weeds and seed-borne diseases. Finally, certified seed protects the grower from contamination or mixture with inferior varieties. Much of the apparent “breaking down” of smut resistance, for example, in our improved grain varieties is actually due to contamination of seed stocks with inferior varieties of similar appearance.

Because of the time and labor involved in producing foundation seed, only 1 or 2 foundation fields are grown by the Experiment Station each year. During the past year a field of Brevor, a soft white winter wheat, and one of Alpine, (Continued on page 97)
This article describes the three species of dodder found most commonly on alfalfa in the seed producing areas of the state.

**Dodder in alfalfa**

Dodder is one of the most serious weed pests in alfalfa grown for seed.

In any eradication program, the first step is to recognize the weed and become familiar with its habits of growth. This article describes the species of dodder most common in alfalfa seed fields in Utah. An article in the next issue will discuss methods of control.

Dodder is a parasitic plant of the genus *Cuscuta*. It is a member of the Convolvulaceae or “morning glory” family. Common names that have been applied to dodder include lovevine, golden thread, strangle weed, hair weed, and bindweed.

Species of *Cuscuta* are found growing in all parts of the world; 158 species have been described. Only 42 species have been found in the United States. Most of the described species are parasitic to wild plants and weeds. However, a few have become adapted to our important crop plants, particularly legumes such as alfalfa.

The Intermountain Herbarium at Utah State University has dodder specimens collected from various parts of the state. One of these specimens dates back to 1879 when it was found growing in Salt Lake County. Before 1957 eight species had been classified in Utah. During the past summer three additional species were collected. It is likely that others will be found as the search continues. A collection made this summer in Millard County is a new species that has never been described or classified. Since it was found growing on a weed (dogfruit, *Lippina cuneifolia* Steud.) on
new land in central Utah, we do not know whether this new species will become a pest on alfalfa should it spread to land seeded to this legume.

Species Found in Alfalfa Seed Production Areas during 1957

Although several of the other species are capable of parasitizing alfalfa, only three were prevalent in alfalfa seed producing areas in 1957. They are: large seeded alfalfa dodder (Cuscuta indecora Choisy), small seeded alfalfa dodder (Cuscuta planiflora Tenore), and intermediate dodder (Cuscuta campestris Yuncker). Intermediate dodder is sometimes called field dodder, and will be referred to as such in this paper; however, some consider field dodder as Cuscuta pentagona. The designation of size has reference primarily to the seeds of the different species.

Prevalence in Seed Areas

The major seed producing areas of Utah are: Millard County which produces about 65 percent of the state's alfalfa seed, the Uinta Basin (Duchesne and Uintah Counties) which produces about 20 percent, and the two northern counties of Box Elder and Cache which produce less than 10 percent. Four other counties: Juab, Sanpete, Utah, and Kane also grow some alfalfa for seed.

In Millard County all three species of dodder are abundant. There were more individual plants of the small seeded dodder scattered throughout the alfalfa seed fields but large seeded dodder covered much larger areas within the fields. Field dodder was less prevalent than the others. However, there was more of it in the Millard area than the other seed areas of the state.

Large seeded dodder was the predominant species in the Uinta Basin. One field was so badly infested that practically every alfalfa plant was covered with dodder. Plants of small seeded dodder were scattered throughout some fields. Field dodder does not have as much

Botanical Differences

The three species of dodder have several botanical differences that are used to identify them. The more important characteristics are presented in figure 1.

Difference in growth habit: Small dodder blooms and matures seed earlier than either large or field dodders. The vegetative period of small dodder is much shorter and more confined to individual host plants than that of large and field
dodder. These latter two species make extensive vegetative growth, spread to many plants, and bloom later than small dodder. It may be that the date of emergence is similar for the three species and the difference in maturity is due to differences in the length of the vegetative period.

Seeds of large dodder under laboratory conditions and constant temperatures did not germinate below 40°F, and difficulty of getting small dodder seeds to germinate at all under laboratory conditions made it impossible to determine at what temperatures this species germinates.

Under field conditions seedling emergence in all three species must extend over a considerable period of time. After a small dodder plant blooms, it does not spread readily and attach itself to new host plants. While large dodder does not spread to new plants as readily as before bloom, it does spread more readily than small dodder. Plans are to study the dates of seedling emergence of the three species in 1958, since this may have an important bearing on control measures.

**Difference in bloom:** Plants of the 3 species of dodder when in bloom are easily distinguished from each other.

Each flower of the large and field dodder is on a stalk whereas flowers of small dodder do not have a stalk.

Flowers of small dodder are small—about the size of a pin-head—whitish, and appear in small compact heads about the same diameter as a lead pencil.

Flowers of large and field dodder are nearly the same size and about twice as large as flowers of small dodder. The stalks of large dodder flowers are generally longer than the flowers, whereas in the field dodder they are usually shorter than the flowers. This gives a more dense appearance of the flower clusters.

**Difference in capsule:** The capsules which contain the seeds are distinctly different in the three species. Those of small dodder are again the smallest being about the size of a radish seed. The capsule of small dodder breaks open in a definite band into two parts. It resembles the two parts of a sugar bowl—the lid and the bowl.

The capsules of small dodder are enveloped by the withered corolla. Capsules of large and field dodder are about the same size and about twice as large as those of small dodder. They break irregularly.

Capsules of large dodder are enveloped, as in small dodder, by the withered corolla. They have an enlargement at the tip. In field dodder the capsules are not enclosed by the withered corolla. There is no enlargement at the tip.

**Difference in seed:** Seeds of large dodder are nearly the same size as alfalfa seed, which makes them difficult to separate from alfalfa seed in cleaning.

Seeds of field dodder are slightly smaller than those of the large dodder. Variation in seeds causes overlapping in size in the two species and it is not possible to distinguish the two by seed size alone. Seeds of the two species are so nearly alike in other respects it requires a specialist to distinguish the difference.

Seeds of small dodder are so much smaller than those of the other two species that they are readily distinguishable.

**Some Host Plants of Dodder Trouble in Alfalfa Seed Fields**

Dodder species differ in their host range. Some are adapted to a wide range of plants while others are more specific. In 1957 small seeded alfalfa dodder was found growing only on alfalfa. Large seeded dodder and field dodder are much less specific. Field dodder has a wide range of host plants; it has been found growing on 69 species of plants. Plants that dodder was observed growing on in 1957 are listed in table 1. With such a wide host range of weeds commonly growing along fence rows, ditches, and in waste places throughout the state it appears the large seeded and field dodder will be a constant threat from seed produced by dodder growing on such plants.

(Continued on page 100)

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**Table 1. Host plants on which dodder species were found growing in Utah in 1957**

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Large dodder</th>
<th>Field dodder</th>
<th>Small dodder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>Medicago sativa L.</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Sweetclover</td>
<td>Mellotus spp.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostrate knotweed</td>
<td>Polygonum aviculare L.</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Field bindweed</td>
<td>Convolvulus arvensis L.</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td>Helianthus annuus L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russian thistle</td>
<td>Salsola kali L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gumweed</td>
<td>Grindelia squarrosa Dunal</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostrate spurge</td>
<td>Euphorbia glypotoesperma L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prickly lettuce</td>
<td>Lactuca serriola L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puncture vine</td>
<td>Tribulus torrestris L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cocksbeard</td>
<td>Xanthium spp.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ditch aster</td>
<td>Aster coerulescens DC.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proventry weed</td>
<td>Iva axillaris Pursh.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common mallow</td>
<td>Malva rotundifolia L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perennial ragweed</td>
<td>Ambrosia psilostachya DC.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bur sage</td>
<td>Franseria acanthca Cov.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tumble mustard</td>
<td>Sisymbrium altissimum L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smother weed</td>
<td>Bassia hyssopifolia Kuntze</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tumbling atropex</td>
<td>Atropex rosa L.</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halogoton</td>
<td>Halogoton glomeratus</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**FARM AND HOME SCIENCE**
Vibriosis in Sheep

M. L. MINER

Experiment stations of the Western States are pursuing fundamental studies that should lead to the control of this serious disease of sheep.

A costly reducer of the sheepman's lamb crop is vibronic abortion of sheep. Caused by microscopic comma-shaped bacteria, Vibrio fetus, the disease takes a toll of more than 1,500,000 dollars each year in the Western States. If a susceptible band of ewes becomes infected after the fourth month of gestation, abortion occurs at an accelerating rate until 10 to 70 percent of the ewes have aborted. Apparently such a herd of sheep becomes immune so that usually no losses occur the next year.

The disease is more serious when the ewes are concentrated in small areas as in shed lambing and in farm flocks. With more farm flocks and wider use of shed lambing the disease has increased to the point that in 1952 the National Woolgrowers Association became alarmed. Through its efforts research on this disease has been greatly increased in Colorado, Idaho, Montana, Utah, and Wyoming.

Little Known About Disease

Little was known about the disease except that a Vibrio organism was the cause and characteristic lesions were seen in the aborted lambs. Little was known about the Vibrio fetus organism which has a counterpart causing sterility and abortion in cattle. The means of spread of the infection, where the organism lived between outbreaks and between flocks, was the carrier a ewe or a ram, and methods of prevention and treatment were...
Having the Disease Confers Immunity

Experimental or natural ovine vibriotic abortion confers immunity to a ewe for at least one year. Thus, the year following an outbreak, a band of ewes will have no abortion resulting from *Vibrio fetus* infection. This does not necessarily mean that older ewes will not contract the disease as immunity is not the result of age, but of previous exposure.

From this evidence of immunity after infection it appeared likely that a vaccine could be produced. However, vaccines used experimentally to date have not conferred immunity. These results have led to a more concerted study of the nutritional requirements and chemical makeup of the organism which causes the disease. This should lead to the development of a product which will produce lasting immunity.

In the transmission of the disease, contaminated premises where abortions have occurred have been suspected as a source of infection. Yet the disease has not been experimentally reproduced from such premises. The organism has not been recovered from water or soil from premises so contaminated.

Experiments at Utah State

Experiments conducted last year at Utah State University showed that the infection could be spread from aborting ewes to susceptible ewes in the fourth month of gestation. Seventy percent of susceptible ewes in bands with aborting ewes aborted; 20 percent of susceptible ewes aborted when aborted infected fetuses were put in their pens, and 40 percent of susceptible ewes aborted in a pen in which the caretaker walked and worked after caring for aborting ewes.

This experiment clearly showed that the disease could be spread from an aborting flock to a clean one by persons with contaminated shoes and clothing or by vehicles. Sheepmen with susceptible flocks can help prevent vibriosis by strict sanitation in their flock and also can reduce losses by sanitary handling of an infected flock.

Experimentally the disease can be reproduced in ewes by force feeding material from aborted fetuses or by feeding hay contaminated with either aborted fetus material or cultures of the organism. Within a flock or between flocks when aborting ewes are present, this is probably the means by which the infection is picked up. Yet when no known vibriotic abortion is present, where does the infection come from or where does it stay from year to year? This question is receiving much attention at present.

**Ewe as a Carrier of Vibriosis**

This year at Utah State University, the role that the ewe may play as a carrier will be studied. In experiments elsewhere there is evidence from cultures of sacrificed ewes which were both artificially and naturally infected that the organism remains in the liver and gall bladder for at least 16 days. The experiment here will attempt to determine if the organisms are present at the time of lambing in ewes which had an abortion last year and in ewes which were artificially infected prior to breeding. Susceptible ewes and cultural methods will be used to test for the presence of the organism.

While much of the research effort has been aimed at finding ways and means of preventing the disease, methods of treatment to reduce the number of abortions in an infected flock are being explored. This past year antibiotics have been used in field cases. The results are inconclusive but encouraging, enough so that the work will be continued and broadened.

Since *Vibrio fetus* does not grow rapidly on artificial media, quite often other bacteria overgrow it, thus making it impossible to find. A cultural method is needed to make it possible to recover *Vibrio fetus* from any material in which it may be present. Basic research at the University is being conducted on the nutritional requirements, the physiology, and metabolism of the organism. This should lead to better cultural methods in recovering and identifying the Vibrio. These in turn may lead to the reservoir of infection or to a good vaccine.
Our Market for Alfalfa Seed

Survey shows that we must meet demand for certified seed of improved varieties of alfalfa and do a better selling job if we are to maintain and expand our alfalfa seed market.

Vernon L. Israelsen

Utah growers who want to remain in the alfalfa seed business must produce certified seed of new varieties and conduct an aggressive selling campaign to obtain and hold customers in the large markets of the East and Midwest where most of the alfalfa seed produced in Utah is sold.

Extension workers in the land grant colleges in the area in which Utah alfalfa seed is marketed are promoting the use of certified seed of varieties adapted to their area. Both they and the people in the trade emphasize the swing toward improved varieties. To get and hold a market, Utah farmers must supply the merchandise consumers want. Consumers, from all reports, are rapidly turning to certified seed. Competitors of Utah growers are fully aware of, and are responding to, that demand. Failure of the Utah producer to recognize these facts may mean disaster for his seed enterprise.

Study of the Market

A recent study of the present market for alfalfa seed made by the Utah Station shows that although Utah has been a leading producer of alfalfa seed for the last half century, the state has established no reputation for quality seed. Little or no effort has been made to build up repeat customers. Purchasers of seed were asked to report the number of years they had used Utah seed. Of 135 purchasers of seed from the 1954 crop, 54 said that this was their first purchase, 51 had made one or more previous purchases. Only 18 had used Utah seed three or more years; 7 had used it for five years or more. Two farmers in Ohio had used Utah seed for 20 years.

A large wholesaler in Illinois who handles alfalfa seed wrote that he
had been in the business for twenty years and no one had ever tried to sell him Utah-grown seed. Similar comments were made by other large operators who think that we have done a poor selling job. The statistics on "repeat customers" seem to confirm their opinions.

In this study, business reply cards were inserted in bags of alfalfa seed from the 1953 and 1954 crops going out of the state, inviting the purchaser to supply information on a half dozen questions. Four hundred and eighty-five cards were returned (table 1). Information was obtained on where and when the seed was purchased, the variety, and the prices paid.

Nearly 75 percent of the total volume of seed reported was certified seed; and only 8 percent non-certified. Buyers of the other 18 percent either did not know whether the seed was certified or failed to answer the question. Whereas only one pound in ten of seed shipped out of the state was certified, on reported purchases three pounds of every four were certified. From these facts we may conclude that only a small fraction of the uncertified seed shipped out of the state reaches the consumer in the original bag. When common seed was emptied and blended with other seed, some of the cards soliciting information were evidently lost or destroyed before they reached the consumer.

The most popular variety of seed sold was Ranger (table 2). About 70 percent of the certified Grimm was sold in Ohio. In Indiana Grimm outsold other certified varieties. Utah farmers preferred certified Ranger.

### Seasonal Movement and Prices

Prices received by Utah farmers for alfalfa seed increased each month from January to May during the period 1939 to 1953, and declined to a low point in October according to figures obtained from the U.S. Department of Agriculture. Prices paid by farmers during the 1955 season followed this same pattern. The pattern was the same for 1954, except that prices in August and September were slightly higher than in April and May. In both 1954 and 1955, farmers who bought their seed in January or February saved 10 percent or more over those who bought in April, although the largest number of purchases were in April. More than 70 percent of all purchases reported by consumers were made during March and April.

The range in retail prices reported was from 23 cents to 43 cents in 1956, compared with 39 cents to 64 cents in 1955. Some seed reaches the retail market as early as November; however, the great bulk of seed moves into the hands of the retailer during the first three months of the year.

A risk in the seed business is reflected in the sharp price break that hit wholesale markets in the early months of 1955. One of the contributing factors was the large crop in 1954.

There was little consistency in the price of the various varieties and types of seed. The highest price paid for certified Ranger was 71 percent greater than the lowest price. Non-certified Ranger had the smallest variation of 6 cents per pound or a 13 percent differential.

Today’s seed market is keenly competitive. California, which entered the alfalfa seed market only a decade ago, has done a tremendous selling job. In 1955 they produced more than 85 million pounds of seed, almost 10 times the 9.9 million pounds produced in Utah. The great bulk of California’s alfalfa seed is certified compared with 10 percent of the Utah crop. In reporting his purchase, one farmer in Indiana observed that it

### Table 1. Cards returned showing purchase of Utah grown alfalfa seed

<table>
<thead>
<tr>
<th>State</th>
<th>From 1953 crop</th>
<th>From 1954 crop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cards returned</td>
<td>Pounds seed</td>
</tr>
<tr>
<td>Indiana</td>
<td>66</td>
<td>7,369</td>
</tr>
<tr>
<td>Ohio</td>
<td>62</td>
<td>7,975</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>37</td>
<td>4,538</td>
</tr>
<tr>
<td>Utah</td>
<td>37</td>
<td>5,055</td>
</tr>
<tr>
<td>All others</td>
<td>55</td>
<td>7,480</td>
</tr>
<tr>
<td></td>
<td></td>
<td>257</td>
</tr>
</tbody>
</table>

### Table 2. Amounts and percentages of varieties of alfalfa seed sold

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Pounds</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranger</td>
<td>8,399</td>
<td>26.8</td>
</tr>
<tr>
<td>Grimm</td>
<td>5,185</td>
<td>16.6</td>
</tr>
<tr>
<td>Buffalo</td>
<td>5,060</td>
<td>16.2</td>
</tr>
<tr>
<td>Other certified</td>
<td>4,566</td>
<td>14.6</td>
</tr>
<tr>
<td>Common—All other</td>
<td>8,085</td>
<td>25.8</td>
</tr>
</tbody>
</table>

### Table 3. Outlets from which farmers purchased their seed

<table>
<thead>
<tr>
<th>Outlet</th>
<th>Total</th>
<th>Certified</th>
<th>Noncertified</th>
</tr>
</thead>
<tbody>
<tr>
<td>All outlets, totals</td>
<td>31,296</td>
<td>23,210</td>
<td>8,086</td>
</tr>
<tr>
<td>Local seed store</td>
<td>5,498</td>
<td>4,638</td>
<td>860</td>
</tr>
<tr>
<td>Farmers’ cooperative</td>
<td>6,442</td>
<td>4,602</td>
<td>1,840</td>
</tr>
<tr>
<td>Wholesale seed and feed</td>
<td>4,730</td>
<td>4,390</td>
<td>340</td>
</tr>
<tr>
<td>Mill and grain elevator</td>
<td>11,737</td>
<td>7,532</td>
<td>4,205</td>
</tr>
<tr>
<td>General merchandise store</td>
<td>440</td>
<td>320</td>
<td>120</td>
</tr>
<tr>
<td>Mail order house</td>
<td>80</td>
<td>80</td>
<td>...</td>
</tr>
<tr>
<td>Other</td>
<td>2,368</td>
<td>1,648</td>
<td>720</td>
</tr>
</tbody>
</table>
would be of interest for someone in Utah to determine why any farmer in Indiana should buy Utah common when he can get certified seed for a cent or two more.

However, the Utah farmer in 1954 appears to have "cashed in" on his customary practice of selling his crop early. The average price he received was slightly higher than the California price and appreciably higher than the United States average. The 1954 crop in the United States exceeded that of 1953 by 21 million pounds.

**HAY OR SILAGE**

(Continued from page 79)

of the ration. Alfalfa silage was less desirable as a feed than either alfalfa hay or corn silage.

**Chemical Analysis of Feed**

The average chemical analysis of the alfalfa hay, alfalfa silage, and corn silage during the 1956 feeding period is shown in Table 2. Alfalfa silage was slightly lower in nitrogen-free extract and higher in ether extract and ash than the alfalfa hay. It was also slightly higher in crude protein and phosphorus. When total digestible nutrients are calculated, however, the alfalfa hay is higher than the alfalfa silage.

**Harvesting and Curing of Alfalfa for Hay and Silage**

In the summer of each of the three years, second crop alfalfa was preserved, half as silage and half as hay. In all three years the hay to be baled was cured in the windrow, baled, and then stored in a hay mow until fed. The hay each year was of good quality.

In 1954, the alfalfa to be ensiled was mowed, raked, and chopped from the windrow into wagons. The forage was then blown into an upright concrete stave silo. The alfalfa was allowed to wilt in the windrow until the moisture was reduced to an estimated 65 to 68 percent. The preserved silage was about average in quality.

In 1955, the alfalfa for silage was cut, raked, and chopped as rapidly as possible and placed in the silo in an unwilting condition. Eight pounds of sodium metabisulfite was added to each ten of green material as a preservative. The ensiled forage contained 29 percent dry matter and was variable and poor in quality.

In 1956, the alfalfa for silage was cut directly from the stump with a self-propelled forage harvester and blown into wagons. It was then stored in a concrete silo, the first half with added sodium metabisulfite (8 pounds per ton) and the last half without added preservative. This silage contained 28 percent dry matter. Sodium metabisulfite may have improved silage quality slightly, but all silage was of good quality.

When the forage was cut directly from the stump with a self-propelled harvester, less debris and soil were picked up than when the alfalfa was cut and raked. This process eliminates the operation of raking and improves the palatability of the feed.

**Loss from Seepage**

Seepage from the silo was appreciable each year. Although such losses were not measured in this study, they have been estimated from studies elsewhere to be so high in some cases as to include one-third of the stored dry matter. Seepage, top spoilage, and other losses are appreciable and the odor and fly problems are objectionable.

**FOUNDATION SEED**

(Continued from page 89)

Inquiries concerning the availability of certified seed and questions concerning the foundation or certified seed programs should be directed to the Utah Crop Improvement Association, Utah State University, Logan, Utah.

**DAIRYING — A PROFITABLE BUSINESS**

(Continued from page 83)

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A Successful Enterprise

While it was not the purpose of this study to recommend dairy practices or production methods, we did hope to discover what activities were associated with a successful enterprise. Here are our observations for your consideration:

1. It is possible to spend too much time and effort in an attempt to get high production per cow. This was not the case, however, in this study. We found that high levels of butterfat production are essential to success. It took about 330 pounds of butterfat per cow to break even. Fifty-five herds averaging 264 pounds of butterfat per cow lost $67.00 per cow. Thirty-nine herds averaging 435 pounds of butterfat per cow made a net return of $59.00 per cow.

2. Some producers spent more time with the milking enterprise than can be economically justified. In our study the fewer hours of labor spent per cow, the higher the net returns. It is possible to neglect the milking herd by eliminating needed attention. But efficient work methods and adequate size of herd make it possible to use labor efficiently. Where labor costs are high, labor can be used more efficiently by increasing the size of herd. Regardless of size of herd, labor costs can be reduced in most cases by using the most efficient work methods so that all duplications of routes, motions, and operations are eliminated.

3. We found that large herds were more profitable than small ones. While herds might become too large to be efficient, we did not find any that were too large in our study. A group of 20 herds, averaging 7.4 cows per herd, produced 358 pounds of butterfat per cow at a loss of $95.00 per cow. A group of 13 herds, averaging 47.5 cows per herd, produced 333 pounds of butterfat per cow at a profit of $54.00 per cow. While size of herd was not associated with rate of butterfat production per cow, larger sized herds used labor and most items of cost more economically.

4. Feed was the largest single cost item. Here we found a great deal of variation. Where feed was adequate but economically fed there was a satisfactory net return. A group of 31 herds with an average feed cost of $0.89 per pound of butterfat produced 377 pounds of butterfat per cow at a profit of $55.00 per cow. A group of 62 herds with an average feed cost of $0.77 per pound of butterfat produced 292 pounds of butterfat at a loss of $82.00 per cow. The amount of grain fed per pound of butterfat produced affected profits. In this study we found no close relation between a high level of grain feeding and a high level of butterfat production per cow.

   This study seems to indicate that costs of feed per pound of butterfat might be reduced by:
   • improving the butterfat production potential of each cow,
   • watching the amount and quality of feed fed,
   • improving the balance of the feed fed, and
   • eliminating opportunities for the cow to waste feed.

5. We realize that total receipts per cow are a product of her production times the price received per pound of product. We found high receipts per cow accompanied by high net return. Producers may well consider qualifying for grade A programs when the opportunity presents itself.

6. In our study the average herd just about broke even financially. Performance better than average adds to success. We found that efficient performance in all practices paid big dividends. We considered size of herd, butterfat per cow, man labor per cow, average receipts per pound of butterfat, and feed cost per pound of butterfat to be the most important measures of efficient production. Herds that had none or one or two measures better than average had minus net return. Herds with all or nearly all measures better than average had the most favorable net return. As the groups progressed from none to all measures better than average, net return steadily increased. The successful producer evidently pays attention to all details rather than trying to excel in any one.

7. We attempted to find the activities and their level of performance that paid best. We divided all the records in three groups based on net return per cow. The most profitable third of the herds had 27.5 cows producing 372 pounds of butterfat at a net return of $91.00 per cow. They had low investments per cow, low labor cost per cow, low feed cost per cow, and consequently, low total cost per cow.

Time Marches On

A similar study in a similar area was conducted in 1938. Economists found the average number of cows per herd was 10.1. These cows produced 253 pounds of butterfat per cow. An average of 160 hours of man labor per cow was invested in the milking herd.

Our study in 1956 shows herds of that size and with those hours of man labor lost $116.00 per cow even though butterfat production was 388 pounds per cow. Time marches on. The average size dairy herd, production, and practices of 19 years ago are not profitable today.
WEIGH-A-DAY-A-MONTH
(Continued from page 87)

Success of Plan in Illinois

In Illinois, where the weigh-a-day plan was first used, the improvement for 13 dairy herds in Clinton County showed the average pounds of milk per cow for 1954, 1955, and 1956 to be 9,311, 9,106, and 9,761 pounds, respectively. In Jackson County the average milk production per cow in 8 herds in 1955 was 7,750 pounds and in 1956, 8,270 pounds.

J. G. Cash, extension dairymen of the University of Illinois, reports that "herds shift from WADAM to DHIA, but to date no herds have left DHIA in favor of WADAM. The longer we work with this program, the more we appreciate its potential. We have seen cooperators use the records to improve the level of production of their herds. The records have pointed the way to changes in management and feeding that have increased income. These men are becoming better dairymen."

Montana Study

The Montana Agricultural Experiment Station has released a comparative study of cow records made in the college dairy herd in 1954, 1955, and 1956. This study compares actual milk weights with the weigh-a-day plan. In the study 177 Holstein and Jersey cow records were used. The data show that while there was some variation in the total milk production between the weigh-a-day plan and actual milk weights of individual cows, when those differences were analyzed statistically, they were not significant.

Their conclusion was that a dairymen using the weigh-a-day-a-month plan of record keeping could expect that some individual cows might be producing more or less than this form of record would indicate. However, on the average, this difference is small. The weigh-a-day-a-month plan requires little time, expense, and effort and it gives the dairymen a better basis for culling, feeding, and breeding than most dairymen now are using.

Will Not Substitute for DHI

Weigh-a-day cannot take the place of standard herd improvement. It is merely a plan for the larger number of herds possibly with small herds) to meet their needs with ease of operation and economy. Dairy herd improvement, now a mechanized operation, where milk is weighed and sampled officially, gives the dairymen a complete record and makes dairying a business. In this program cows are properly identified with detailed information as to birth and breeding dates, daily milk weights, as well as monthly milk and butterfat production. Much more information is given on a lactation basis for which 305 day records are used in culling and breeding. Other benefits include the use of these records in the national proved sire program and for research studies.

There is no substitute for Dairy Herd Improvement and dairymen taking advantage of the many features have improved their herds steadily. The productive level for these better herds is more than 10,000 pounds of milk and nearly 400 pounds of butterfat.

FARM AND HOME SCIENCE

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Gladys L. Harrison, Editor
DODDER IN ALFALFA
(Continued from page 92)

Hard Seeds are Common in Dodder

Ninety percent or more of the seeds produced by dodder have a hard seed coat that is not immediately permeable to water and oxygen and thus seeds do not readily germinate. These hard seeds may lay in the soil for several years without germinating and still retain their viability. With the action of freezing and thawing the seed coat is gradually softened. Then under favorable conditions the seed will germinate and parasitize a host plant growing nearby. Recent experiments have shown that large seeded alfalfa dodder is capable of germinating and emerging from depths of 4 inches in the soil.

Control of dodder in seed infested soil presents a serious problem to the alfalfa seed producer.

WATER MOVEMENT IN SOILS
(Continued from page 85)

If a well aggregated or coarse soil underlies a fine soil, which may occur from excessive cultivation, furrow spacing may be increased since downward movement will be retarded by the coarse layer as shown in A. If water is removed at time 60 the fine soil is completely wetted and water has penetrated well into the granular soil after 4 hours drainage and has penetrated completely through the granular soil after 24 hours as shown in B.

PEACHES THROUGHOUT THE SUMMER
(Continued from page 81)

— August 14, TRIOOGEM — August 28, and GOLDEN EAST—August 28. These three varieties are excellent in quality but are too soft for commercial handling.

White-Fleshed Peaches
For those few people who enjoy a white-fleshed peach, the following varieties are recommended: MAYFLOWER — ripening date about July 12. This is the earliest peach grown on the experimental farm. Two others are: ERLI-RED-FRE — July 30 and RARITAN ROSE—August 7.

CONTRIBUTIONS TO RESEARCH
August 15 to November 15, 1957

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<tr>
<th>Organization</th>
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FARM AND HOME SCIENCE