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Bulletin No. 243 - Practical Results from the State Experiment Farms

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Range improvement by different tillage methods, Archer Field Station.

PRACTICAL RESULTS FROM THE STATE EXPERIMENT FARMS

Bulletins will be sent free upon request.
Address: Director of Experiment Station, Laramie, Wyoming.
UNIVERSITY OF WYOMING
Agricultural Experiment Station

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*In cooperation with U. S. Department of Agriculture.
2Mr. Marshall also served from 1923 to 1929.

¢On leave.
§Acting superintendent.
The several stations comprising the Wyoming system of Experiment Farms have been established from time to time in various parts of the state with special reference to soil and climatic conditions, and are supported by state funds. Five of them are irrigated, and on the other three dry farming methods are used. The work at Archer and at Sheridan is carried on cooperatively with the United States Department of Agriculture.

The work includes experiments and demonstrations with field crops, both grain and forage, crop rotations, feeding tests with livestock, rations and housing methods for milk production, methods of poultry housing and rations, fruit production, tree distribution, range improvement and management, climatic records and soil moisture studies.

The experiment work that is being done and the questions that have been answered by actual tests on these farms are of great value to farmers and ranchmen. As soon as results of special interest are obtained, they are released as press bulletins. These progress reports reach farmers and ranchmen in all parts of the state through the newspapers and farm journals. More detailed results and conclusions are published as circulars and bulletins when projects are finished. Important phases of the work taken from all of the farms are also published from time to time as bulletins. The following pages list some of the highlights of the work on the several farms during the last three years. Many of the questions discussed here were asked by farmers and livestock men. More detailed information on any of these subjects mentioned may be obtained by writing to the Department of Experiment Farms, Laramie, Wyoming.
AFTON

ELABORATE HOUSING DOES NOT INCREASE MILK PRODUCTION

Dairy cows continue to produce more milk and butterfat when they are kept in an open shed than they do in a modern dairy barn. Four years' results at the Afton Experiment Farm showed that the cows in the open shed were more comfortable, gained weight and ate a little more feed. The increased production was about offset by the extra feed and bedding. They produced an average of .95 pounds of butterfat per head daily. During the barn periods they produced .89 pounds of butterfat per head daily and lost some weight. This was in a test where the cows were alternated each 30 days during the winter months. When they were kept in the open shed continuously for the entire year, they did even better, producing at the rate of one pound of butterfat per head daily.

The net difference in the returns, above feed cost, in favor of the cows in the barn was only 12 cents per head a month, and of course was less when the cows were kept in the open shed continuously throughout the entire winter.

Both lots of cows had access to running water and the same kind of feed. The shed cows were driven into modern stanchions for milking, twice a day.

The results show clearly that farmers can carry on dairy production very satisfactorily without the necessary outlay for large, expensive barns. The only thing that is needed is an open shed in which the cows can bed down comfortably and a milking room. At the Experiment Farm the open shed comprises about 60 square feet per animal. A milking room with half a dozen stanchions is ample to take care of the animals. In a dairy section, such as that of southwestern Wyoming, this reduced cost of housing for the dairy herd means thousands of dollars in the pockets of the farmers.

FEEDING GRAIN TO COWS DECREASES PROFITS

Feeding grain to a group of cows in the dairy herd at the Afton Experiment Farm increased the yield and also the butterfat, but not sufficiently to pay for the extra cost of the grain used.
January, 1941  The State Experiment Farms

Young farmers study practical dairying at Afton Experiment Farm.

The average results for the four years during which this experiment was carried showed that the cows, when they received grain, produced slightly over a pound of butterfat per head daily, compared with one pound of butterfat when grain was omitted from the ration. Butterfat returns per day, figured at local prices, were 3.6 cents more for the cows that received grain than for those that did not receive grain. This was not sufficient to pay for the grain, which consisted of ground barley, fed at the rate of one pound for each six pounds of milk produced. Only cows producing above 20 pounds of milk per day received grain. The four-year average showed that the cows without grain made a return of $10.41 more than did the grain-fed cows, above the cost of feed per year.

CULTIVATING MEADOWS REDUCED YIELDS

Contrary to results obtained in other parts of the state, especially at the Lyman Experiment Farm, cultivating grass meadows decreased yields, and with alfalfa meadows there was so little increase from cultivating that it did not pay for the cost of the work. However, when barnyard manure was applied, yields went up on the grass meadows more than 75 per cent, and alfalfa was
increased 15 per cent. The results obtained on the Afton Farm differ from those of the other Experiment Farms, due largely to the type of soil on the Afton Farm.

**AFTON**

**CHART NO. 1**

**SOME TREATMENTS IMPROVE MEADOWS**

(7-yr. average)

<table>
<thead>
<tr>
<th>Lbs. per Acre</th>
<th>Grass Meadows</th>
<th>Alfalfa Meadows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manure Top Dressing</td>
<td>4,469</td>
<td></td>
</tr>
<tr>
<td>Manure + Cultivation</td>
<td>3,366</td>
<td></td>
</tr>
<tr>
<td>Cultivation</td>
<td>1,738</td>
<td></td>
</tr>
<tr>
<td>Disking</td>
<td>1,552</td>
<td></td>
</tr>
<tr>
<td>Harrowing</td>
<td>1,493</td>
<td></td>
</tr>
<tr>
<td>No Treatment</td>
<td>2,527</td>
<td></td>
</tr>
</tbody>
</table>

| Treat-       | 10,721        | 9,401 |
| ment         | 9,306         |       |

1See alfalfa renovation on Lyman Experiment Farm.

**IF YOU SEED GRASS WITH YOUR ALFALFA, LOWER YIELDS ARE LIKELY**

Mixing grass seed with alfalfa at the time of seeding decreased the yields of forage, as shown by six years’ average results.

Farmers and ranchmen in this part of the state were of the opinion that more forage could be produced on an acre of alfalfa ground if grass were seeded with the alfalfa. But the results proved just the opposite. Grimm alfalfa, seeded alone, produced 4.75 tons per acre, and in all cases where the grasses had been mixed with it, the yields were depressed.

Seeding the grasses and clovers alone, however, gave lower forage yields than when they were mixed with alfalfa, except red clover, seeded alone, which gave a greater yield than any of the grasses or alfalfa or the mixtures. On land where alfalfa can be grown satisfactorily, there is no point in mixing grasses with it, since this does not produce as much forage as alfalfa alone, and it is not any more palatable for dairy cattle.
Bush fruit varieties, Afton Experiment Farm.

**CHART NO. 2**

**GRASS SEEDED WITH ALFALFA DID NOT INCREASE YIELDS**

<table>
<thead>
<tr>
<th></th>
<th>Lbs. per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa alone</td>
<td>9,554</td>
</tr>
<tr>
<td>Alfalfa + Orchard grass</td>
<td>8,525</td>
</tr>
<tr>
<td>Alfalfa + brome grass</td>
<td>8,290</td>
</tr>
<tr>
<td>Alfalfa + alsike grass</td>
<td>8,016</td>
</tr>
<tr>
<td>Alfalfa + timothy</td>
<td>7,341</td>
</tr>
</tbody>
</table>

**ARCHER**

*(In Cooperation with U. S. Dept. of Agriculture)*

NEW METHODS INCREASE CERTAINTY OF WINTER WHEAT YIELDS

Since the Archer Experiment Farm first introduced the furrow drill, which has been the means of greatly increasing the certainty of winter wheat production, it has continued to work with various methods of seedbed preparation as a way of lowering the cost...
and also increasing the certainty of producing a crop in the south-eastern part of the state. The Experiment Farm has shown that the use of pitting machines in preparing the summer fallow gives yields twice as high as are obtained when the common moldboard plow is used. One of these pitting machines is called the "eccentric oneway plow." This implement was developed at the Experiment Farm and can easily be duplicated by the average farmer who has either a disk or a oneway plow. This "eccentric" plow, which gives larger yields of winter wheat, also prepares the seed-bed at a greatly reduced cost, compared with the old-fashioned way of plowing. It destroys all of the weeds and at the same time leaves the surface full of small depressions which prevent soil blowing and hold the rain water where it falls. A great many farmers have improvised this tool from their own equipment. Implement manufacturers, noting the favorable results at the Archer Station, have also made the disks in large quantities, already to put on the farmers’ oneway plows.
A SHELTERBELT INCREASES HAY YIELDS

Nearly a ton of crested wheat grass hay per acre can be produced on the dry lands in seasons of limited rainfall, if the proper attention is given to methods of seeding and protection. This large yield in the dry year of 1938 was obtained on land that was protected by a single row of trees, approximately 18 feet high. These trees were on the north side of the plats. This yield was more than twice as great as when the grass was grown 150 feet farther away from the windbreak protection. On this exposed area the yield was only 800 pounds per acre. The grass was drilled in rows 7 inches apart.

The one row of trees in this case is not an adequate windbreak, and with a better shelterbelt on the windward side, the protected area could be extended considerably farther. The use of trees for protection is not only important for field crops, but is especially worth while for protecting garden areas near the buildings where the certainty of good yields of vegetables is always desirable.
WHEN IS THE TIME TO PLANT GRASS, ALFALFA AND SWEET CLOVER?

If you are seeding crested wheat grass, the best time for the planting is early in the spring, through the month of March and the first part of April. The stand of crested wheat grass from planting early in March was 76 per cent, and planting the first of April gave a stand of 87 per cent. Later plantings tended to show a very decided decrease in the stand.

However, the seeding of alfalfa should be done later for the best results. The first two weeks in April gives by far the best stands of that crop. Contrary to popular opinion, the best stand of sweet clover was obtained from seeding the first part of June, from which a stand of 70 per cent was obtained. Seeding crested wheat grass on this date was practically a failure. The next best seeding for sweet clover is the middle of April. A great many people believe that seeding crops early in the spring is the ideal time, but these forage crops respond quite differently when they are all planted at the same time. For example, the fall seeding gave a stand the following year of 50 per cent for crested wheat grass, 3 per cent for alfalfa, and only a trace for sweet clover.
CONVERT A POOR CORN CROP INTO CASH

A poor yield of corn can be pastured by lambs and turned into marketable meat from what otherwise would be largely wasted in the field. Corn that produced so little that it could not be profitably harvested by machinery was worth $1.18 per 100 pounds in terms of lamb gains, when the corn was pastured by lambs in the fall. There were no harvesting costs, except supplying drinking water and salt.

Feeding cottonseed cake to the sheep while they were on the corn pasture improved the appearances and the rate of gain, but it reduced the net profits from $1.18 to $.99 per 100 pounds of corn harvested. The lambs gained approximately a quarter of a pound per day per head on the corn alone, and with the cottonseed cake the gain was slightly higher, but not sufficient to pay for this concentrate.

PASTURING RYE IN THE FALL PRODUCES LOWER YIELDS IN THE SPRING

Many farmers believe that they can pasture their rye in the fall without reducing the crop the following season. The Experiment Farm has shown that if you use part of the crop for fall pasturage you will not have it the next year when you harvest.
Winter rye that was pastured in the fall in 1939 produced hay the following season at the rate of 2,366 pounds per acre. The field of rye next to it, that was not pastured during the fall, produced 3,353 pounds of hay per acre, an increase of just about a half-ton per acre, compared with the field that had been pastured. The grazing of the rye was only moderate and had not apparently injured the stand of the plants.

Unless there is a very great justification for pasturing in the fall, it would be well to remember that hay in the stack the following year is a very decided insurance against feed shortage throughout the winter months.

EDEN

MANURE DOUBLES BARLEY YIELDS

Applying barnyard manure to the light loam soils of Eden Valley increased the yield of barley more than 100 per cent. The barley crop was part of a rotation with alfalfa. When the land was used without fertilizer, the yield of barley was 1,750 pounds per acre. When the barnyard manure was applied, the yield of barley jumped to 3,520 pounds per acre, and the alfalfa increased 83 per cent, compared with the plat that was not manured.

The carry-over effect of fertilizers is also noticeable in larger yields. One year after the application of barnyard manure, alfalfa showed an increase of 30 per cent of hay, compared with the check plat. When only phosphate was applied, the carry-over effect, one year later, showed an increase of 15 per cent.

The soil in this section of the state is deficient in humus, and it is important that all feed crops that are produced be converted on the farm, so that the manure may be returned to the soil to build up fertility.

GRASS MIXTURES PRODUCE LARGE YIELDS

Although this Experiment Farm is in an area where the natural vegetation consists largely of sagebrush, yields of grass mixtures produced as high as 5,000 pounds of air-cured forage per acre. Most of the settlers in this section of the state are engaged in dairying, in a larger or less extent, and it is imperative that they have ample pasture, if they are to continue on an
Dairy barn, Eden Experiment Farm.

Economical basis in milk production. With the expected increase of settlement in this valley, it will be necessary that crop production be increased in order to take care of the needs of the new settlers. Some of these grass mixtures are a decided improvement over the natural range, and others are being tested for irrigated pasture use and for hay production.

**EDEN**

**CHART NO. 3**

**PASTURE MIXTURES ARE IMPORTANT IN EDEN VALLEY**

<table>
<thead>
<tr>
<th>Lbs. per Acre</th>
<th>Crested wheat grass</th>
<th>Huntley mixture</th>
<th>Grimm alfalfa + crested wheat grass</th>
<th>Morton's mixture</th>
<th>Crested wheat + Kentucky blue grass</th>
<th>Wyoming mixture</th>
</tr>
</thead>
</table>
QUACK GRASS CAN BE ELIMINATED BY CULTIVATION

A dense stand of quack grass has been entirely eliminated by continued clean fallow, over two years' time. This is much cheaper than the use of chemicals, and leaves the land in readiness for crops sooner than if chemicals are used. Since the settlement of the Eden Valley, quack grass is one of the pests that has come in very rapidly and has taken a great many fields by reason of its persistent habit of growth. It is very important that economical methods that can be used on large-scale operations be developed to control this weed. The clean cultivation method is one of the most economical that has been used. This same method has worked satisfactorily upon the other Experiment Farms and is far cheaper and more satisfactory for large fields than the chemical treatment.

BROADLEAF COTTONWOOD TREES ARE ADAPTED TO EDEN VALLEY

The broadleaf cottonwood is one of the most suitable trees for this part of the state. This is proved by the growing of some 25 different species during the last six years. Following the broadleaf cottonwoods, willows, caraganas, buffalo berries, Ponderosa pine and western red cedar are well suited for planting in this part of the state. The Chinese elm, although it does well in many other parts of the state, has killed back very severely under conditions that obtain on the Experiment Farm at Eden.

GRINDING ROUGHAGES FOR LAMBS NOT PROFITABLE

There was no increase in the rate of gain when ground alfalfa was used in comparison with long alfalfa for wintering lambs. The lambs made identically the same gain in both cases, and it cost approximately two dollars per ton to grind the alfalfa. Since the amount of feed consumed was practically the same in both cases, the feed cost was greater where the alfalfa was ground.

Grinding bright, clean straw and alfalfa, 50 per cent of each, reduced the gains by 20 per cent, compared to long alfalfa; and when sweet clover and straw were ground together, the gains were reduced 25 per cent. The animals did not like the ground alfalfa as well as the long hay and refused a large amount of the
straw mixtures. Death losses were approximately the same in all lots, during the three years of this test. With home flocks of sheep on the increase in the Eden Valley, it is important that the farmer know something about different feeding rations, so that he will not be forced to carry on these experiments on his own account.

GILLETTE

PROPER COMBINATIONS MAKE BETTER YIELDS OF WINTER WHEAT

Seeding winter wheat on fallow is a more certain method of producing a yield than seeding it after any other crop in this part of the state. The fallow should be prepared in the month of May to produce highest yields. Plowing the fallow has increased the yields over a 14-year period, about 1½ bushels per acre, compared with duckfooting; but, of course, the operation with the plow is considerably more expensive than it is with the duckfoot cultivator. In all cases the use of the furrow drill gives larger yields than does the common drill, regardless of how the fallow is prepared or in what season of the year. If you prepare your fallow in the first part of July, you may expect yields reduced approximately 25 per cent, compared with May fallow.
Seeding the wheat in the middle of September will give better yields than seeding in any other month, and using 30 pounds of seed per acre is another means of insuring highest yields.

**FALCONER CORN IS DEPENDABLE**

This variety continues to yield the highest of the various corns that have been tested at Gillette. When it is planted June 1 with the use of furrow openers on the planter, it gives better yields than by other methods. But Black Hills yellow dent, which is a very close second in point of yield, gives its greatest yields when it is planted two weeks later than Falconer.

One year's results with 30 corn hybrids showed that all but two of them produced more total forage than did Falconer, some of them having yields of 3,500 pounds per acre, and Falconer, 1,731 pounds per acre. None of the hybrids produced as much grain as did Falconer. The work with hybrid corns promises to increase very materially the quality and amount of forage crops used at the present time in this part of the state.
ALFALFA YIELDS BEST IN WIDE ROWS

Ladak alfalfa continues to be the highest yielding variety. Ladak produces its best yields when the seed is planted in rows 42 inches apart. When the rows are 84 inches apart, the seed production is greater, but the forage is reduced to about one-half. The average yield of Grimm, over nine years, is 60 per cent of Ladak for the same period.

GILLETTE

CHART NO. 4

ALFALFA IN 42-INCf ROWS GIVES THE LARGEST YIELD OF HAY

<table>
<thead>
<tr>
<th>Rows</th>
<th>Hay Yield (Lbs. per Acre)</th>
<th>Seed Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>7&quot;</td>
<td>806</td>
<td></td>
</tr>
<tr>
<td>42&quot;</td>
<td>1,096</td>
<td></td>
</tr>
<tr>
<td>84&quot;</td>
<td>597</td>
<td></td>
</tr>
</tbody>
</table>

IMPROVE THE NATURAL RANGE

One variety of slender wheat grass produced at the rate of 2,916 pounds of forage per acre. A number of other drought resistant grasses are being tested in cooperation with the Soil Conservation Service to determine those that are suitable for re-seeding the range. Many of these, in their second year from planting, produced yields above a ton of hay per acre. Spring seeding has resulted in larger yields than seeding in the fall. In this part of the state depleted range lands and abandoned farms can be restored to good grazing areas by seeding to some of these grasses that are proving themselves very drought resistant and capable of producing large amounts of forage.
A little water from the farm windmill, applied during long drought periods, increased the vegetable yields in the home garden 85 per cent, averaged for two drought years. In the case of Stringless Green Pod beans and Improved Wax beans the increase was 244 per cent, compared with the yield produced on fallow land. The very little water which is ordinarily used is no
tax upon the farm supply, and it frequently means the difference between a total failure and a garden which is ample to supply the family with vegetables during the entire year.

DO NOT GRIND RUSSIAN THISTLES

A ration containing Russian thistles made just as large gains as did a ration of alfalfa for lambs. The thistles were fed with sudan grass in the proportion of 50 per cent of each, with corn and cottonseed cake as a supplement. This resulted in lamb gains of .33 pounds per head daily. The same rate of gain was made when alfalfa hay replaced the thistles-sudan-grass in the ration.

Grinding the thistles and the sudan grass had a detrimental effect upon the sheep, so far as the gains were concerned. The average daily gain where the ground roughage was used was only .22 pounds per head.

Adding beet sugar molasses to the ground thistles and sudan grass did not pay for the cost of the extra treatment. The gains were .25 pounds per head daily.

LANDER EXPERIMENT FARM AND CLARKE-McNARY TREE DISTRIBUTION
APPLE TREES RESPOND TO FERTILIZATION

Wealthy apples increased in yield and size when treble superphosphate was put on the land at the rate of 350 pounds per acre. Fifty loads of barnyard manure per acre also increased the yield of Wealthy apples in a similar trial to that of the superphosphate. Hibernal apples were likewise improved.

If the farmer, working in his own home orchard, does not have the phosphate or the manure, he can improve very materially the growth of the trees, the color of the fruit and the quantity by growing a cover crop, such as red clover, and then plowing it under after a year's growth. The orchards in the state are relatively small sized, and it is not a difficult matter to get sufficient fertilizer to improve the quality and the quantity of the fruit very materially. This work pays dividends in providing the kitchen and the cellar with fruit that otherwise might be purchased, or might not. Fruits are a part of the farm garden that should receive more attention on the farms and ranches of the state.
This Experiment Farm has developed some hundreds of seedling apple trees, a number of which are decidedly superior to some of the common varieties that are generally grown. Examples of these new seedlings are the Brechsteinia, the Margaret, the Fremont and the Poposia. This work shows that fruits which are more suitable to Wyoming conditions than those varieties imported from the east can be developed and propagated in our own state. The work should be encouraged, and the distribution of the desirable varieties should be extended, so that every farmer and ranchman would have some of these fruits in his home garden.

**Trees are distributed to all parts of the state**

Nearly one and a quarter millions of trees have been distributed for shelterbelt purposes to the various counties of the state. The work began some thirteen years ago in cooperation with the Federal Government and has continued without interruption. If each farmer and ranchman in the state were to plant
a small block of trees about his buildings, there would still be need of millions of trees. The varieties of trees that are grown as demonstrations on the several Experiment Farms of the state have proved that for the eastern dry lands of the state the most suitable varieties are Russian olive, caragana, Chinese elm, green ash, boxelder, Ponderosa pine and Rocky Mountain red cedar. For the western part the best varieties are cottonwoods, willows, caragana, boxelder, Colorado blue spruce, Ponderosa pine and Rocky Mountain red cedar.

LANDER

CHART NO. 6

TREES FOR SHELTERBELTS HAVE BEEN DISTRIBUTED TO FARMERS AND RANCHMEN IN EVERY COUNTY IN THE STATE

LYMAN

PONDING THE WATER REDUCES ALKALI

Ponding the water for 60 days on land heavily impregnated with alkali salts made it possible to produce far larger crops than any other method of treatment. The average yield for the four years of crops, including silage, oats and barley following this water treatment was 7,732 pounds per acre. Applying sulphur at the rate of one ton per acre gave an average annual yield for the same period of 5,879 pounds. When one and a half tons of alum was applied on an acre, the average yield was 6,619 pounds.
per acre. Irrigating in the fall by flooding gave a yield of 5,188 pounds per acre. It appears that where water is limited, such as was the case where this work was done, ponding the water in the fall is a much more economical practice for controlling alkali than the application of minerals or the flooding method. The effect of this treatment was evident for five years following. A considerable portion of the farm land in this part of the state contains alkaline salts, and a method that is economical and practical will enhance the value of crops of the valley several fold.

**Alkali Control Methods**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average 4-yr. yield of crops lbs. per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diking water 60 days in the fall, plus 10 loads manure per acre</td>
<td>7,732</td>
</tr>
<tr>
<td>Alum, 2,800 pounds, plus 10 loads manure</td>
<td>6,619</td>
</tr>
<tr>
<td>Sulphur, 2,000 pounds, plus 10 loads manure</td>
<td>5,879</td>
</tr>
<tr>
<td>Fall irrigating, plus 10 loads manure</td>
<td>5,188</td>
</tr>
</tbody>
</table>

**CULTIVATION IMPROVES ALFALFA**

The alfalfa yields were increased as much as 43 per cent by the application of barnyard manure and cultivating. Cultivating alone increased the yield 28 per cent. This result is opposite to that obtained on the Afton Experiment Farm. There cultivating alfalfa meadows did not increase the yield. The soil is much heavier on the Lyman Farm than it is on the Farm near Afton, a fact which may account for the difference. Many of the alfalfa fields in the Bridger Valley and in other parts of southwestern Wyoming have remained in alfalfa so long that they are practically run out by dandelions and other weeds. Farmers have been fearful of plowing up their alfalfa because they believed it was very difficult, if not impossible, to get another stand. A severe cultivating with the stiff-shank alfalfa renovator will do the job and increase the yields very materially. After cultivating, the field has the appearance of having been plowed, but nothing has happened, except the tearing out of dandelions and other weeds. The alfalfa stand is as good as it ever was, and the increased yields and general stimulating effect to the plants results in increases that pay many times the cost of the work.
ALFALFA IMPROVED BY CULTIVATION:

<table>
<thead>
<tr>
<th>Lbs. per Acre</th>
<th>Manure + cultivation</th>
<th>Cultivation</th>
<th>No treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,781</td>
<td>5,184</td>
<td>4,045</td>
<td></td>
</tr>
</tbody>
</table>

GARDEN PEAS MAY BECOME ANOTHER CASH CROP

Peas produced 240 bushels of pod peas to the acre. This crop is being tested to determine the possibility of another cash crop for the farmers in this part of the state. The high altitude with cool nights produces an excellent quality of peas that are greatly in demand. Sufficient acreage of this crop would justify the building of a vinery or a cannery. The crop matures satisfactorily in the growing season, and with good roads and easy means of transportation, the peas could be moved to processing plants or consuming centers with little expense.

SKIMMILK REPLACES GRAIN IN PORK PRODUCTION

Skimmilk had a replacement value of 2 cents a gallon in terms of the grain feed it saved. The pigs were given one gallon of milk daily in addition to a barley-oats mixture. It not only required less grain to make 100 pounds of pork, but the pork gains were made 14 per cent faster than where only grain and water were given to the pigs. Where farmers have skimmilk available, the fact that it will speed up the fattening of pigs and save grain, and also increase the rate of gain, are considerations that are important in a feeding program.
Cross-bred pigs, on a grain and milk ration, made even more rapid gains, compared with the Duroc pigs. Their rate of gain was 12 per cent faster, and they required less grain for the increase in weight. In these experiments only pigs of good type that are bred on the Experiment Farm were used. A great many Duroc pigs have been distributed to farmers and ranchmen for breeding stock and have also been used by 4-H Club boys in their demonstration work.

**NATIVE RANGE IMPROVEMENT GOES AHEAD**

A large tract of land near the Experiment Farm has been selected and preparations for fencing and seeding have been made. Seed from a number of varieties of grasses have been sown during the fall and winter months. This work is in cooperation with the Taylor Grazing Act committee of District No. 4, the Uinta Development Company, and the Lyman Experiment Farm. A program has been set up for the purpose of determining better methods of utilizing the native range by means of reseeding
in certain areas, by controlling the grazing periods, by fencing and by developing structures that may be used as a means of distributing run-off water in a more efficient manner over areas that are otherwise subject to erosion. Seed for restoring the cover is being gathered from native grasses and shrubs and also from cultivated species. These are being grown on the Experiment Farm for the purpose of studying their hardiness and their seed producing capacity. The first year's growth from some of these grasses that are now being tested show yields as high as 5.25 tons per acre in the case of Canadian wild rye grass. Another species, Russian wild rye, although it did not make as high yields as some of the others, is particularly thrifty in its habit of growth, producing a quantity of fine blades near the ground, which should make it a valuable forage plant. Crested wheat grass, which has been grown a number of years, produced 4.5 tons per acre. A number of other grasses produced above two tons of forage per acre.
The State Experiment Farms
LYMAN
CHART NO. 8
LARGE YIELDS FROM SOME NEWLY INTRODUCED GRASSES
AT LYMAN EXPERIMENT FARM

SHERIDAN FIELD STATION
(In Cooperation with U. S. Dept. of Agriculture)

EXPERIMENT FARM LOOKS FOR BETTER VARIETIES

Three varieties of winter wheat that have been grown continuously on the Experiment Farm for 23 years have each averaged more than 30 bushels per acre on fallow land. This includes good years, when above 50 bushels per acre were produced, and drought years when practically total failures have been recorded. These wheats are Karkoff with an average of 32 bushels per acre, Turkey, 31.2; Kanred, 31.9. But even with these high yields, more recent introductions have given larger yields for the years that they have been grown than the old standbys. Averaged for the last six years Cheyenne, Nebraska No. 60, Yogo and Montana No. 36 have all produced more than the wheats originally grown on the farm. Most of these are of high milling quality and are very desirable for dry land farms.

The spring wheat yields are approximately two-thirds as much as the returns from the winter wheats. In this case also new varieties have been added from time to time, and some of these have given greater returns for the period during which they have
been grown than the original wheats. Some of these have shown an increase over the standards of 28 per cent in yield.

This work of testing new varieties is carried on for all of the grains, and the seed from the better ones is distributed to farmers and ranchmen, and they in turn, of course, get the benefit of the work of growing, comparing and selecting which is done on the Experiment Farm.

High Yielding Grains are Developed for Wyoming Farmers

By Continued Testing

<table>
<thead>
<tr>
<th>Grain</th>
<th>Varieties</th>
<th>Average Yield per acre, bu., for last 6 yrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Wheat</td>
<td>Winter wheat, standard variety (Karkoff)</td>
<td>27.3</td>
</tr>
<tr>
<td></td>
<td>on Experiment Farm for 23 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recent introduction (Cheyenne)</td>
<td>31.6</td>
</tr>
<tr>
<td>Spring Wheat</td>
<td>Spring wheat, standard variety (Marquis)</td>
<td>18.4</td>
</tr>
<tr>
<td></td>
<td>on farm for 24 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recent introduction (Comet)</td>
<td>24.5</td>
</tr>
<tr>
<td>Barley</td>
<td>Barley, standard variety (Trebi)</td>
<td>48.1</td>
</tr>
<tr>
<td></td>
<td>on farm for 24 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recent introduction (Velvon)</td>
<td>52.0</td>
</tr>
<tr>
<td>Oats</td>
<td>Oats, standard variety on the farm (Markton)</td>
<td>49.8</td>
</tr>
<tr>
<td></td>
<td>Recent introduction (Carleton)</td>
<td>51.0</td>
</tr>
</tbody>
</table>
TURNING UNDER GREEN MANURE CROPS NOT PROFITABLE

Winter wheat has produced an average yield of 28.2 bushels per acre when it was grown on fallow land that had a green manure crop turned under, such as peas, rye, or sweet clover. But when the fallow had no crop turned under, the yield of the winter wheat was 1½ bushels greater. These yields are averaged for 23 years and show that the turning under of green manure crops did not increase winter wheat yields, where the grain was grown on fallow land. With oats there was a difference in favor of bare fallow of three bushels per acre, and with spring wheat the yields were practically the same, compared with green manure. Corn on fallow produced only .8 bushels more per acre than it did when it was grown continuously on the same ground. Fall plowing for the corn is better than spring plowing in this part of the state.

SORGHUM, A PROMISING FORAGE CROP

A test with a number of sorghums, both the grain varieties and the forage varieties, shows yields for the last four years as high as 3,200 pounds per acre for Cheyenne Sweet Stalk. This variety has been grown in comparison with a dozen others, and has proved to be a consistent high yielder. Its grain yield was 18.5 bushels per acre, and one or two others have varied from 19 to 21 bushels per acre, but the forage has been decidedly less than the yield of Cheyenne Sweet Stalk. This yield is larger than the long time average for alfalfa or corn. These varieties are being tested to determine drought-resistant crops that may be recommended to the farmers in this part of the state.

SOYBEANS ON DRY LAND

There has been a considerable demand for tests with soybeans, farmers thinking it might be possible to grow this legume crop on dry lands with greater returns than are realized from alfalfa. The largest forage yield of five varieties for the last two years was 1,839 pounds per acre. This particular variety produced 300 pounds of seed per acre. McCauley's Manchu produced 390 pounds of seed per acre but was considerably lower in its total forage production. These results do not justify the farmer in
switching to any great extent to soybeans from some of the other forage crops that have already been proved capable of producing high yields of forage under non-irrigated conditions.

COMMERCIAL FERTILIZER TRIED WITH DRY LAND CROPS

Drilling treble superphosphate in the soil at the time of seeding winter wheat made a yield of 46.6 bushels per acre, compared with 43 bushels for no treatment. When the phosphate was applied to spring wheat, the increase was 1½ bushels per acre. From the experience with our non-irrigated lands, the limiting factor for crop production is moisture. Not enough crop material has been removed from the land to deplete the original fertility of the soil very seriously so far. The cost of the phosphate was more than the increased return from the crop and its use in similar situations is not recommended.
A large number of grasses are being tested to determine their suitability for improving natural range vegetation. Side oats, grama grass (*Bouteloua curtipendula*) produced two tons per acre of air dry forage. This variety had been seeded only two years. This yield compares with 3,300 pounds per acre produced by crested wheat grass. The latter grass is an old standby which has been used for a number of years and is very resistant to drought conditions. Many of the grasses that are being developed give promise of supplying a long-felt need in the program of range improvement. They mature at different times and have various habits of growth that make them especially suitable for grazing purposes. One of these varieties, called Blue Joint Turkey Foot, produced nearly a ton and one-half of forage per acre. The seed from the more suitable varieties is used for increase and seeding under natural range conditions.

**TORRINGTON**

**SUGAR BEETS GIVE LARGE YIELDS ON NEMATODE INFESTED SOIL**

The problem of growing profitable sugar beet crops on the light soils in the Torrington area has challenged the best efforts of the Experiment Farm. During the past several years the Experiment Farm has cooperated with the United States Department of Agriculture in studying means of producing profitable crops of beets on these light soils. Last year individual yields as high as 31.9 tons per acre were produced on the Experiment Farm. The work shows that the early planting of beets is an insurance against injury by the nematode organism. This is due largely to the fact that the nematode does not thrive in low temperatures in the spring, while the beet root gets a start which enables it to go through the season in a thrifty manner. The average of all of the plats showed a yield of 23.5 tons per acre when the beets were planted March 20. This yield tended to decrease with each subsequent planting. The beets planted April 20 averaged 17 tons per acre; and when they were planted April 30, they averaged only 12 tons per acre. The March 20 planting is several weeks
EARLY PLANTING OF SUGAR BEETS PROTECTS THEM AGAINST NEMATODE

<table>
<thead>
<tr>
<th>Tons per Acre</th>
<th>March 20</th>
<th>April 1</th>
<th>April 10</th>
<th>April 20</th>
<th>April 30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>22.34</td>
<td>19.60</td>
<td>17.79</td>
<td>13.44</td>
<td>11.40</td>
</tr>
</tbody>
</table>

Earlier than the customary planting time for most of the beet crop. This is one means that can be adopted by beet growers to increase their beet yields very materially.

The average results also show that the beet crop, if it is preceded by two years of crops which are resistant to nematode, such as sudan grass or barley, will be greater than where only one year of these crops precedes the beets. These facts are particularly important to farmers, many of whom have abandoned the growing of beets entirely, because the ordinary planting dates with ordinary rotation methods have frequently resulted in a crop that was a practical failure. This work has been carried on for three years, and the results are reasonably consistent and are of value to growers of sugar beets.

**PLOWING NECESSARY FOR SUGAR BEETS**

It is very important that grain land be plowed in preparation for the growing of sugar beets. When the grain land was simply disked as a preparation for the beets, the yield was 11 tons per acre. When it was plowed 5 inches deep, the yield was 18 tons per acre; and when it was plowed 7.5 inches deep, the yield was 20.1 tons per acre. When the plowing was deeper than 7.5 inches the yield was reduced. With potato land the largest yields of beets were obtained when the plowing was 5 inches deep. In the
case of grain stubble ground, the stubble and trash on the surface cannot be satisfactorily covered and incorporated with the soil unless the plowing is from 7 to 8 inches in depth. It should be kept in mind that plowing to a greater depth did not increase yields but did increase labor costs.

<table>
<thead>
<tr>
<th>Seedbed Preparation</th>
<th>On Grain</th>
<th>On Potato Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disking</td>
<td>11.0</td>
<td>13.2</td>
</tr>
<tr>
<td>Plowing 5 &quot; deep</td>
<td>18.0</td>
<td>16.1</td>
</tr>
<tr>
<td>Plowing 7½&quot; deep</td>
<td>20.1</td>
<td>15.0</td>
</tr>
<tr>
<td>Plowing 10 &quot; deep</td>
<td>19.4</td>
<td>16.0</td>
</tr>
</tbody>
</table>

The Best Plowing Depth for Sugar Beets on Potato Ground Is Five Inches.

MANURE INCREASES BEET YIELDS TWELVE TONS

Where no manure was applied to the soil in a rotation of beets and alfalfa, 8 tons of beets per acre was the average yield. When 16 loads of manure per acre were applied to the beet land, the yield jumped up to 20 tons per acre. This was approximately...
three-fourths of a ton of beets for every load of manure. Such results justify the farmer in feeding all of his crops on the farm and returning every possible load of manure he can get to his beet fields. It costs very little more to take care of a large beet crop than it does an ordinary one, and the net returns are much greater. The use of manure is especially important on the lighter soils, such as those of the Experiment Farm, which is representative of a large body of the irrigated land on the north side of the North Platte River.

PASTURING ALFALFA, SWEET CLOVER AND SUDAN GRASS

Alfalfa can be pastured satisfactorily with lambs or hogs. The Experiment Farm showed that alfalfa which produced an average of four tons per acre had a carrying capacity per acre of eight ewes and their lambs. The lamb gain, has averaged 412 pounds per acre. If the gain is valued at six cents a pound, the alfalfa would be worth six dollars a ton, as it stood in the field without any work of harvesting. In addition to this the ewes were pastured without any charge against the crop. There have been no death losses in this experiment for three years, due to bloat. No supplementary feed was provided and the lambs continued in a thrifty condition throughout the entire season.

Lamb gains were 25 per cent less on sweet clover pasture than they were on alfalfa, and when sudan grass was pastured by the lambs, the lamb gain was one-third as much as it was for alfalfa pasture.

When pigs were pastured on alfalfa with a supplement of grain and tankage, the value per acre, for the grain that was replaced by the pasture, was approximately $49, compared with a lot of pigs that were fed in the dry lot for the same period of time. The replacement value of the alfalfa was based upon corn at $1.25 per hundred and tankage at $3.00. The pigs, of course, are much harder on the alfalfa pasture than are the sheep, and for that reason some allowance should be made for restoring the alfalfa after the pigs have pastured it. The pigs were all in a
Corn hybrids, Torrington Experiment Farm.

thrifty growing condition during the pasture period. This alfalfa pasture which produced approximately 4 tons of hay per acre, had a carrying capacity of 40 pigs per acre. In a sugar beet area, where the alfalfa is part of the crop rotation with sugar beets, this method of harvesting the alfalfa by pasturing, rather than cutting for hay, is important for at least part of the alfalfa crop, since it reduces labor costs and divides the farmer’s income risk.

CORN HYBRIDS SHOW BIG YIELDS

Of some 30 corn hybrids that are being grown on the Experiment Farm, all but three gave yields greater than the standard U. S. 133, which has been grown on the farm for a number of years. The U. S. 133 produced 82.5 bushels of grain per acre, and one of the hybrids, Iowwealth, produced 117.4 bushels per acre. When it came to the consideration of silage there were 15 corns that were better than U. S. 133. The highest yield of silage was
17.7 tons per acre. This was 3.5 tons above the U. S. 133. Many of these hybrids promise to make yields considerably above U. S. 133. As soon as the value of these is definitely determined, seed will be recommended to farmers and ranchmen as a means of increasing their corn and forage yields by the use of adapted corn hybrids.

Sorghums as an Emergency Crop

In years of limited irrigation water, or on dry lands in drought years, the sorghums are reasonably certain of producing a crop of forage. The highest yield on the Experiment Farm is 16.5 tons per acre for the forage varieties. Although this is less than the yields of some of the corn hybrids, the fact that the sorghums can mature a crop under droughty conditions gives them a place in the agriculture in this part of the state, particularly on the lands that are non-irrigated or have a limited amount of water for crop production.

Soybeans for Forage

Soysota, a variety of soybeans, produced 8 tons per acre of air-cured forage. This is practically twice as much as the average yield of alfalfa on the farm, but this crop requires planting every year, which is an expense to be charged against the soybean crop. The cost of handling the crop is also more expensive than for the ordinary hay crop. Although the forage from some of the varieties was so small that it was not worth the cost of harvesting, there were a number of others that made yields from 3 to 6 tons per acre.

Pasture on High Priced Land

The Experiment Farm, in cooperation with the Soil Conservation Service, has seeded grass mixtures in four pastures and will test the returns from pasturing with cattle, compared with growing sugar beets, potatoes and corn on similar land. This work is part of a plan of developing pastures on irrigated lands that will be suitable for livestock production and can be used in combination with sugar beet farming.
FEEDERS' QUESTIONS ARE ANSWERED

Feeding corn silage to steers as part of the ration resulted in an average daily gain of 2.4 pounds per head, compared with 2.7 pounds when sugar beet pulp replaced the silage. This is of particular interest to farmers who live outside of the territory served by the beet sugar factories, because it means that they can grow a crop of corn, such as the hybrid varieties mentioned above, and produce very satisfactory gains on their steers. By the use of high yielding varieties, or corn hybrids, the cost per ton of silage can be materially reduced, compared with what it is at the present time, and will tend to make more profits for those feeders who do not have access to sugar beet pulp.

MINERALS DID NOT REPLACE COTTONSEED CAKE

Mineral salts did not take the place of cottonseed cake. It has been suggested that much of the value in the cottonseed cake consisted in the phosphate content, and that this could be supplied more cheaply in mineral form. Accordingly, lambs were allowed free access to phosphate salt mixtures, instead of cottonseed cake, and as a result their gains were 20 per cent less. Not only were the gains less, but the cost of making the gains was increased 32 per cent per hundred pounds.
SEXED CHICKS NOT PROFITABLE

The price of the chick, plus its feed cost up to five months of age, was 59 cents each for sexed chicks, compared with 43 cents each for pullets from mixed chicks. The cockerels sold from the mixed chicks were credited against the feed costs. Due to the fact that there was a fairly good demand for the cockerels, the price of the broilers contributed considerably toward reducing the final cost of pullets at five months of age.

The price of the chick, plus the cost of the feed up to five months of age was 74 cents per pullet when a commercial feed was fed and 31 cents less when the ration was mixed at home. In this case, however, there was no allowance made for the farmer's time in mixing the feed, which work requires some care, as well as time in preparing the feed properly.

WORLAND

MANURE MAKES SUGAR BEETS

When manure was applied to sugar beet land, the yield of beets increased more than 50 per cent. These results were obtained from a rotation in which two years of sugar beets followed four years of alfalfa. The manure was applied to each crop of sugar beets at the rate of 12 loads per acre in the fall of the year and plowed under. The average of the first crop of beets following the alfalfa showed even a greater increase as a result of the manure, the amount being 5.3 tons per acre, or an increase of 60 per cent. In this case each load of manure was worth a little less than half a ton of sugar beets. Although the beets were grown on a heavy fertile soil, they nevertheless showed a very profitable response to the application of manure. Farmers in this section are realizing the great importance of barnyard manure, and as a result they plan to use every vestige of roughage and grain as well as some shipped in feeds, for livestock feeding. These experimental results prove beyond any question that even on alfalfa land barnyard manure makes profitable increases in sugar beet yields.

3The experimental work on the Worland Farm was closed November 1, 1939.
SWEET CLOVER PASTURE IS USED FOR A SHORT ROTATION

For a short rotation, sweet clover may be combined with the growing of sugar beets. In this test the sweet clover was pastured the second year with lambs. The lambs gained 542 pounds per acre. These lambs were fat before any appreciable numbers of fat lambs were moving to markets. This pasture year was followed by two crops of sugar beets. The beet yield was a little less than 12 tons per acre. This rotation, however, is not adequate to maintain soil fertility, but can be used for part of the farms where a quick turnover is necessary. The lambs do a splendid job in cleaning the fields of weeds. Lamb gains have not diminished during seven years. In fact, in the fifth year of pasturing the lambs gained more than 700 pounds per acre, but the beet yields have tended to decrease. In any system of farming in this part of the state the plan should be to apply barnyard manure to the beet crop in as generous amounts as is possible.

BETTER BEANS DEVELOPED

Breeding of seed beans for improved strains resulted in several better types than the parent stock. One of these, a new Golden Wax type, appears to be a true sport from the parent and has been grown for several years on the Experiment Farm. This particular bean grows on a bush which is considerably larger and
more leafy than the parent. This increased growth and leafiness protects the pods from sun scalding and spotting, factors which are objectionable in the canning industry. The plants of this new bean have more pods, which are longer and are nearly straight, as contrasted to the curved pod of the parent beans. The straightness of the pods is a characteristic very much in favor with the cannors, because it makes a better looking pack and adds to the ease of handling. Work for the improvement of other beans is being continued for the purpose of improving seed beans, which is a very important crop in the Big Horn Basin.

HILL PLANTING AND MECHANICAL BLOCKING AID SUGAR BEET PRODUCTION

The customary method of planting sugar beets in long, continuous rows is giving way to hill dropping. This method saved about one-half of the seed, but did not result in appreciable differences in yields, compared to beets that were hand blocked or mechanically blocked. Where there is a uniform stand of beets, the mechanical blocking can be done with very good results, compared with hand blocking. It is a means of thinning the beets very rapidly by a mechanical device, and this eliminates a good
many weeds and gives the blocks of beets a little time for improved rate of growth before they are thinned, which is not possible where the work is all done by hand. The beet labor also moves a little faster when it is working in the fields that have been mechanically blocked. This is due largely to the fact that the soil has been loosened around the beets as a result of the cross-row cultivation by the blocking machine.

**USE OF IRRIGATION WATER IS IMPORTANT**

When a foot of water was used throughout the summer season in irrigating beets, the yield was 13.25 tons per acre. As the water was increased, the yield of beets went up, but not in proportion to the amount of total water used. A large amount of the water was measured as waste or run-off. The waste water that had gotten away and had gone beneath the range of the beet roots was about 10 per cent when one foot of water was applied; and when 1½ feet were applied the waste was 22 per cent; and when 2 feet of water were used in irrigating the beets, the water that got away from the land was 26 per cent. In the latter case the yield of beets averaged 16 tons per acre. This work has just been started and indicates the need for systematic studies in the beneficial use of irrigation water. It is important in Wyoming that a more intelligent use be made of our irrigation water for various crops and under various soil conditions. Large applications of water may actually depress the yields and in addition will tend to injure the soil for subsequent crops. With limited supplies of irrigation water in many parts of the state, it is highly important that detailed studies be made with reference to its most efficient use in the state’s agriculture.

**SELF-FED LAMBS MAKE LARGER GAINS**

When lambs were on a ration of whole barley, wet beet pulp and alfalfa, they made an average daily gain of .19 pounds per head daily, when the barley was fed in a separate grain lot. With a self-fed ration of ground barley and dried beet pulp and long alfalfa, the rate of gain jumped up to .25 pounds per head daily, which was practically 30 per cent greater than where the
hand feeding had been done. The percentage of fat lambs was considerably greater, also, than in the case of hand feeding. In practically all rations where the lambs were self-fed the gains were considerably higher than they were in the hand-fed lots. The death losses in the self-fed lot were not higher than they were in the hand-fed lots.

In self-feeding lambs considerable time is saved in hand labor, but it is important that a supply of the mixed feed be on hand at all times, or there is danger of the lambs overeating when they have been without feed for some time. For this reason feed and water should be constantly available to the lambs.

In one test where whole barley was mixed with the dry pulp and self fed, the gains were about as good as where the grain had been ground, and the death loss was not significantly different from those in the other lots. However, at the close of the feeding period losses occurred, which perhaps might be attributed to using whole barley in a self-fed mixture. The lamb feeder would do well to be careful to avoid using whole grain in a mixture to be self-fed, because the lambs are likely to pick out the grain to the exclusion of the other parts of the mixture.
SPAYED HEIFERS MAKE GOOD GAINS

Spayed heifers made larger gains than did bred heifers, but not as large as the open heifers, which gained at the rate of 2.8 pounds per head daily. The heifer groups, in all cases, gained a little more than did average grade steers, and the feed cost for putting on a unit of gain was less for the heifers than the steers. This work was carried on at the request of cattle feeders in the Big Horn Basin, they believing that the spayed animals would make enough better gains to pay for the expense of spaying them. These animals were spayed shortly before going into the feed lot, and it is probable that if the operations had been made earlier in the season, the spayed heifers would have been completely recovered at the time of going into the feed lot, and perhaps would have shown gains even better than the open heifers did.
The following publications of the Wyoming Experiment Station may be had upon request: (Revised list, January, 1941).

**ANNUAL REPORTS—**
19th to 50th, inclusive (1908-9 to 1939-40, inclusive, except 21st and 22nd.)

**INDEX BULLETINS—**
E, G, and H.

No. **STATE FARMS BULLETINS—**

No. **CIRCULARS—**

No. **BULLETINS—**
112. The Poisonous Properties of the Two-Grooved Milk Vetch (*Astragalus bisulcatus*).
116. Winter Grains.
163. Results with Tree Planting at the Sheridan Field Station.
185. Barley Tests at the Sheridan Field Station.
205. Economic Studies of Irrigated Farms in Big Horn County.
209. Forty Years of Weather Records.
212. Steer Feeding in Southeastern Wyoming.
216. Sugar Beet By-Products for Fattening Lambs.
220. Study of Psyllid Yellows in Wyoming.
221. Occurrence of Selenium and Seleniferous Vegetation in Wyoming.
223. Corn Production on the Campbell County Experiment Farm.
227. Sugar Beet Tops, Cottonseed Cake and Mono-Calcium Phosphate in Rations for Steers.
228. Type of Farming and Ranching Areas in Wyoming.
229. Vegetative Composition, Density, Carrying Capacity and Grazing Land Values in the Red Desert Area.
231. Poisonous Plants and Livestock Poisoning.
232. Breastbones of Turkeys.
234. Cellar Wintering of Bees.
237. Roughage Feeding of Dairy Cattle.
238. Wintering Bees in Wyoming.
239. The Two-Queen Hive and Commercial Honey Production.
240. Salinity Conditions in the Big Horn River During the Years 1938 and 1939.
241. Livestock Poisoning by Oat Hay and Other Plants Containing Nitrate.
243. Practical Results from the State Experiment Farms.