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Utah's Farm Prosperity Depends on

Expanded Markets

TRADE BARRIERS MUST BE ELIMINATED

By VERNON L. ISRAELSON

From the point of view of physical access to markets, Utah is adversely situated. It is undoubtedly correct that within a radius of 500 transportation miles no other city in the United States of size comparable to Salt Lake has such a sparsely populated area or surrounding region. Utah and her six contiguous states comprise 24 percent of the land area of the United States, whereas in 1950 these seven states had less than 3 percent of the nation's population.

Los Angeles, which is Utah's most important single market, is 822 rail miles from Ogden, Denver is 577, Omaha 990, and Chicago 1478 rail miles. The fact of distance to market for Utah products is more clearly seen by using an actual example. Using only carlot unloads in the largest city in each state to which Utah fruits and vegetables were sent in a recent year, and making arbitrary assumption that all these 2474 carloads were shipped from Ogden, which somewhat understates the distances, these 2474 cars travelled an average of 1401 miles each to reach their respective destinations. Thus the average movement of these products was only slightly less than the distance from Ogden to Chicago.

In addition to the barrier of distance to major consuming centers, Utah is confronted with the additional barrier of topography. Whether produce moves east or west from this point to any metropolitan center, it must be transported across a mountain range. Thus distance and topography constitute two great natural barriers standing in the way of transporting our goods to principal markets. These can never be entirely obviated. Through vast expenditures for railways, through engineering skill in the construction of super four, six, and even eight lane highways, and with greatly improved rolling stock, the time factor is vastly reduced in reaching these markets. This is not to mention the airways for which the transportation of agricultural commodities is at the present only a minor role in this vast flow. They seem to give similar promise for the foreseeable future. Technological improvements have greatly extended the possible physical boundaries of the market but these improvements are shared by all and because of our barriers they are available to us only at a cost which is greater than that enjoyed by some of our competitors.

High Railroad Rates

Railroad rates in this immediate area are at or near the highest levels that prevail in the United States. Prior to the eleven postwar freight rate increases that have been authorized by the Interstate Commerce Commission, the level of rates in Utah was roughly 75 percent higher than in the rail territory including generally the states east of the Mississippi and north of the Ohio Rivers. In zone IV of

(Continued on page 64)
Dr. Orson W. Israelsen, professor of irrigation and drainage and acting head of the department until last July 1, was given the nation’s highest award in the field of agricultural engineering—the John Deere Gold Medal—at the annual meeting of the American Society of Agricultural Engineers in Pittsburgh, Pennsylvania, June 17. Dr. Israelsen became professor emeritus July 1. He will continue his research program on a part-time basis.

From a brochure distributed on the occasion of the award, the material for which was prepared by Dean J. E. Christiansen of the School of Engineering, we take the following with slight modification and deletion:

"Choice of Dr. Orson W. Israelsen by the Jury of Awards of the American Society of Agricultural Engineers to be the John Deere Gold Medalist for 1953 might well be based on any of three aspects of his career—research, teaching, or practicing and consulting engineering. Yet somehow the height of his attainment seems overshadowed by the lofty rectitude and fortitude of his personality, his caliber as a man.

Orson W. Israelsen was born December 25, 1887, in Cache Valley at Hyrum, Utah. His parents were immigrant pioneers of humble estate. Growing up as a farm boy he did his share of chores and other farm tasks. When the time came that he needed a picture to appear in his high school yearbook, he earned it by building a pasture fence for the photographer.

He was graduated a bachelor of science in 1912 from Utah State Agricultural College... continuing his studies at the University of California, he took a master’s degree in irrigation engineering in 1914. There too... he received his Ph.D. in 1925. Meanwhile, during much of 1913, he had begun studying distribution of water in soil for the U.S. Department of Agriculture, and continued similar studies for the University of California during 1914-16.

In the summer of 1916 Dr. Israelsen returned to Utah State Agricultural College as a member of the faculty, and there—except time out for his doctorate study in California—he has continued ever since. After assistant and associate professorships he became, in 1919, professor of irrigation and drainage engineering. For some eighteen years he has been head of the department, and has served as acting dean of the school of engineering. Almost from the start, beginning the summer of 1917, he has been repeatedly, almost regularly, in active or consulting practice. A list of more than thirty engineering engagements show them to run from a few days to several years, some overlapping and some still continuing. Geographically they range from Canada to Brazil, though most of them are in his own or neighboring counties or states.

Dr. Israelsen designed the hydraulic laboratory for the school of engineering in his own college, drainage and culinary water systems for towns of Newton and North Logan, as well as drainage and irrigation improvements for a considerable number of districts, counties, and corporations. As engineer, consultant or collaborator he has also served federal agencies...

To those who know of Dr. Israelsen only by his works, is may well be an astounding revelation that for more than half his professional career he has heard no sound whatsoever. It was in May, 1928, that he was stricken with epidemic spinal meningitis, of such severity as to imperil life, and with dramatic abruptness—a matter of minutes—passed forever into a world of complete silence. Colleagues and personal friends marvel at his mastery of new modes of communication, and his fortitude—almost to the point of nonchalance—in making the necessary adjustments in living. Outside those personal circles there has been no apparent change in his activities and achievement.

As one of the West’s... highest authorities on water in dry regions, it was almost inevitable that he should become an expert witness in court cases arising from conflicting interests and conflicting ideas as to rights in and use of...

(Continued on page 66)
TRANSMISSION OF Staphylococcosis IN TURKEYS STILL UNSOLVED

By ROYAL A. BAGLEY and WAYNE BINNS

How staphylococcosis or synovitis in turkeys is transmitted is still a mystery and until this problem is solved, little information can be given to turkey growers on how to prevent the disease. However, the disease has been studied for a number of years by the staff of this and many other experiment stations and many of its characteristics and transmitting agencies have been found, but to the present the means of transmission has eluded researchers.

DR. ROYAL A. BAGLEY is a former graduate of USAC who has recently returned on the staff as assistant professor of veterinary science after receiving his D.V.M. at Colorado State College. Before going to Colorado, Dr. Bagley did some of the original research at this Station on staphylococcosis. DR. BINNS, head of the Department of Veterinary Science, returned to the campus July 1, after a year spent in graduate study at Cornell University on a Danforth Foundation fellowship.

The hock joint is swollen, tender, and has an increased amount of fluid

As the turkey industry has grown in Utah staphylococcosis, which was first described eighty-two years ago by Prahl, has become one of the most important disease problems the industry has to face. Losses can be quite variable in different years and in different flocks, running from 5 to 20 percent. The disease first appears on the range in birds from 9 to 14 weeks of age and can persist in the flock until marketing time.

Cause

Staphylococcosis is a bacterial disease apparently caused by the organism Micro-

 cocus pyogenes var. aureus. This organism can usually be isolated from infected birds showing typical symptoms. However, there seems to be several strains of the organism which may show up in different flocks. A strain may be likened to a family called Jones which has four boys. Each boy has certain characteristics that make him different from the others, but he still has certain basic characteristics common to all the Jones family. The disease organisms have been found on the ground, in the feeders and watering troughs, and in range houses where turkeys are raised.

Whether there is another agent, such as a virus, that combines with bacteria to cause the disease is not known at present. The question of predisposing factors must also be explored further. Such factors as nutrition, rate of growth, genetics, sex, age, breeds, management, environment, and sanitation are undoubtedly important items to be considered.

Disease Characteristics

Birds with staphylococcosis become depressed, show a loss of appetite, are reluct-

(Continued on page 66)
Dr. Lorin E. Harris, left, and Dr. C. Wayne Cook, Utah State Agricultural College scientists, received $5,000 Hoblitzelle National Award for their outstanding research in nutrition and range management. Award made May 20 at meeting of Texas Research Foundation, Renner, Texas.

**Cook and Harris RECEIVE HOBLITZELLE AWARD IN AGRICULTURE**

Brief mention was made in the June issue of Farm and Home Science of the presenting of the Hoblitzelle award in agricultural science to Dr. C. Wayne Cook and Dr. Lorin E. Harris, Utah Station staff members. Notice of the award came too late to include a longer article in that issue. These two Utah Station scientists received gold medals and shared in the $5,000 award for the greatest contribution to American agriculture during the past two years for their research in range nutrition, including factors affecting the chemical composition of range species, botanical and nutritive composition of the sheep's diet, supplementary feeding trials on a detailed experimental basis and also on a practical basis. In this research these men developed a unique method for measuring the composition of the foraging sheep's diet. They also contributed outstanding information about the botanical and chemical nature of range forage and have devised a means of feeding sheep individually on the open range. Their work has been described more fully in earlier issues of Farm and Home Science 9(3)8-11, 1948; 11:32-33, 42, 1950; 12:48-49, 63, 1951) and in two bulletins, "The nutritive content of the grazing sheep's diet on the summer and winter ranges of Utah," Bulletin 342, and "The nutritive value of range forage as affected by vegetation type, site, and state of maturity," Bulletin 344.

The purpose of the Hoblitzelle award is to encourage scientific research in agriculture and to provide suitable recognition for the results of research. It is given every two years by the Texas Research Foundation at Renner, Texas. The winners are chosen from names submitted by thirty-nine regional committees in the United States, Hawaii, and Alaska. The selection committee is composed of leaders in the field of agriculture from all over the country.

Dr. C. Wayne Cook, associate professor of range management received his B. S. at Fort Hays Kansas State College, his (Continued on page 68)
Increased Numbers of Fall and Winter Freshening Cows Offer More Stable Yearly Milk Production

By WELLS ALLRED and THOMAS I. GUNN

SEASONALITY of milk production is a problem confronting the dairy industry. While consumption of fluid milk is relatively stable throughout the year, milk production fluctuates during different seasons with high production in the spring and summer and lowest production during the fall and winter months. This conflict in the production and consumption patterns poses many problems to the dairy industry—particularly to the Grade A producer. First, it results in a relatively large amount of grade A milk being sold for a price reflecting its use in manufactured products during the months of high production. Second, there is the possibility that during months of low production distributors will be unable to provide adequate supplies to customers. Third, opportunities for increased out-of-state shipments of grade A milk are likely to occur during the periods of low production in other states. A more even production pattern in Utah would enable our producers to meet this demand when it occurs. Fourth, distributors must have sufficient plant capacity to handle all the milk produced during peak periods, which results in partially used plant facilities and higher per unit processing costs during periods of low production.

More Stable Production

A more stable production could be obtained in Utah by increasing the percentage of fall and winter freshening cows. Production costs are apparently lowest for dairymen with fall and winter freshening herds. Studies made in Maine, Vermont, and New York indicate a substantial decrease in cost of producing a hundred pounds of milk with fall and winter freshening herds as contrasted with those freshening in the spring and summer. These data are probably applicable to Utah conditions. In all 4 states cows are generally dry lot fed for from 4 to 6 months. Pastures are best during the late spring and early summer and generally become less productive during July and August. Thus spring and summer freshening cows are frequently underfed and excessively bothered with insects during a crucial period of milk production, whereas fall and winter freshening cows are dry or drying up during this period. Hence fall and winter freshening cows should produce higher than those freshening in the spring and summer. This higher production is the major reason for the lower unit costs of producing milk from fall (Continued on page 67)
A rank growth of canary grass uses excessive quantities of water, builds berms into the canal, and lodges in the canal to obstruct the flow of water.

**CHEMICALS WILL CONTROL**

**TWO SERIOUS WEED PESTS IN UTAH**

**Quackgrass and Canary Grass**

By F. L. TIMMONS and W. O. LEE

Quackgrass (*Agropyron repens* L.) is a serious and rapidly spreading perennial weed in fence rows, small irrigation ditches, gardens, and lower-lying wetter fields in northern Utah. It develops a dense growth which crowds out crop plants in gardens and fields and obstructs the flow of water in small irrigation ditches. The tough sod formed by the fibrous roots and numerous rootstocks is difficult to plow and till, especially in small gardens.

CMU applied in March 1953 (right foreground) gave much better elimination of canary grass than the same treatments applied in December 1952 (left foreground). This picture taken two years after early spring treatment with CMU shows control of quackgrass in an irrigation head ditch as compared to untreated area in background.

Fall treatment with CMU also gave good control of quackgrass for two years.

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Quackgrass is quite commonly, but erroneously, called Johnson grass in Utah. Johnson grass (Sorghum halepense) is a southern grass that resembles cultivated sudan grass closely except for the course perennial roostocks on the former. Johnson grass occurs in Utah only in the extreme southern part where it grows 4 to 7 feet tall. Quackgrass rarely grows taller than 2 to 3 feet.

Reed canary grass (Phalaris arundinacea L.), a desirable pasture grass for wet lands, is proving a serious nuisance in small farm irrigation ditches and along continuously flowing irrigation canals. Canary grass is spreading rapidly along such canals in Cache County. The grass develops berms which extend out into the canal reducing the water carrying capacity. During the summer and fall the tall course-growing canary grass lodges into the canal greatly obstructing the water flow, raising the water level, and increasing seepage losses and overflows. The grass growing at the water line cannot be reached satisfactorily with a mower even where there are roadways on both sides of the canal.

Canary grass is easily controlled in cultivated fields and is no problem there or in pastures where it is grazed by livestock. Quackgrass, on the other hand, is a serious problem in alfalfa meadows, pastures, and cultivated fields. It can be eliminated in cultivated fields by one full season of intensive cultivation but in non-cultivated areas herbicides offer the most effective and economical means of eradication. The following recommendations are based upon experimental results to date.

1. For quackgrass in gardens or small patches in cultivated fields: plow or spade the land in the fall, apply TCA at one pound per square rod in water with a sprayer or sprinkling can. Cultivate again in the spring and gather up fragments of quackgrass rootstocks left alive by the chemical.

2. For quackgrass and canary grass in fence rows, road sides, and small ditches: apply CMU at 1/4 to 1/2 pound per square rod, Atlacide or sodium chlorate at 6 pounds or Polybor-chlorate at 12 pounds per square rod in the fall or not later than April 10 in the spring. Burn dead vegetation before making chemical applications. Apply retreatments a year later as necessary to eradicate any surviving grass.

3. For canary grass on inside banks of irrigation canals: burn off accumulated growth in late fall or early spring and apply CMU at 1/2 pound per square rod in water. Retreat surviving grass as necessary one year later. It is important that the CMU be applied when there is no water in the canal and when there is likelihood of considerable rain or snowfall before water is turned into the canal.

Repeated heavy applications of sodium chlorate gave some control of quackgrass on the ditch bank but none in the bottom of the ditch.
Utah sheep producers will save money by USING SCOURABLE BRANDING PAINT

By DOYLE J. MATTHEWS and MILTON A. MADSEN

The wool grower in the range area must brand his sheep in order to identify them properly. His objective has been to obtain paint that is easily applied and will be legible throughout the entire year. Several materials have been used; however, all of these branding fluids have created a problem for the wool manufacturer. Before the manufacturing process starts it is necessary to separate all extraneous material from the wool. The paints ordinarily used will not dissolve in the scouring process. These paints can only be separated by hand-clipping the paint from the wool. This is a costly process and it is nearly impossible to remove all of the paint. The remaining paint interferes with the wool processing machines and, wherever found in a fabric, reduces the value and marketability of the product.

A large woolen manufacturing company reports that the average wool sorter must spend one-half hour daily clipping the paint from the wool. If this process could be eliminated, it is estimated that there would be a saving of 5 cents per pound of clean wool in the manufacturing processes. This saving would decrease the manufacturing cost of wool about 10 cents per sheep shorn, or approximately $125,000 per year. This would amount to $1,200,000 per year on the wool produced in the eleven western states.

It has been recognized for some time that some type of paint should be developed that would provide a fairly durable, legible brand and yet could be removed during the usual scouring and manufacturing processes. In 1950 G. C. LeCompte of the U. S. Department of Agriculture, after preliminary studies, reported that a durable and scourable paint had been developed.

Suitability of Scourable Paint Tested

It seems reasonable that paint which will wash out in the scouring solution will tend to lose its legibility during the months of rain, snow, and weathering on the range. To discover if this was the case, the Utah Station initiated a study in 1952 to determine the suitability of the scourable paint under Utah conditions.

In the spring of 1952 the scourable paint and a commercial non-scourable paint were tested in the range herds of two cooperators. The two paints were applied at random to approximately equal numbers of sheep in each herd at shearing time. In the first herd, 2,040 sheep were branded, and in the second, 2,808 sheep.

In the fall, six months after the application of the brands, the two herds were rounded up on the range and the brands were scored on legibility.

The scoring system, as illustrated in fig. 1, designated clear cut and obvious brands as 1. Progressively less obvious brands were designated as 2, 3, or 4. Extremely indistinct brands were labeled 5.

Average scores for the herds and different paints tested are shown in table 1.

Favorable Comparison

Although the average scores show the commercial non-scourable paint was slightly more legible in every case, the differences were significant only in the first herd and, even there they were not pronounced enough to be detected by casual inspection of the whole herd. In the second herd there was practically no difference in scores.

The two paints had different average scores in the two herds because of a difference in wool fineness. Fine wool retains the legibility of a paint brand much longer than coarser wools.

The different colors of paint used were approximately equal in legibility.

Approximately 12 percent of all brands were not legible at scoring time and could not be identified. These brands were usually on extremely coarse woolled sheep.

DOYLE J. MATTHEWS is assistant professor and Milton A. Madsen is associate professor of animal husbandry.

Fig. 1. Pictures taken during scoring which show typical brands in each of the scoring categories from 1 to 5

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Fig. 2. A comparison of the effect of scouring on the non-scourable and USDA scourable paints. Top row, left, wool sample with non-scourable brand; center, after passing through one scouring solution; right, after passing through two scouring solutions. Note that the non-scourable paint actually tends to soften and spread during scouring. Bottom row, left, wool sample with USDA scourable brand; center, after passing through one scouring solution; right, after passing through two scouring solutions.

At shearing time in the spring of 1953 a random sample of these brands was taken for scouring. This phase of the study has not been completed. However, all sample comparisons between the two paints have given results which correspond to the illustrations in fig. 2. From these comparisons, the value of the scourable paint is obvious.

As a result of further experimentation, changes are being made in the USDA formulae to improve the durability of the paint.

On the basis of the information collected, the authors recommend the adoption of the USDA scourable branding paint in the hope that the money saved in the manufacturing processes will be passed back to the sheep producer.

NOTE: The scourable branding paint is manufactured in the West by the Rodda Paint Company of Portland, Oregon, and distributed by the Pacific Wool Growers' Association, 314 North West Avenue, Portland, Oregon. The price is approximately $3.50 per gallon which compares closely with non-scourable paints.

Table 1. Average brand scores of sheep branded with scourable and non-scourable paint, October 1952

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for September 1953
A TEST OF DURABILITY OF CANAL LINING MATERIALS IS THEIR ABILITY TO RESIST Root Penetration

By C. W. LAURITZEN

Farmers and irrigation companies are generally convinced of the advantages of lining canals to prevent seepage losses and thereby save water for crop production. The high cost of conventional linings, however, has limited lining progress and the lining of many canals awaits the development of lower cost materials.

There are many factors to consider in developing a lining among which are ease and cheapness of construction, together with durability.

The Utah Station in cooperation with the Soil Conservation Service has been engaged in investigations over the past years to find an effective and lower cost lining material. One of these investigations has been on the use of asphaltic membranes. A buried asphaltic membrane is now coming into wide use. The durability of this type of lining and some others is dependent among other things on the readiness with which they are penetrated by plant roots. This report is limited to the results of some initial studies in which alfalfa seed was planted in soil above samples of several liners and the extent of root penetration noted. A container consisting of three separate compartments, one above the other was used. The membranes to be studied were inserted at the junctures of these compartments as they were filled with soil and function as barriers separating the soil column in the containers. As the seeds germinated and grew, the advance of the roots was observed through the glass fronts of the container. Finally the soil was washed away from the roots and the extent to which they had penetrated the liners was observed and photographed.

Included in the test were samples of the following liners:

1. Fiberglass reinforced asphaltic membrane.
2. Paper-backed membrane—P.
3. Asphaltic-coated asbestos membrane.
4. Paper-backed membrane—P.
5. Butyl-coated fiberglass.

Three of these containers with the plants growing in them just prior to washing the soils away from the roots to determine the extent of penetration are shown in fig. 1. The roots with the soil washed away are shown in fig. 2 indicating the extent of penetration. The lining material in the container at the left is the asphalt-coated asbestos liner. The one in the center and the one at the right are paper-backed asphaltic liners. No roots penetrated the asphaltic-coated asbestos liner. On the other hand, roots penetrated the paper-backed liners. The asphalt-coated asbestos liner in the container to the left in fig. 3 has been pulled away from the soil and is standing on edge...
below showing that no roots have penetrated. The container at the right shows that roots penetrated the upper liner readily over the entire area. The roots had to be broken away from the liner at the lower depth in order to tip the upper compartment which accounts for the short length of roots coming through the upper liner. Fig. 4 differs from fig. 3 only in that the upper side of the asphalt-coated asbestos liner is photographed to show that while the roots did not penetrate this liner, they were imbedded to some extent in the surface. Roots growing through a fiberglass reinforced membrane are shown in fig. 5. The container in which butyl rubber was tested is shown in fig. 6. As will be seen, there was no penetration of roots through this liner. Fig. 7 shows this liner with the top compartment tipped up and the liner pulled away to show the concentration of roots at the top of the liner. The liner is draped on the container below. There was no penetration of the roots or imbedding in the butyl rubber. The other sample of paper-backed liner and the sprayed membrane were also penetrated by roots, the roots penetrating over the entire area of the liners at both depths.

These tests indicate the asphalt coated asbestos liner will be much more resistant to root penetration than the other types of asphalt liners tested and that the butyl rubber liner will be even more resistant. The plant used in these tests was alfalfa. It is possible that if other plants had been used, other results would have been obtained. Additional tests are planned using other plants.

Some tests are in progress to determine the resistance of various membrane liners to sprout penetration. In these tests seeds and rootstocks will be buried under the upper liner and the emergence of plants through the liners observed. Preliminary tests indicate that alfalfa seedlings will not penetrate any of the liners tested. The ability of other seedlings and sprouts from root cuttings of woody plants such as wild rose and willow has not yet been tested. The ability of plant shoots to penetrate asphaltic linings, however, is well recognized and subgrade sterilization is a requirement of good construction practice except where canals are constructed through relatively sterile desert areas. A number of sterilizing agents have been used. Polybor-chlorate at the rate of about 0.8 pounds per square yard is commonly used at the present time with fair results. Other new soil sterilents such as CMU may prove even more effective.

The addition of any reinforcing agent or filler to asphalt membrane liners seems to increase the resistance of the structure to weathering and aging in contact with the soil. This is not always true of root penetration and cannot be confirmed insofar as the effectiveness of fillers and reinforcing agents in controlling seepage losses is concerned. Butyl rubber is the most resistant of all these materials to weathering and the processes of aging in contact with the soil as well as root penetration.

From left to right. Fig. 1. Three of the containers used to study root penetration of membrane canal liners showing plant growth just prior to washing roots free of soil.

Fig. 2. The membrane in container at left is an asphalt coated asbestos liner, in the center container, a fiberglass reinforced asphalt liner, and the container at right a paper backed liner.

Fig. 3. The same liners shown in 2 with the top compartment of the containers at left and right tipped up to expose the underside of the membrane.

Fig. 4. This figure differs from 3 only in that the upper side of the liner at left is photographed showing the embedding of roots in the surface.

Fig. 5. Roots growing through a fiberglass reinforced membrane.

Fig. 6. In this test a butyl rubber liner was used.

Fig. 7. The upper compartment of the container in fig. 6 is tipped to show the concentration of roots above the liner and the upper surface of the liner free of any embedding of roots.

For September 1953
Dr. Walker, as assistant director of the Foreign Agricultural Service, in charge of the technical assistance program, discusses problems connected with its services in Thailand with M. C. Chakrabandd, assistant dean at the College of Agriculture, Bankben, Bangkok.
sufficient food, healthier bodies, and a chance for their children to have better things than they themselves have had. These instinctive desires have reached the boiling point in some countries and resulted in an overthrow of the government—all in an effort by the people to improve their lot, so they can live as other free people of the world.

It is easy to understand that people with so little to look forward to, might readily be attracted by the promises of communism. The promise of ownership of land, of plenty of food, and of other things, even though these promises are not well founded, undoubtedly sound good to people who perpetually are hungry and inflicted with disease, without opportunity for medical treatment. It is no wonder that communism has appealed to millions of people, and that they have permitted themselves to be absorbed into it without knowing what the future actually held in store for them.

Technical Cooperation Program

To aid in meeting this situation the United States government has developed the technical cooperation program. In this program our government is cooperating in such a way that we can share with the underdeveloped countries the modern skills, methods, and scientific discoveries that will enable them to develop their own resources. It is believed that if we can help these people increase their production of food products, to improve sanitation and health, and to raise their educational level, it is less likely that they will be tempted by, and fall into, the trap of communism. (People instinctively crave freedom, and they will give their lives to get it, and to preserve it. It is on this premise that the technical cooperation program is based.)

The Technical Cooperation Administration, an agency of our government, functioning under the new Foreign Operations Administration, has been given the responsibility of conducting the technical assistance program. This agency, the TCA, has sought and utilized the cooperation and assistance of other agencies of the government which are responsible for technical programs here in America. For example, the U. S. Department of Agriculture has been requested by TCA to aid in conducting the agricultural aspects of the technical cooperation program. Likewise, the U. S. Public Health Service has cooperated with TCA in carrying out the sanitation and health programs of technical assistance. The Bureau of Reclamation has aided in the irrigation and reclamation programs, the U. S. Office of Education has given assistance in education. Other government agencies and also the land grant colleges and universities, and many non-profit, private agencies and foundations have contributed generously in the support of this program of technical assistance in foreign countries.

Objectives of the Program

The long-range objectives of the technical cooperation program are to help the people of the underdeveloped countries to help themselves. This is done by sending technically trained men and women into these countries to work with officials of the cooperating country to train them how to do some of the things that we have learned to do here in America and which we have found to be effective in increasing food production, and in improving sanitation and health conditions. Agricultural extension agents are working with officials of other countries, showing them how to organize an extension service, how it should be administered on the national level, and how it should function on the village level. Agronomists are teaching the farmers how to improve their cultural practices, how to use commercial fertilizer, how to irrigate their lands, and how to use some of the smaller machine tools to make their work more effective and with more efficient use of human and animal labor. They have helped them to introduce new crop varieties, and test varieties for adaptation to their own soil and climatic conditions. Livestock specialists and veterinarians have taught the farmers how to vaccinate and otherwise treat their animals for the control of disease. Improved breeding stock of poultry, sheep, and dairy cattle have been introduced to aid in building up the quality of animals grown. Entomologists have demonstrated new methods and procedures, and new insecticides for the control of insects that have normally destroyed a large percentage of the crop for many generations.

In brief the technical cooperation program is one of education. American technicians work along side the government officials or leaders of the cooperating government and train them how to utilize the skills and methods we have developed in this country. It is not a program, as some have believed, where American technicians are sent to a foreign country actually to do the work involved in developing the resources of the country, and to carry on a program of food production, improvement of sanitary conditions, and to conduct health and educational programs. The basis of the entire program is education and training of people to help themselves.

Most of the underdeveloped countries are essentially rural and most of the people are engaged in food production. Consequently the major effort in the technical cooperation program is in the field of agriculture. More than three hundred agricultural technicians are now engaged in this program and distributed in more than thirty countries.

These people have been received in a most friendly manner by the people with whom they are working. It is not difficult for the people of these underdeveloped countries to see that the agricultural technicians are there to help them when they show them how they can increase food production, control harmful insects, and improve their plant and animal breeding stock. Real friendships are formed which serve as a solid base for the development of peace between the cooperating countries. It is the opinion of many people who have been engaged in this work that it is one of the most effective instruments in promoting peace among the nations of the world. It is concrete evidence that we are willing to share with them our knowledge and skills, the principal things necessary for the development of any nation.

Another phase of the technical cooperation program is conducted here in the United States. Young men and women who are potential leaders in their country are brought to this country for a period of training in their chosen field of specialization. Some attend school in a college or university for a year, or in some cases for a longer period. Others are given practical experience in their special field in different parts of the United States so they will have a variety of experiences which will be helpful to them when they return to their home country.

In short the technical cooperation program can be an effective instrument in promoting the democratic way of life and also peace among the free nations of the world. It is the kind of program that might well have the full support of all people who are interested in peace and cooperation among nations. Furthermore, although it is costing an appreciable sum of money, its cost is only a small portion of the total foreign aid program and far less than the cost of the military program. It costs much less than does the construction of a single battleship or an atomic bomb. It promotes peace and preserves human life, and it develops the dignity of man.
LET'S DO IT WITH

Electricity

By ALBERT B. SMITH

States both in the home and in the various farm buildings. Electricity performs equally well in lighting, heating, cooling, and in mechanical power. It has been of great service to the farmer in the recent years of labor shortage when good labor was scarce and high priced.

Electricity will do the work of a hired man for much less cost. Much farm work can be adapted to the use of electric energy. On the dairy farm for instance, electricity will milk the cows, clean the barn, grind the feed and distribute it to the cows, cool the milk, heat water for cleaning purposes, and do many more things. The average dairyman uses 150 man-hours of labor to milk and take care of a cow for a year. The best dairyman using modern methods and modern machinery can do it in much less time.

In poultry farming the use of electric power can make the operation nearly automatic. Lights to extend the working day of the hen can be turned on by a time clock; automatic feeding can be started by a time clock and run for long enough to fill the feed troughs. This feeding operation alone can cut the time spent in feeding by a third. Thus a poultryman can handle about three times more birds if he will take advantage of the available electric labor saving machines that have already been adapted to the production of poultry.

Electric power is much cheaper than man power. Rates are usually established so that the more equipment used, the less it costs for each additional kilowatt hour of energy. From the rate schedule of one Utah power company, the minimum bill is one dollar and this will include the first 20 KWH (kilowatt hours) used, or a cost of five cents a KWH. With 60 KWH, the bill will increase to $2.19 or a cost of 3.65 cents per KWH. With the use of 200 KWH per month, the average cost per KWH is about 2.95 cents. If enough equipment is added to use 400 KWH per month, the bill will go up to $9, but the average cost per KWH is 2.25 cents.

With electricity available on nearly 90 percent of the farms of Utah, the efficient farmer can reduce his labor costs by making electricity work for him.

In the past hundred years the people on farms in the United States have decreased from 85 to 15 percent of the population, yet food production has kept pace with the greatly expanded population. This decrease in the food producing part of the population has been made possible by improved crops and livestock which produce higher yields, and by more efficient farm practices which include the greater use of mechanical power. The laborers who used to work on farms are now the workers who are making the radios, television sets, automobiles, and countless other things that we now consider everyday conveniences, but which were luxuries less than fifty years ago. The future of American agriculture will depend to a large extent on how well the farmer is able to let mechanical power do his work.

Electricity is a form of power now performing a great variety of services on more than 2,000,000 farms in the United

HERE'S WHAT ONE KILOWATT HOUR WILL DO IN THE FARM HOME

Light a 40-watt lamp for 25 hours or
Run a flatiron for 2 hours or
Pump 1,000 gallons of water from a shallow well or
Wash 70 pounds of clothes or
Refrigerate food for 18 hours or
Run a radio for 15 hours or
Run a vacuum cleaner for 3 hours or
Cook a meal on an electric range or
Run a sewing machine for 8 hours or
Tell time for 20 days or
Operate a mangle for 50 minutes or
Take care of doorbells for a month and one-half or
Toast bread for 8 mornings or
Percolate 40 cups of coffee or
Operate a kitchen mixer for 20 hours or
Heat 3 gallons of water from 56 to 212 degrees or
Run a 6-inch fan for 50 hours or
Run a pump for 3 hours or
Heat a heating pad for 15 hours or
Operate a radiant heater for 2 hours or
Make 10 batches of ice cream or
Run an exhaust fan for 5 hours or
Make 30 waffles or
Operate a moving picture machine 4 hours or
Stoke 1/4 ton of coal or
Heat a hot plate for 2 hours.

About one and one-half kilowatt hours of electricity per cow will do the milking for a month.

A mechanical milk cooler will help maintain high quality

ALBERT B. SMITH is a new member of the staff this year. He is a graduate from the School of Engineering, USAC, and was at New Mexico State College before returning to Utah. He is working on a farm electrification project sponsored by the power companies of Utah and southern Idaho in cooperation with the Utah Station.

Farm and Home Science
AVERAGE CONSUMPTION
OF ELECTRICITY FOR
VARIOUS FARM USES
(kilowatt hours)

Brooding (chick)—1/2 per six weeks per chick.
Brooding (lamb)—3 per lamb.
Brooding (pig)—36 per litter (150 watt bulb continuous).
Churning—1 per 100 pounds of butter.
Cream separating—1/2 per 1,000 pounds of milk.
Dairy-utensil sterilizing (10 to 40 cows)—3 1/2 to 7 1/2 per day.
Dairy-water heating—15 to 35 per 100 gallons.
Farm chore motors (3, 5, 7 1/2 h.p.)—3, 5, 7 1/2 per hour of operation.
Farm shop—1/2 to 3 per month.
Feed grinding (3, 5, 7 1/2 h.p.)—1/10 to 3 per 100 pounds.
Fractional horsepower motors—1 for each 1 to 5 hours of operation.
Freezer—50 per mo. for 20 cu. ft. box.
Fruit grading—1/2 to 1 1/2 per 100 bushels.
Grain cleaning—1/2 to 1 1/2 per 100 bushels.
Grain elevating (5 h.p.)—1 1/10 to 5 per 1,000 bushels.
Hay hoisting (5 h.p.)—1 per 7 1/2 tons.
Incubating (small)—150 to 300 per 1,000 eggs hatched.
Lighting entire farm—25 to 30 per month.
Milk cooling—25 to 30 per month per 10 gallons per day.
Milking-portable type—1 1/2 per cow per month.
Milking-pipe line type—2 to 3 per cow per month.
Paint spraying—1 per 250 square ft.
Running water—20 to 30 per month.
Sheep shearing—1 1/2 per 100 sheep.
Silo filling—1 to 1 1/2 per ton.

APPROXIMATE COST PER MONTH TO USE VARIOUS ELECTRICAL APPLIANCES IN THE HOME

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Approx. wattage</th>
<th>Avg. kwh per mo.</th>
<th>At 3.56c per kWh</th>
<th>At 2.56c per kWh</th>
<th>At 1.55c per kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed covering</td>
<td>200</td>
<td>15</td>
<td>.55</td>
<td>.40</td>
<td>.23</td>
</tr>
<tr>
<td>Clothes dryer (115 v.)</td>
<td>1,600</td>
<td>40</td>
<td>1.61</td>
<td>1.06</td>
<td>.62</td>
</tr>
<tr>
<td>Clock</td>
<td>2</td>
<td>1</td>
<td>.04</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>1,000</td>
<td>7</td>
<td>.26</td>
<td>.19</td>
<td>.11</td>
</tr>
<tr>
<td>Disposal unit</td>
<td>500</td>
<td>7</td>
<td>.07</td>
<td>.05</td>
<td>.03</td>
</tr>
<tr>
<td>Fan</td>
<td>75</td>
<td>4</td>
<td>.15</td>
<td>.11</td>
<td>.06</td>
</tr>
<tr>
<td>Heat lamp (infrared)</td>
<td>250</td>
<td>2</td>
<td>.07</td>
<td>.05</td>
<td>.03</td>
</tr>
<tr>
<td>Heater (radiant)</td>
<td>1,000</td>
<td>8</td>
<td>.29</td>
<td>.21</td>
<td>.12</td>
</tr>
<tr>
<td>Heating pad</td>
<td>50</td>
<td>1</td>
<td>.04</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>Home freezer</td>
<td>300</td>
<td>50</td>
<td>1.83</td>
<td>1.33</td>
<td>.99</td>
</tr>
<tr>
<td>Iron</td>
<td>1,000</td>
<td>6</td>
<td>.22</td>
<td>.16</td>
<td>.09</td>
</tr>
<tr>
<td>Ironer</td>
<td>1,400</td>
<td>10</td>
<td>.37</td>
<td>.27</td>
<td>.16</td>
</tr>
<tr>
<td>Lighting (avg. family use)</td>
<td>110</td>
<td>1</td>
<td>.04</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>Percolator</td>
<td>500</td>
<td>5</td>
<td>.18</td>
<td>.13</td>
<td>.08</td>
</tr>
<tr>
<td>Range (7 to 12 kw)</td>
<td>100</td>
<td>10</td>
<td>.29</td>
<td>.21</td>
<td>.12</td>
</tr>
<tr>
<td>Radio</td>
<td>300</td>
<td>30</td>
<td>1.10</td>
<td>.80</td>
<td>.47</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>100</td>
<td>10</td>
<td>.37</td>
<td>.27</td>
<td>.16</td>
</tr>
<tr>
<td>Small motor</td>
<td>250</td>
<td>9</td>
<td>.33</td>
<td>.24</td>
<td>.14</td>
</tr>
<tr>
<td>Stoker (without blower)</td>
<td>400</td>
<td>30</td>
<td>1.10</td>
<td>.80</td>
<td>.47</td>
</tr>
<tr>
<td>Stoker (with blower)</td>
<td>300</td>
<td>25</td>
<td>.91</td>
<td>.66</td>
<td>.39</td>
</tr>
<tr>
<td>Television*</td>
<td>250</td>
<td>2</td>
<td>.07</td>
<td>.05</td>
<td>.03</td>
</tr>
<tr>
<td>Washing machine</td>
<td>250</td>
<td>30</td>
<td>.15</td>
<td>.11</td>
<td>.06</td>
</tr>
<tr>
<td>Vacuum cleaner</td>
<td>2,000</td>
<td>300</td>
<td>2.65</td>
<td>1.33</td>
<td>.99</td>
</tr>
<tr>
<td>Water heater</td>
<td>250</td>
<td>4</td>
<td>.04</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>Water pump</td>
<td>265</td>
<td>16</td>
<td>.58</td>
<td>.42</td>
<td>.25</td>
</tr>
</tbody>
</table>

*Television may partially offset use of lighting.

Left to right: A small feed mill will grind the feed needed on the farm. It will operate on about one kilowatt per hour of use.
A collection of used parts and a small motor will efficiently move feed from the storage room to the feeding center.
A cooling unit designed to be used in a home built milk cooler.
EXPANDED MARKETS
(Continued from page 49)

Western Trunk Line Territory which, among other areas, includes roughly the eastern half of Utah, the level of rates was 83 percent higher than in Eastern Territory. Certain of the recent freight rate increases have somewhat narrowed the differential that prevailed at the end of the war. Belated recognition by the commission that the differential in rates was too great resulted, in certain instances, in smaller percentage-wise increases in the high rate areas than in the lower rate areas. Also certain agricultural commodities were excepted from the full 15 percent increase authorized in Ex Parte 175, effective May 1952. Given some preferential treatment among other things were fresh fruits and vegetables, sugar, grain, and grain products. These exceptions, known as "hold down" provisions, in the case of fruits and vegetables and of sugar, limited the rate increase to 12 and 10 cents per 100 pounds, respectively. This was of definite advantage to those commodities where they were subject to long hauls, and these provisions tended to narrow the spread in transportation costs of those producing areas located long distances from markets as compared with those closely situated. This was especially significant for California with her enormous volumes of fruits and vegetables, which are in competition with those from Florida for the Atlantic seaboard market. On a competitive basis, it would likewise be of some advantage to rail shippers of fruits and vegetables from this state.

Freight Rates Increase Two Thirds Since War
In the case of livestock, eggs, and certain dairy products, no "hold downs" were provided. Here the percentage increase was uniform regardless of distance to market. These are basic commodities for which Utah producers must rely on distant markets. Estimated cumulative increase in rail freight rates since June 30, 1946, for all agricultural commodities shipped in carlots is 66.4 percent. Fresh fruits other than citrus increased about 54 percent while rates for transporting animals and animal products are up approximately 85 percent. In view of the predominance of the animal industries in this state, these rate changes bear a heavy impact on producers in this area. The percentage-wise freight rate increases are disadvantageous to producers in this area and tend to decrease the share of the consumer's dollar that finds its way back to the farmer.

One indication of the importance of the agricultural marketing problem and hence of the transportation problem to this area is the fact that whereas Utah and its contiguous states in 1950 comprised 2.96 percent of the population of the nation, their cash receipts from marketing agricultural commodities were 5.83 percent of the national total. This was 197 percent of their proportionate share. That the substantial increase in freight rates on animals and animal products is injurious to Utah is evident from the dominance of livestock in our state economy. On the national level, animals and animal products accounted for 56 percent of cash receipts from farming, whereas in Utah the corresponding figure was 72 percent. Animals and animal products represent a heavy net outflow from this state. The out movement by rail was almost double the in-movement for this category of products in 1950. Utah's wool clip of more than 6,000 tons annually almost all goes to Boston. Approximately 90 percent of our important turkey crop goes to the large eastern markets. About 40 percent of our eggs move out-of-state and a similar proportion of cull hens. Utah's per capita milk production in 1951-52...
exceeded the national average by 180 pounds and exceeded the average of the eleven western states by 340 pounds per capita. This means a heavy out-movement of milk or its derivatives. These facts suggest the adverse effect of high freight rates on the most important segment of our agricultural establishment.

Beef prices have slumped drastically in the past 18 months. Some other animal and animal product prices have declined somewhat less and a few have strengthened in price. But transportation rates are at their all time high level. Some of the principal roads are now petitioning for a further increase. Transportation rates are rigid. Once increased by the Commission authorization they strongly resist downward adjustment. In contrast, agricultural prices are extremely fluid and respond quickly and often violently to downward pressures.

Evidence of this is seen in the fact that between December 1951 and December 1952 the farm value of food in your market basket declined almost 10 percent (9.8) but the marketing charges in the same period, the costs incident to getting the food from the farm to your basket, increased 7 percent. In these inverse price movements the decline in farmer receipts was almost all absorbed in increased costs of marketing services, an important component of which is transportation. As compared with the 9.8 percent decline in prices received by the farmer the cost to the consumer was down only 1.3 percent, whereas rail freight rates generally increased 15 percent.

Two Attacks on High Transportation Costs

There appear to be two primary attacks that can be made on high transportation costs. First to develop and exploit fully our local markets and adjacent markets that lie nearest at hand. Second, processing of products as a means of increasing their market value in relation to costs of transporting them to market. Both approaches have the advantage of creating work opportunities and absorbing labor.

Trade Barriers

Perhaps fully as significant and certainly more disturbing than the physical barriers to trade are the institutional and legal barriers. These are a growing menace to interstate and even to intrastate commerce in some instances. These barriers have become political boundaries: municipal, state, and national. No attention will be given here to the national problem of restricting international trade through tariffs, quotas, and related devices, though the principles that prompt state action in this area are similar to those that give rise to protective tariffs in national economies.

States have an undisputed right and indeed a duty to provide inspection laws that will assure a reasonable safeguard against spread of insect pests and animal and plant diseases. They must safeguard the public health and use reasonable care in the protection of the public from misbranded, mislabeled, and adulterated food products, and related fraudulent acts and practices.

Our present concern is with those restrictive measures which impede the free and unrestricted flow of commodities in interstate commerce and whose actual or real purpose is to restrict or limit competition. The original states transferred to the federal government the power to regulate commerce among the several states. The federal constitution provides in article I, sec. 10 that "No state shall, without the consent of Congress, lay any duties on exports or imports except what may be absolutely necessary for its inspection laws." Thus early recognition was given to the absolute need for state inspection laws. Congress has not "given its consent" for other burdens to be placed upon interstate commerce. Until the last two or three decades such minor burdens as were laid down upon trade between the states were largely incidental to some legitimate need for inspection. Their impact was light and they went largely unnoticed.

However, beginning with the early 1930's as the impact of the depression deepened, there appeared a rash of legislative enactments which were implemented by rules, regulations and orders promulgated by administrative bodies, the effect of which is to restrict severely the free flow of agricultural products, though the avowed purpose of the actions may have been for quite different objectives. These restrictions and impediments to free trade take many forms and appear in many guises. Licenses, fees, taxes, inspections, brands, labels, standards, grades, packaging, and quarantines are some of the more frequent and widely used devices. They are normally invoked under the police powers of the state and are often given legislative status, as measures to protect the public health, safety, and welfare. The taxing power may also be used as was the case in this state, which was the first in the United States to place a tax on the sale of oleomargarine. Few would argue seriously that the real purpose of the tax was to raise revenue and not discourage the consumption of a product competing with a major state industry.

A state may underwrite entrepreneurial inefficiency when it refuses to accept the milk and dairy inspections of a neighboring state and also refuses to permit its own inspectors to go across the state line for purposes of inspecting the facilities under which milk is produced. Such refusals effectively preclude the movement of fluid milk into the protected market. A city ordinance which required all milk sold or offered for sale within the city be pasteurized within five miles of the center of the city was upheld by the state supreme court. Subsequently the U. S. Supreme Court in reversing the state court decision declared that to permit this city "to adopt a regulation not essential for the protection of local health interests and placing a discriminatory burden on interstate commerce would invite a multiplication of preferential trade areas destructive of the very purpose of the commerce clause. Under the circumstances here presented, the regulation must yield to the principle that 'one state in its dealings with another may not place itself in a position of economic isolation.'" (U. S. Supreme Court No. 258, October term, 1950, Dean Milk Co. vs. Wisconsin).

Study of Extent of Trade Barriers

A study is now in progress in the eleven Western States to discover the kinds and the extent of these "trade barriers". It is not unlikely that the most expeditious and effective way of "clearing the deck"s of many of these restrictions will be through court action which can reaffirm the validity of the commerce clause. Aid will probably come from agencies such as the United States Public Health Service. This service has promulgated a model milk ordinance and code. Numerous state and local health authorities pattern their ordinances closely to this model. Some, however, insist on variations and unique features which have doubtful value as far as quality of product is concerned, but the variations may make compliance difficult or impractical for out-of-state producers who would like to enter the market.

At this moment Utah producers have a problem of this nature with the authorities of our sister state Nevada.

Most important in eliminating these artificial and needless barriers will undoubtedly be an informed public opinion, which, in possession of the facts as these are made available, will seek and demand relief from the adverse effects of restricting freedom of exchange of goods. Unfortunately these restrictions appear to be most numerous and to bear most heavily upon the agricultural segment of our complex industrial system.
O. W. ISRAELSEN
(Continued from page 50)
water. Backed by the immensity of his technical knowledge and the orderly, albeit at times laconic, manner of his mind, his lack of hearing helped him to become something of a modern oracle.

Discussing questions propounded in writing he was utterly oblivious to objections shouted by counsel and to admonition by the court. And before long the soundness and justice of his testimony would so impress all parties that objection all but ceased. It is recalled that parties who lost in court by reason of his testimony would turn to him forthwith for guidance in working out plans in conformity with decisions which they had opposed, yet adopted as wise and right because of his part therein. In this vein an attorney writes:

'He has long been one of the chief expert witnesses in this and surrounding states, for he is well known as basing his opinions solely on scientific facts and principles, irrespective of which side may call him. It was about 25 years ago, when Dr. Israelsen was called as a witness against my client's contention, that I first learned to admire him. Although called by the other side, he frankly stated his scientific opinion... even though it contradicted another witness and was not what the parties wanted who called him as a witness.'

As an author, Dr. Israelsen is perhaps most widely known for his textbook "Irrigation Principles and Practices," first published in 1932 and still a standard... work on the subject. In a bibliography listing him as sole author of 31 titles and collaborator in 38, he deals with practically every aspect of irrigation water, from its sources on and under the ground, through canals and courts, its behavior in soils and in living plants, and finally its disposition by drainage. He has written alike for farm papers and station... technical journals...

Now a life fellow, Dr. Israelsen became a member of the American Society of Agricultural Engineers in 1914, at the threshold of his professional career. He is a past-president of the Utah Academy of Science, Arts, and Letters. Other memberships include the American Society of Civil Engineers, American Association for the Advancement of Science, American Geophysical Union, American Society for Engineering Education, Idaho Reclamation Association, The International Mark Twain Society and the societies of Sigma Xi and Phi Kappa Phi.

In addition to Dr. Israelsen's accomplishments as an irrigation and drainage engineer, many of his students say that his greatness lies in his influence on the lives of young engineers. He has the unusual ability to teach engineers how to study, to convince them that work should be pleasure, rather than drudgery, and that success is measured by accomplishments, and by contributions to the public welfare, more than by the accumulation of money.

He has been much more than a teacher. He has been a "second" father to students—guiding, counseling, encouraging, and inspiring. Years after students have completed their work in his classroom they call at his home with the same freedom and fondness that his own children do. His students, who have excelled in many engineering fields, are a monument to his greatest contribution to society...”

STAPHYLOCOCCOSIS
(Continued from page 51)

ant to move, and develop fever (fig. 1). When the bird is forced to move lameness is noted which may be unilateral or bilateral. The hock tendon is swollen, tender, and has an increased amount of fluid (fig. 2 and 3). Birds thus affected may die in one to six days or life may be prolonged over a period of two weeks or more. When the disease takes the chronic form the bird is unable to move about and literally starves to death. The acute form of the disease can cause high losses without producing any marked symptoms of lameness.

Transmission
Since staphylococcosis is a bacterial disease it must be considered infectious, yet it does not appear to be contagious to any great degree. This conclusion has been established by running infected and healthy birds together with little or no transmission of the disease from diseased to healthy birds. As the organism passes from one bird to another in a flock there is increased virulence and probably the contagious nature of the disease is increased. This is supported by the epidemic form the disease can take, becoming acute and spreading rapidly through the flock in a few days. However, in other flocks it takes a chronic insidious form striking down only a few birds each day.

How the first bird becomes infected is yet to be discovered. The manner in which the disease spreads from one bird to another is still unknown. The predisposing factors such as injuries, contamination of feed and water, and certain phases of nutrition have been investigated without finding that any of them is responsible.

Prevention
Since the transmission of the disease is unknown, little can be said about prevention. The possibility of vaccination is being explored. Since the disease is infectious the following practices should help to reduce the incidence: a clean water supply; a balanced nutritional diet with no sudden nor radical changes in feeds; clean equipment, disinfected between seasons. Routine moving of equipment to new ground during the growing season is a sound practice and should always be employed. When the disease starts in a flock the sick birds should be segregated immediately.

Treatment
At present recommendations for treatment are more in the nature of what not to use than in a specific remedy for the disease. Various sulfonamides have been tried and found of no value. The following antibiotics have been found non-effective: penicillin, streptomycin, and aureomycin. Some of the newer antibiotics such as terramycin and erythromycin may offer some hopes as they have a greater specificity for Staphylococcus.

The question is often asked as to why staphylococcosis is so hard to treat. The answer lies in the fact that the organism spreads to the tissues of the body such as the tendon sheath, wing joints, and the sternal bursa, which are not readily accessible to antibiotics that must rely on the blood stream to reach the bacteria. The areas where the staphylococci become established have a small blood supply. Again we may be dealing with an organism that is resistant to antibiotics so far used. Undoubtedly the acute form of the disease will respond to treatment much better than the chronic form for the organism is to be found in the blood stream and internal organs.

Research is being continued on the transmission phase of the disease to determine how the organism is spread from one bird to another. When the route of transmission and the various predisposing factors can be explained, then it will be possible to set up a program for prevention. Various new antibiotics and therapeutic agents are being checked as they become available for cures for staphylococcus.
and winter freshening cows, according to these studies.

Incentives for High Fall and Winter Production

The major bargaining association and distributors in Utah have recognized this problem by paying higher prices for milk during the fall and winter months as a means of stimulating production during these seasons. In addition most grade A producers are permitted to build their base production during these months. The size of the base determines, in part, the amount of total production that can be sold for the grade A price. Thus, a base forming period in months of generally lower production should stimulate milk production during this time.

Apparently producers are influenced by this policy. Data for 1948 and 1952 indicate that both grade A and grade C producers have leveled milk production between these 2 years. Factors, such as weather conditions and feed supplies, in addition to price incentive plans, could of course be responsible.

Average daily production of milk was compared between the 5 months of April through August, during which daily production was above the annual daily average, and the remaining 7 months, during which daily production was below average. In 1952, 108 pounds of milk were produced during the above average months compared with 112 pounds in 1948 for each 100 pounds produced during the 7 months below average.

During May and June of 1952, the two highest producing months, 120 pounds of grade A milk were produced per day for every 100 pounds produced in the two low producing months of January and February. This is compared with May and June of 1948 when 124 pounds of milk were produced per day for every 100 pounds in January and February of that year, thus indicating a change to more stable production of grade A milk between 1948 and 1952.

There was more stable production of grade C as well as grade A milk in 1952 than in 1948. In 1948, 144 pounds of grade C milk were produced daily during May and June for every 100 pounds produced per day in the low months of January and February. Data for a corresponding period in 1952 show that 139 pounds were produced for each 100 pounds of daily production in the 2 low months.

For the 5 months during 1948 in which daily production of grade C milk was above the annual average, 130 pounds were produced for every 100 pounds in the 7 months during which production was below average. Corresponding production in 1952 was 128 pounds per day in the 3 high months for each 100 pounds produced per day in the low months.

It would therefore appear that: (1) Grade A production is more even throughout the year than grade C production; (2) An increase toward greater stability in both grade A and C milk production has occurred between 1948 and 1952. This was no doubt influenced by pricing plans which favor stability in production but may have been owing to weather conditions, feed supplies, or other factors.

Available information indicates that income to milk producers and processors would be increased if milk production throughout the year were more stable. This stability in Utah could be obtained with an increase in the number of fall and winter freshening cows resulting in higher production per cow and lower production costs. With a more even flow of milk throughout the year from dairymen, processing and distributing plants should be able to reduce their unit processing costs. Also fluid milk production and consumption would be more closely correlated to help reduce grade A surpluses and enable dairymen more readily to take advantage of increases in demand.

SERIOUS WEED PESTS

(Continued from page 55)

Control of Canary Grass Along Irrigation Canals

Three experiment begun in October 1951, December 1952, and March 1953 have shown CMU to be effective at heavy rates of 1/4 to 1/2 pound per square rod in eliminating canary grass on the inside banks of a continuously flowing irrigation canal. The effect of the chemical remained in the soil for at least a year even at the waterline.

Atlacide or chlorate at 9 pounds or more and Polybor-chlorate at 12 pounds proved much more effective than CMU or sodium chloride for eradicating quackgrass. The treated plots extended from a fence line across an irrigation head ditch and into the edge of an alfalfa field. CMU was tested at rates of 20, 40, 60, and 80 pounds per acre (1/8, 1/4, 1/2, and 1/2 pound per square rod). TCA was tested at 160 and 320 pounds per acre (1 and 2 pounds per square rod) and chlorate was tested at 480 and 800 pounds per acre (3 and 5 pounds per square rod.) CMU completely eliminated quackgrass and other grasses at 40 pounds or more per acre and the ditchbank and bottom of the ditch have remained free from quackgrass for more than two years.

CMU had little effect on wild licorice, wild rose, and asparagus plants that were present on the ditchbanks.

The heaviest rates of TCA and chlorate gave fairly good kills of quackgrass in the fence line and on the ditchbanks but gave poor control in the field and little reduction of the grass in the bottom of the ditch even after full treatments were made in April 1952, bringing the total treatments to 640 pounds of TCA per acre and 1600 pounds of chloride per acre. TCA did not reduce the stand of alfalfa even at the extremely heavy rate, but neither did it eliminate the quackgrass. Repeated experiments have shown that TCA will not give satisfactory control of quackgrass in alfalfa meadows, fence lines, or irrigation ditches where the soil cannot be cultivated before and after the chemical is applied.

Experimental applications which were made in December 1951 in the fence line and irrigation ditch along the same field compared CMU, Atlacide (chlorate), and Polybor-chlorate. CMU again proved the most effective but the advantage was not as great as in the experiment begun in the spring of 1951. CMU at 1/4 or 1/2 pound per square rod eliminated quackgrass 83 to 97 percent. Six to 9 pounds of chlorate or 12 to 18 pounds of Polybor-chlorate per square rod were required to give a similar degree of control.

Control of Canary Grass Along Irrigation Canals

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R. H. Mathew
Director
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or more per square rod gave fairly good temporary control but the effect of the chemical was lost from the soil at the waterline before the end of the first season and the canary grass began to recover.

Burning the frozen-down grass and other dead vegetation from the previous season before the chemical application proved necessary for best results. The chemical treatments made in March 1953 appear to have been much more effective than those made in October 1951 or in December 1952. This may have been because the vegetation remained too green or wet during the fall in both years to permit burning it off before the chemical applications.

Costs of Chemical Treatments

The costs of eradicating quackgrass or canary grass with herbicides are high, especially when calculated on a per acre basis. However, these costs usually are not as high as the expense of less effective mechanical or hand methods. At present prices of chemicals the cost of treating quackgrass in gardens and cultivated fields with TCA at one pound per square rod is about $0.50 per square rod or $80 per acre. The cost of treating fence lines or ditchbanks, including expense of application, with CMU at 1/2 pound, Atlacide or chlorate at 6 pounds, or Polybor-chlorate at 12 pounds per square rod ranges from $1.00 to $1.25 per square rod.

Treating a strip four feet wide under a fence line or along an irrigation ditch would be $10 to $100 per mile. Treating canary grass in strips four feet wide above the waterline of a canal with CMU at 1/2 pound per square rod would cost about $160 per mile for one side of the canal or $320 per mile for both sides. Obviously the time to begin eliminating canary grass is when it is in small patches and before the ditchbanks become solidly infested with it for long stretches.

* * *

COOK AND HARRIS

(Continued from page 52)

M.S. degree at USAC, and his PhD degree at Texas A and M College. He served as assistant state range examiner in Kansas and was range conservationist with the Soil Conservation Service before coming to Utah State in 1943.

Dr. Lorin E. Harris, professor of animal husbandry, received his B. S. degree from USAC and his masters and doctorate from the University of Illinois. He formerly served on the staff of the USDA, University of Hawaii, University of Arkansas, Cornell University, and the Department of Interior. He has been a member of the Utah State staff since 1945.

<table>
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<th>CONTRIBUTIONS TO RESEARCH</th>
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<tr>
<td>Utah Power &amp; Light Company</td>
<td>$6,000</td>
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<tr>
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<td>Telluride Power Company</td>
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<td>Uintah Power and Light Company</td>
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<tr>
<td>Sharp &amp; Dohme</td>
<td>$2500 to study coccidiosis in sheep, cattle, and poultry.</td>
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<td>Ogden Grain Exchange</td>
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<td>Woodruff Seed Company</td>
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<td>Northrup-King and Company</td>
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<tr>
<td>American Cyanamid Company</td>
<td>6 pounds Aero Cyanate and 8 pounds Aero Sodium Cyanamid to make exploratory tests to determine if these chemicals have value as defoliants on wheatgrasses grown for seed production</td>
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<td>5 gallons Malathon for experiments in the control of aphids and worms on cabbage</td>
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