Factors Affecting Profits in the Poultry Enterprise

By Carl Frischknecht

EVEN though chickens are efficient in converting raw farm products into human food, every locality has some poultry flocks with low production from which little or no profit is obtained. This is because the owner in most instances fails to recognize and give careful attention to all the factors under his control which affect the success of his poultry business. Some poultry units are unprofitable because they are too small, or the egg production is too low, mortality in the flock is too high, or because the products are of inferior quality. Any factor or condition which increases or decreases the expenses and the receipts from the poultry flock is closely associated with the profits which are derived from raising chickens.

Breeding

Breeding is partly responsible for the amount of profit that is obtained from a poultry flock. This is because the number, size, shape, color, shell texture, and quality of the eggs that are laid by a bird or an entire flock are all inherited characteristics. While chickens respond readily to their environment, the limits of performance, so far as each of these important egg-production characteristics is concerned, are fixed by the bird's breeding or inheritance. The best bred stock can be ruined by poor environment in a short period of time. On the other hand, the most ideal environment can never overcome the handicap of starting with or continuing to make replacements in the flock with pullets that are inferior or only mediocre in quality.

If circumstances are such that the poultryman cannot produce his own stock, it is a good practice to buy pullets from a reliable breeder or hatcheryman whose breeding program is supported by progeny tests and by outstanding production and pedigree records.

Importance of Environment

The chief source of income from a flock of chickens in Utah is from the sale of eggs. This means that a high egg production per bird must be obtained in order to make a profit. After obtaining birds that have been bred to live, to grow, and to lay a large number of marketable eggs, producers are next confronted with the problem of providing an environment that will result in the greatest response from their birds so far as each of these important characteristics is concerned. Chickens are like automobiles and other types of engines and machines. They may be built to perform a certain amount of work but the efficiency which is actually obtained from them is determined by the conditions under which each is operated. Every poultryman in this state should be striving to obtain an average annual production of 200 eggs per bird.

Comfortable Housing

Chickens will not lay well if they are not comfortably housed. In order to be comfortable, a poultry house must be warm, well-ventilated, roomy, dry, and clean. Some of the poultry houses in Utah are badly in need of remodeling and many of them should be insulated to make them more comfortable throughout the entire year. It is also desirable to cover the cold cement floor with deep, finely-pulverized litter during the fall and winter months to keep the houses dry and warmer.

Light is another environmental factor which has a direct bearing upon egg production and hence upon the profits which are obtained from a flock of chickens in a given period of time. Poultry physiologists have found that the light which passes through the eye of a chicken causes the pituitary gland in the lower part of its head to produce a follicle-stimulating hormone which causes the bird to lay eggs.

Use of Artificial Light

The use of artificial light does not increase the number of eggs a bird or a flock will produce in a year, but it does enable the owner to gather more of his eggs at the time of the year when eggs are higher in price. Many poultrymen have been able to increase their production by using artificial light during the late summer, fall and winter months when egg production in this area is low and eggs are higher in price.

The studies which have been made indicate that the best results are obtained when chickens in production receive about 14 hours of light each day.

Egg Production

Figures compiled by the U. S. Bureau of Agricultural Economics indicate that the average egg production in Utah is 122 eggs per bird. This is too low to enable the average poultryman in this state to make much profit. The most successful poultrymen in this state, as a rule, are the ones who are getting the highest egg production per bird.

Feed is the largest single item of cost in producing either poultry or eggs. Profits in the poultry enterprise then depend in part upon using feeds that will produce the greatest response in the chickens. In addition to providing a well-balanced feed it is important to see that the birds get all they want to eat and that the feed

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In beef production Utah is chiefly on a feeder cattle basis. It is true that about 30,000 cattle are fed in this state each year, but in the main cattle must be shipped out to be finished. If individual producers in large numbers could establish a reputation for a dependable product a top market could be assured. Why not “Utah feeder cattle top the mid-west market?” “Utah feeder cattle bring premium prices?” The cattlemen of Utah owe it to themselves as individuals to produce as profitably as they can and they owe it to the nation in this emergency to utilize the feed, the grazing facilities, the breeding herds in such a manner that the investment will yield the largest amount of food for the nation with the material that they have on hand or can develop.

Desirable conditions are brought about only with deliberate effort and determined action. Cattle producers must plan, work, cull, select, advertise, grade, market, and persist in a program if their product is to demand more than ordinary returns. In raising inferior or superior stock it must be remembered that the work is the same, the number in the breeding herd can remain the same, the acreage is the same, the amount of feed the same, the chief difference is regularity with which each cow calves year after year and the efficiency of the calves as machines converting feed into quality meat.

A beef improvement program in Utah is taking shape at the present time. Fortunately several agencies most concerned are working together closely in order to insure material progress within a reasonable time. The Utah State Agricultural College Animal Husbandry Department has bred from their own Hereford herd, and raised, six sons of the champion bull Advance Domino 3D, donated by Sears Roebuck and Company. These promising young bulls are going to the following counties: Duchesne, Emery, Millard, SanJuan, Sevier, and Utah. These bulls will be on exhibition at the County Fair in Nephi September 3 to 5, and after appropriate ceremonies on September 5 will be dispersed to the communities indicated. When additional bulls are developed by the College, they will go to other communities desiring them and where they can be used to advantage. Represented in this movement and actively participating with the college is the Utah Cattle and Horse Growers’ Association. A member of this association heads the local committee in each community receiving a college bull. Others on each committee are a county commissioner, the vocational agricultural teacher, and the county agricultural extension agent.

Two other Hereford bulls of outstanding merit are available to those owning registered Hereford cattle in Utah. These are Advance Domino 3D, sire of the six bulls being placed out, and WHR Purritan 8th. These bulls head, respectively, the herds at Utah State Agricultural College, Logan, Utah, and the Branch Agricultural College in Cedar City. Registered Hereford cows with clean bills of health may be sent to either place for the nominal service fee of $2.00 by any Utah Breeder.

In an effort to locate those sires that are producing offspring that are destined to give a good account of themselves in the feed lot, the Utah Agricultural Experiment Station proposes to carry on cattle feeding experiments with calves of known ancestry. Thus, it is hoped that calves sired by different bulls will be fed comparable rations and otherwise handled alike so that differences in rate of gain, in economy of the use of feed, and in quality of meat produced may be traced to individual bulls. More and more those in the beef bull producing business in the state may test out their own herd sires.

Thus it is proposed to tackle a difficult problem, that of finding the blood lines that are already established in the feed lot. The Utah Agricultural Experimental Station proposes to choose a number of sires that are producing an estimated 80,000 to 100,000 feeder cattle each year. This stuff is sired by a variety of bulls. It is known about their breeding qualities and their freedom from disease, except Bang’s and tuberculosis on which attention is usually focused.

On the farms and ranches of this state 100 cows and heifers are maintained to produce 60 calves to marketable size. It is an accepted fact that feeder cattle, even of acceptable type and conformation, differ widely in their efficiency to convert feed into gain.

So this is the problem: The management of breeding herds so that for every 100 females of breeding age as near to 100 marketable calves as possible may be produced, of a quality that will command prices that will net a measurable profit to the producer. To solve this problem, cattle producers of the area must concentrate their attention upon the selection and use of satisfactory sires and upon the necessity of so handling the herd that maximum production may be made possible. When one recognizes and defines his problem he has gone a long way toward solving it. In many feed lots the best steers each year gain 50 percent more rapidly on 25 percent less feed and make as much as $5.00 to $12.50 a head more profit than the poor steers in the same lot on the same feed at the same time. To a large extent this difference in economy of gain in the feed lot is owing to inheritance.
Maintaining the soil in good condition is fundamental to increased production. This may be done in three ways: by the addition of crop residues, farm manures or green manures. This article tells of the use of green manure

GREEN MANURE CROPS FOR SOIL IMPROVEMENT

Most farmers associate a dark color with highly productive soils. However, it is not the color in itself but factors associated with dark color that cause plants to grow well. Soils composed primarily of mineral particles are light in color, often almost white, and as the amount of humus increases, the color becomes darker. It is soils high in humus, then, that are usually so productive.

The term "humus" includes all of the finely divided particles of partially decomposed organic materials which once constituted the tissues of plants and animals. There are several reasons why humus is so desirable in soils: (1) A soil without humus is not a true soil but is merely an accumulation of mineral particles derived from rock material. (2) Humus gives the soil a good tilth, making it open, porous, and sponge-like in character so that plant roots can easily penetrate it. (3) Humus increases the availability of water and plant nutrients. (4) Humus furnishes food for desirable soil microorganisms. (5) A soil well supplied with humus is easier to cultivate than a soil poorly supplied with humus.

There are three broadly different sources of humus for most farm soils: (1) crop residues, (2) farm manures, (3) green manures. Crop residues are of great value in maintaining soil humus, but in most cases they are inadequate. Where an adequate supply of farm manure is available to supplement crop residues, soils are usually maintained at a high humus content. Where such a condition does not exist, green manure crops may prove valuable in building soil fertility.

Where alfalfa is grown frequently in a crop rotation so that it occupies the land one-third to one-half the time and the hay produced is fed on the farm and returned to the soil as manure, a high level of humus is maintained. For such farms green manure crops may prove valuable in building soil fertility.

What are Green Manure Crops?
A green manure crop is a crop grown to be plowed under for soil improvement. Such crops are for the purpose of adding organic matter to soil and thereby increasing the humus content. In addition, leguminous green manure crops may add nitrogen to the soil. And, under some conditions, green manure crops may have added value in protecting soil from erosion or even leaching.

Desirable Characteristics of Green Manure Crops
The success of a green manure crop program depends largely on the selection of a crop well adapted to individual farm conditions. In general, the following characteristics are desirable: (1) inexpensive seed, (2) ability to grow well on poor soils, (3) ability to make a rapid, succulent growth, (4) the crop should be hardy and able to survive adverse conditions, (5) a legume crop is preferred.

Among the leguminous crops adaptable for green manures in Utah are sweet clover, alfalfa, hairy vetch, field peas, and soybeans. Non-leguminous crops that are occasionally employed include principally annual weeds and small grains. Although seed for legumes is usually more expensive than for small grains, the legumes are to be preferred because of their ability to take nitrogen from the air and add it to soil.
Defense Activities of Station Staff

Demands for the services of the agricultural experiment stations are accelerated and intensified in time of war. Needs created by changing market conditions, new pests and diseases, new crops and materials become more urgent during war times, and a host of new problems arise for which prompt solution is required.

The major part of the Utah Station work has been found to have direct application to the increased production program. Information on means for producing higher yields of better products has been, and will continue to be given out as the research progresses. But, besides conducting their regular research programs, staff members have assumed other special duties to help speed the war effort.

Many special demands have been made on the Department of Agronomy and Soils for emergency reports on soil conditions to aid in the location of defense industries. These special activities may be summarized as follows: (1) soil surveys and planting suggestions to control the dust menace for the areas around the Small Arms Plant in Salt Lake City made by Dr. D. S. Jennings and Dr. R. J. Evans; (2) a land classification map of approximately 266 square miles of land between North Ogden in Weber County and Farmington in Davis County; (3) an analysis of soil samples for the Shell Loading Plant near Ogden; (4) land classification maps for use in the transfer of property for the new steel plant at Geneva, Utah; (5) a map, furnished to the War Department at their request, showing the arable land in the vicinity north of McCormick in Millard County to aid in the determination of the desirability of portions of the area under the Utah Central Canal for resettling the Japanese; (6) a crop appraisal and detailed soil survey of the site for the naval supply depot made by Dr. Jennings, Dr. W. Thorne, Professor A. F. Fracken and Dr. G. T. Blanch.

Some of the defense activities of other staff members are listed below:

Dr. F. F. McKenzie, head of the Department of Animal Husbandry, represents the American Society of Animal Production in an effort to mobilize personnel and research facilities throughout the United States through the medium of the National Research Council.

Professor C. J. Sorensen, research associate professor of entomology, has been appointed as a leader in the western United States to disseminate information for the control of insects attacking alfalfa and other hay crops.

Dr. G. F. Knowlton, research associate professor of entomology, has conducted an intensive campaign for the control of injurious insects through the daily press, farm journals, the radio, and public meetings.

Dr. W. P. Thomas, head of the Department of Agricultural Economics, has acted as a member of the state special committee to analyze the agricultural labor problem, with special reference to the labor requirements and labor available.

The following members of the staff have cooperated with the representatives of the Bureau of Agricultural Economics and other U. S. Department of Agriculture bureaus on the preparation of a report on 1943 agricultural goals for Utah: A. F. Bracken, D. S. Jennings, L. H. Pollard, A. L. Stark, G. Q. Bateman, Byron Alder, O. W. Israelens, W. P. Thomas, D. A. Burgoyne. These men acted as a technical committee advising on the 1943 goals and preparing the reports on the long-time desirable agricultural program for the state.

Those not now regularly receiving Farm and Home Science who would like to do so may have their names put on the mailing list by writing the Utah Agricultural Experiment Station, Logan.

In the Rocky Mountain area the diet of cattle may be deficient in salt, iodine and phosphorus. All grain concentrates should contain 2 pounds of steamed bone meal for each 100 pounds. The animal should also have free access to a mixture of 20 pounds ground salt, ½ pound potassium iodine and 80 pounds steamed bone meal placed in the yard or pasture.
ELECTRIC POWER SERVES THE DAIRY FARM
BY GEORGE Q. BATEMAN

The saving of time and labor on the dairy farm by the use of electric power is becoming more and more important with the increased scarcity of farm labor. During the past two years a study has been under way at the Dairy Experimental Farm to determine the amount of power used and the cost of operation of a number of electrical appliances that may be used by the dairy farmer in the production and the handling of milk. This project has been conducted cooperatively with the Utah Power and Light Company, who provided and installed the equipment.

Some of the appliances on which records have been kept are: (1) A small hammer mill powered by a 1½ horsepower motor used for the grinding of grain for the dairy herd. (2) A three unit milking machine. (3) A cream separator used to separate skim milk for calves. (4) A 10 gallon water heater. (5) A utensil sterilizer cabinet. Each of these appliances was installed and attached to a separate meter which recorded time operated and power used.

Power and Total Cost of Grinding Grain
The grinder used to grind the barley and wheat for the dairy cows was a small hammer mill powered by a 1½ horsepower motor. This hammer mill had an average capacity of 815 pounds of ground grain per hour. The mill was operated each week for 1 hour and 27 minutes to grind the week's supply of grain for the dairy herd of 30 cows, 2 herd sires, and some 30 young females.

The power cost for grinding grain was 0.68 of a cent per 100 pounds or 13.7 cents per ton for the two year period. Over this period the total cost of grinding which included the cost of the mill and the motor, interest on the investment, and the cost of power was 11.9 cents per 100 pounds and $2.38 per ton of grain ground.

With the reasonable assumption that the hammer mill and motor will be in good condition at the end of ten years, using the data for the two year period, the cost of grinding grain has been calculated. The total cost of grinding grain over the ten year period, including the cost of the machine, power, and the interest on the investment, would be 3.7 cents per hundred pounds or 75 cents per ton.

The data point out the economy and saving to the dairyman who is equipped to grind the grain for his dairy herd. In addition to the saving in cost of grinding there is the advantage of being able to make his own grain mixture from suitable grains grown on the farm.

It pays to grind grain for dairy cattle. Experimental evidence shows that there is a loss of 10 to 20 percent in feed value when whole grains are fed. Grain when ground to a medium degree of fineness is superior in palatability to whole grain and results in increased milk production when fed. However, it should never be ground too fine. Grain when ground coarse not only results in higher milk production and a greater gain in body weight than when it is finely ground but in addition the power cost for coarse grinding is much less than when the grain is ground fine.

Small Water Heater
Too much importance cannot be placed on the necessity of having a plentiful supply of hot water on hand at all times for washing dairy utensils. This is an absolute necessity if milk of low bacterial count that will stay sweet is to be produced. In the State of Utah many hundred thousands of pounds of milk are turned down by manufacturing plants each year because it is too sour for use. This is not only a great loss to the dairy farmer but a loss to the nation in large quantities of food sorely needed for national defense.

This loss can be entirely eliminated by thoroughly washing and sterilizing dairy equipment with hot water and immediately cooling the milk after milking.

The water heater used in this study has a capacity of 10 gallons which amount of water was used at each milking. The water is heated by an electric element in the bottom of the tank. The heater can be connected onto regular electric service by plugging into a wall or light socket.

The heater used 131 kilowatt hours per month to heat 600 gallons of water.

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The Range Management Department has for several years operated two pastures in the mountainous range lands near Logan for the purpose of measuring performance of both range and cattle. These pastures, at about 7,000 feet elevation, are typical of high summer range in northern Utah. They are steep, well supplied with water, vegetated mainly by aspen and sagebrush types, and receive annual precipitation of about 20 inches per year.

Grazing has been done by cattle belonging to the local grazing association; these being steers, mostly Hereford, but including some shorthorn and some mixed-blood animals, and mostly 1 or 2 years old. As a group, they are probably fairly representative of Utah's range cattle (figure 1).

Grazing begins when cattle are allowed to enter the national forest ranges, usually July 1, and continues until about October 15. Animals are marked with metal ear tags and weighed at monthly intervals or more frequently (figure 2).

The data obtained from these pastures are highly variable and the results given here are only preliminary.

Average Gain

Six year averages including 220 steers showed average beginning weight to be 569 pounds and average final weight to be 744 pounds, this being a gain of 175 pounds for the 3½ months grazing season or 6.4 pounds per head per day and losses of as high as 4.0 pounds per head per day have been recorded. In one instance, a lot of 20 cattle averaged a daily gain per head of 3.6 pounds for 1 month, and in another instance a lot of 37 cattle averaged a daily loss per head of 1.9 pounds for 2 weeks.

Effect of Season Upon Gain

Strong correlation is apparent between season and animal gains. Cattle given adequate range forage but no supplement of any kind on an average show reduced gains each 4 week period as the summer progresses (see figure 3). A 4-year average gain for the first 4 weeks was 73.4 pounds per head, followed by gains of 57.1, 33.0, and 20.1 pounds per head for the following 3 four-week periods. Sometimes, as in 1941, heavy weight losses may be suffered in late season. Two intensities of grazing, one allowing an excess of forage throughout the year and one allowing about average use of forage resulted in surprising differences in animal weights, especially in late season (see figure 4). One group of animals was allowed 11.9 acres of range per head for the 3½ month grazing season and another was allowed 6.3 acres per head. The latter grazing intensity resulted in full use but was not judged to be over-use. At the less intense stocking rate, animals at all times had before them an excess of forage.

Animals from the lightly stocked pasture showed much better weights by the end of 2 months, although feed was apparently still abundant in the heavily stocked pasture. In the first 2 weeks of October, however, even animals on the lightly stocked pasture lost weight, averaging a daily loss per head of 0.08 pound. In the same period, animals on the heavily stocked pasture lost 1.93 pounds per head daily—an average loss of 27 pounds per head. Certainly where steers are marketed on a weight basis from the summer range, holding them on the range after gains cease is a ruinous practice. Stockmen must make every effort to determine when this point is reached each season, since it varies greatly from year to year.

Weather Influences Effect of Season

Forage condition, as determined by precipitation and temperature, greatly changes the "average" picture during abnormal years. This was especially obvious in 1935 and in 1940, both of which were dry and hot during the midsummer but...
which, especially 1940, had good growing conditions in late summer. In 1935, given no supplemental feed animals with an excess of range forage gained an average of
but 0.32 pound daily from August 15 to September 12 but gained 1.66 pounds per head per day from September 12 to October 10 (see figure 3). In 1940, the average daily gain was 0.81 pound from August 7 to September 5, but the gain increased to 2.36 pounds from September 5 to October 7. Obviously, then, a universal rule that animals do not make good gains in late summer is false. This can be looked upon only as a general or to-be-expected situation.

Size of Animal May Influence Gains
Likewise, there appears to be a difference in weight response from large animals as compared to small animals. Over several years, a large number of animals averaging 484 pounds at the start of grazing gained by 1 month intervals 2.11, 2.19, 1.33 and 0.84 pounds per head per day, for a seasonal average of 1.62 pounds. In the same pastures, animals averaging 625 pounds gained 2.29, 2.16, 1.31, and 0.37 pound per head per day for a seasonal average of 1.53 pounds. While these data do not show great differences in total seasonal gains made by different sized animals, small animals seem to continue gaining weight later in the season than large animals. Some of this difference might be attributable to age since larger animals often were older animals.

When and What to Sell
Wise marketing is one key to successful ranching for it not only gives the highest income but it leads toward better range management. In the herd are certain animals which are to be marketed and are being held either to gain weight or to obtain higher market prices. The advisability of marketing these animals, usually young stock not used for replacement or non-producing or aged cows, depends upon price-weight relationships and upon whether there is sufficient feed to keep them without depriving the breeding herd of feed. When feed is short or high priced, early marketing is especially desirable. When animals have reached peak weights on the summer range and begin to lose flesh, immediate removal of those to be marketed is almost always wise.

Since cattle normally gain little and may actually lose weight during fall and winter months it is not advisable to hold marketable animals until winter or spring unless a substantially better price level can be obtained or unless there is an abundance of inexpensive supplemental feed available.

A Montana study showed that peak weights for dry cows were reached in June or July during drought years and weights declined thereafter as fed became dry, less nourishing, and more scarce.

![Average head gain in pounds on experimental pastures near Logan under "usual" conditions and under 1935 conditions when the summer was exceptionally dry. Usually, a progressive decrease in gains can be expected on summer range as the season progresses.](image)

Cumulative weight gains obtained on experimental pastures in the summer of 1941 when the pastures were grazed at two intensities.

![Montana research has shown a close correlation between age of the mother and weaning weight of calf produced. Calf weights are of great importance to the rancher and these data indicate that generally it is wise to keep cows older than 9 years. Data from Montana Agr. Exp. Sta. Bul. 400. 1942](image)

The peak weights were reached later in good years. It was concluded that low gains or actual weight decreases in late summer, together with lower prices after midsummer, point to the desirability of selling early in the season rather than in late fall. This was of especial importance during drought years for then weights declined faster and feed was more scarce. Selling cull cows and steers early leaves more feed for the breeding herd during these critical years.

At What Age Should Range Cows Be Marketed?
Other Montana investigations have shown interesting and important differences in weaning weights of calves (about 6 months of age) from cows of various ages. Figure 5 shows that 5- and 6-year-old Hereford cows under range conditions produced the largest calves and that old cows, especially those past 9, produced small calves. Two-year-old heifers also produced small calves. Although price levels and feed conditions make a universal rule impossible, marketing cows when they reach 9 years of age seems advisable. Occasionally, animals over this age are good producers, but as a general practice keeping old cows results in lowered range efficiency, for these animals consume forage that otherwise would go to higher producing stock.

America Needs Beef
In 1942, it is more than usually important that maximum meat marketing be obtained. The demand will be good and prices will be high. Utah stockmen have a rare opportunity now to cull aged and low producing cows at good prices. War efforts make marketing young animals at maximum weights more than ever important. Range conservation obtained by early and heavy selling is more than ever important, for the range, as a food producing factory, is on the front line in national defense.

C. J. Sorenson, associate research professor of entomology has received notice of his appointment as a leader in the western United States to disseminate information for the control of insects attacking alfalfa and other hay crops. Professor Sorenson is one of 38 entomologists selected from the entire United States by the National Committee on Coordination of Entomology and the War Effort to bring together as soon as practicable the knowledge of the control of insects that affect the production of vital war commodities, and then to disseminate these recommended methods of control to growers and others concerned. This will be done through the publication of circulars and posters, and through cooperation with other agencies who have personal contact with farmers.

Professor Sorenson will appoint subleaders in the different states to take care of the work in local areas.

9 for September 1942
Range Reseeding Gives Promise of Increased Feed Supplies

Forage on Range Areas Receiving 10 to 11 Inches of Rainfall Can Be Increased by Reseeding the Areas to Grasses

By A. F. Bracken

In this time of needed meat production, methods of increasing the supply of forage are very important. Reseeding of the spring-fall ranges in Utah promises to solve one of the most vexing feed problems. These lands have served as a buffer to summer as well as winter grazing areas. In seasons when the plant growth of the deserts is inadequate for support of livestock, the spring-fall ranges are not infrequently used throughout the winter and, in certain years when forage supplies are low on mountain ranges, these lands are sometimes grazed late in the summer season. This area, was largely covered with grass at the time of settlement. Misuse together with overuse has resulted in a serious depletion of the natural plant cover which has been replaced by sagebrush to a point where the grazing capacity is now measurably reduced.

Throughout the state this condition has been a major factor contributing to the low lamb and calf crops, low lamb weights, and at times excessive loss of breeding stock, particularly sheep.

There is sufficient evidence, however, both practical and experimental, that this condition can largely be corrected by the establishment and maintenance of a good plant cover consisting of adaptable forage species.

The spring-fall ranges are largely located between the desert lands and summer ranges, and in some cases are adjacent to cultivated valleys. All of this area, however, is not adaptable to reseeding. In general it is doubtful that sections receiving less than 10 or 11 inches of rainfall should be plowed and planted to grass except in special cases. Even though rainfall is adequate, steep slopes of more than 10 percent are likely not suited to this type of treatment for the reason that the hazards of erosion may far outweigh any benefit. Because of the effort and expense involved in treating and seeding these lands only sections of above average potential production should be considered for trial. These better areas are usually covered with a vigorous growth of sagebrush or other similar plants. Land supporting greasewood may, in some cases, be reseeded, but shadscale is a definite indication of soil not adaptable to this use. It is estimated that there are in Utah at least 1,000,000 acres of range land, well suited to treatment necessary to make them productive to livestock needs. The major part of this land is located in San Juan, Iron, Beaver, Millard, Juab, Tooele, and Box Elder Counties with smaller amounts scattered through other parts of the state.

It is recognized that in order to make spring-fall range productive, adaptable grass species should be selected for reseeding. Need may be a factor governing choice of variety. A number of livestock men have used common rye for the past several years, some with phenomenal results. This plant has the advantage of making feed the first season following planting and, in some sections, by shattering or from record growth, will reproduce itself for several years without drilling. In certain areas, however, it has failed to continue after the third season. Because of this uncertainty, it is suggested that rye be used in cases where immediate forage is necessary, ultimately replacing it with a perennial such as crested wheatgrass, (*Agropyron cristatum*). This early, drought resistant, palatable, long lived grass should be the dominant species seeded on spring-fall range of intermediate elevation. From present evidence and, considering available seed supplies, crested wheatgrass is the best grass for reseeding purposes. It is rather slow to start growth, hence needs to be protected from grazing until the end of the second year.

Other grasses which have a place in a reseeding program either planted alone or in mixtures include beardless wheatgrass, (*Agropyron inermis*), western wheatgrass, (*Agropyron smithii*), Indian ricegrass, (*Oryzopsis hymenoides*), blue wild rye-grass, (*Elymus glaucus*), big blue grass, (*Poa ampla*), bulbous blue grass, (*Poa bulbosa*), and smooth bromegrass, (*Bromus inermis*). The latter is particularly well adapted to higher elevations and greater amounts of rainfall. In addition
to the grasses named, others are under trial, some of which appear promising.

Sowing of grass seed on spring-fall ranges may be done in one of several ways. It can be broadcast without any previous soil preparation by hand or cyclone seeder. Following seeding, the land may be left without treatment, sheep may be herded over the area, or an attempt may be made to cover the seed with a harrow or drag. In the majority of cases, however, this method of obtaining stands has resulted in failure.

In case the land is a deserted dry farm, covered mainly with Russian-thistle, favorable results have come from drilling without removal of the weeds. On the other hand, if cheat grass has encroached upon the area, the land should be spring plowed before the grass has ripened seed. This will largely eliminate the competition, resulting in a better stand of the seeded forage.

Where the land is covered with brush and burning is attempted, more effective kills are usually obtained by burning in August. If the soil is not too compact, seed may be drilled without any previous or subsequent tillage. Burning is hazardous, however, so must be done with care and adequate protection against the spread of fire.

Again in case the land is covered with sagebrush, 85 to 95 percent of the plants can be killed by plowing with a large one-way disk. The brush may be left in place to protect the soil from erosion or raked into piles and burned. If the former method is followed good stands of rye have been obtained by broadcasting in front of the plow. For grasses, broadcasting behind the plow has been more effective. If the brush is largely removed, rye as well as grass should be seeded with a drill.

Rate, time and depth of seeding are important factors in establishing successful stands of forages on spring-fall ranges. In case rye is used, 30 to 40 pounds seeded to an acre have given adequate stands. Crested wheatgrass responds best to moderate amounts of seed ranging from 4 to 7 pounds. Rates for other grasses depend upon size of seed and germination percentage. As to time of seeding, fall planting has, on the whole, been more successful than spring seeding. Early fall seeding has given the best results in seasons of relatively high early fall precipitation, but, in dry seasons, late fall is safest. Depth of sowing depends upon the size of the seed. Rye may be planted from one to two inches in depth but the maximum for grasses is usually considered to be one inch or less.

Thus the conversion of our spring-fall grazing areas into a great reservoir of feed is a perfectly feasible undertaking, which if accomplished, will not only significantly add to our agricultural income but will also tend to stabilize the range livestock industry by eliminating one of its most serious hazards.

The soil survey of the Virgin River Valley area has just been published by the United States Department of Agriculture. This area is in the southern part of Washington County and the northern part of Mohave County, Arizona. The area contains 320 square miles or 204,800 acres, most of which is in Utah.

President E. G. Peterson of the Utah State Agricultural College and Director Reed Bailey of the Intermountain Forest and Range Experiment Station of the U. S. Forest Service inspecting a crested wheatgrass pasture near Scipio for September 1942

NEW PUBLICATION


(Continued from page 3)

GREEN MANURE CROPS

will help to build up poor soils. It is usually not advantageous to grow alfalfa for soil improvement alone. The seed is expensive and the early growth is slow. Clover is preferable for soil improvement where a hay crop is not important.

Alfalfa is used to some extent as a green manure crop in orchards, but its high water requirement and long growing season limit its usefulness under such conditions. It usually competes with trees for water and nutrients throughout the entire growing season. Competition for nutrients is partially compensated for by leaving all top growth on the land as a mulch which can be gradually worked into the soil. But because of its high water requirements, it seems inadvisable to plant alfalfa in orchards on gravelly soils.

Sweet Clover. Sweet clover is an excellent crop for building soil humus. The seed is relatively inexpensive; the plants grow rapidly on nearly all soils; a large amount on nitrogen is fixed in the soil; and the crop works well into a short rotation program.

For the small truck farm where cash crops are grown nearly every year, sweet clover builds up the soil while requiring that the land be out of paying crops a minimum of time. Biennial sweet clover can be planted in the latter part of August or early September. In a normal year a good growth should be obtained by the latter part of May. This can then be plowed under and later crops such as potatoes planted about two weeks later. For spring planting, annual, or Hubam clover can be used. It can be planted with a small grain or pea crop. After the grain or peas are cut the clover should make a rapid growth to be turned under in the fall. When planted at the same time, Hubam clover makes a more rapid growth than common white sweet clover.
Biennial sweet clovers may also be used for soil improvement in orchards. The Alpha strain of sweet clover which is used extensively in orchards in the Pacific Northwest is much finer stemmed than either of the common sweet clovers and is accordingly much easier to handle. If allowed to grow throughout the summer, sweet clover will compete with the trees for moisture and plant nutrients, and, in addition, may produce more growth than can be adequately worked into the soil. A addition may produce more growth than a result enough trash may be left in orchards to encourage damage to trees during the winter by rodents. If sweet clover is planted in late summer in time to be buried in the ground by the warm days of late spring and is ready to be turned under about the middle of June. Like alfalfa and sweet clover, vetch is a legume and is able to take nitrogen from the air for growth. As a result, when turned under a rich supply of nitrogen is released into the soil to supply the needs of trees.

Small Grains. A number of small grains have been used in various parts of the United States as green manure crops. For the gravelly orchard lands, barley and rye are probably the most promising of the small grains for green manure crops. Small grains, not being legumes, do not add nitrogen to the soil and do not build up soil organic matter as readily as alfalfa, sweet clover, and vetch. While not as desirable as legumes for soil improvement, the small grains are readily accessible, have low seed costs, and are undoubtedly better than clean cultivation.

Weeds. Weeds are often useful for organic maintenance in orchards. In many Utah orchards, weeds are the only plant material worked into the soil other than that added in farm manure. Where good stands of non-noxious weeds are regularly obtained, they probably serve as well as small grains, and there is no cost for seed nor labor of planting.

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**ELECTRIC POWER**

(Continued from page 5)

The average cost per month was $1.44. A check of the temperature of the water coming from the heater registered 142° F.

Cost of Separating Skim Milk for Calves

The saving of time and labor by use of electric power on the cream separator is characteristic of electric power on many of the dairy production applications, but the close skimming resulting from constant speed operation often gives an annual saving greater than the original cost of the electrical equipment.

At the dairy experimental farm it is the practice to separate from 20 to 30 gallons of milk each day to be fed to calves. The cost of electric power for separating this amount of milk for the two year period was shown to average $0.80 per year or a power cost of 6 cents a month.

**Milking Machine Power Cost**

The power cost of operating a three unit milking machine used to milk 25 to 30 head of cows a day averaged $1.06 per month or 1.8 cents per milking for the twelve month period. An average of 49 kilowatt hours was used per month.

When milking machines are used it is most important that the milk house have an adequate supply of hot water for washing if the bacterial count of the milk is to be kept at a low level.

The saving of time and labor through the use of milking machines is recommended when the herd exceeds 12 to 15 cows, and only then when it releases labor that can be used to greater advantage performing other productive work.

Cost of Sterilizing Dairy Equipment with Electricity

The cabinet electric sterilizer used in this study has a capacity to accommodate three milking units, the milk cooler, separator equipment and all milk pails used. The sterilizer used an average of 146 kilowatt hours per month with an average monthly power cost of $3.18 for the two year period.

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**Small Portable Electric Motor**

There are many jobs for a small portable electric motor around the farm. The one on the dairy farm has been used mostly for fanning seed grain, alfalfa seed and grass seed. This motor has been used part time for two months of the year at a cost of approximately 15 cents per month.

An electric motor provides the easiest way of doing many hard tasks around the farm and home at the cost of a few cents per day. Electric motors have the advantages of not being affected by heat or cold, of starting instantly, and of being adapted readily to automatic control such as a pressure switch on the water system or a thermostat on the ventilating fan. Portable motor applications may prove economical by reducing the expense of equipping each machine with a separate motor. This applies to equipment used but a few days a year, such as a wood saw, ensilage cutter, or fanning mill. For appliances that receive frequent use, the most economical and convenient method is to have and individual motor drive.

**Electric Fly Screen**

Another piece of electrical equipment used at the Dairy Experimental Farm is the very efficient and economical fly screen. These screens are installed on each door leading into the milk room. As the flies attempt to pass between the wires they are electrocuted. These screens have been an important factor in keeping the fly population to a minimum. These screens are harmless to human beings. The amount of power used by the fly screen is so small that it is difficult to measure.

Electrical power is a handy and economical servant when properly installed on the dairy farm.
POULTRY PROFITS

(Continued from page 1)

hoppers are kept in good repair to prevent feed from being wasted.

Studies of the feed requirements for laying chickens have shown after
enough feed has been consumed to take care of the requirements for growth and
maintenance, approximately .09 pounds additional must be consumed for each egg
that is laid. In other words, if you had two chickens with the same live weight,
the one that lays the largest number of eggs will require the largest amount of
feed. In spite of this fact, it is well to remember that the pounds of feed required to produce a dozen eggs decrease rapidly as the egg production per bird is
increased.

Culling

There are some chickens in the best bred flock that do not respond well even
when ideal environment is provided for them. Poultrymen who expect to make
a profit must not only learn how to identify these poor producing chickens but
must possess the courage to take them out as fast as they appear in the flock. An
adult chicken consumes about 7 pounds of feed per month. With prices as high
as they are at the present time, it does not take long for a non-producing bird
to eat more feed than it is actually worth.

Chickens that are laying have combs and wattles that are large, bright red in
color, lay bones that are wide apart and thin on the ends and skin that is soft and
pliable. Chickens that are not in production have combs and wattles that are
small, white, and lifeless; lay bones that are close together, rigid, and thick on the
ends; and skin over the abdomen that is thick and leathery. Good producers have
little or no yellow color in the skin around the vent, head, and shanks and they are
late molters. Poor producers molt early and have yellow pigment in the skin
around the vent, head, and in the shanks when they are not laying.

Reduction of Mortality

Even though the chicken is a small economic unit which can be readily replaced
at relatively little expense, the high mortality that occurs annually is a decided
handicap to those who enter the poultry business.

Reports received from Utah poultry record keeping cooperators during the last
ten years indicate that about 25 percent of the pullets which are placed in the laying
houses each fall die before the first year of production is completed. Retarded
growth, poorly finished market birds, and decreased egg production among the birds
that live are additional losses that result from birds that are affected with para-
sites and diseases.

While preventative measures and sanitary management are essential in any livestock
program, they are especially important in the field of poultry husbandry. Domestic
fowls are subject to a large number of parasites and diseases, many of which re-
spond poorly or not at all to treatment. For many of the disease conditions en-
countered, no effective treatment is known. Furthermore, the handling and
dosing of an individual fowl involves time and effort that is usually out of pro-
portion to its value, and often ends in disappointment. For these reasons, the
prevention of poultry ills is by far the most satisfactory procedure.

Practices which have helped to prevent losses from parasites and disease in the
poultry flock are: (1) Purchase strong, healthy, vigorous stock. Chickens are
carriers of disease. For this reason, it is safer to buy baby chicks than started or
ready-to-lay birds. The practice of buying adult birds is hazardous so far as the
spreading of disease is concerned. (2) Clean the poultry houses and equipment
thoroughly at regular intervals throughout the year. (3) Keep birds of different
ages separate and raise young stock on new ground each year. (4) Remove all
sick birds from the flock and burn all birds that die. (5) Examine birds reg-
ularly for parasites and treat them promptly for the particular parasite or
parasites found. (6) Consult a capable veterinarian whenever an outbreak of an
infectious or contagious disease occurs in the flock.

Quality Products

The production of low quality products not only reduces the producer's profits
but is a decided handicap to the industry. While it is impossible to improve upon
the original quality present when the egg is laid, the effort can and should put
forth to prevent eggs from deteriorating in quality and value until they are mar-
keted. Egg quality can be maintained on the farm by gathering the eggs often—
4 to 5 times daily especially during dry, warm weather, and taking them immedi-
ately to a cool, damp egg room having a temperature of about 40 to 50 degrees
Fahrenheit and a relative humidity of 65 to 70 percent. The egg cases, the flats,
and the fillers should also be kept in a cool damp place and all the animal heat
should be allowed to leave the eggs before they are cased. Another good prac-
tice is to send the eggs to market as often as possible.

There is often a difference in price of 3 to 8 cents a dozen between the three
top grades of eggs that are produced in this state. The producer who is able to
market 70 to 75 percent of the eggs that are produced in the top grade makes more
profit than the flock owner who is satisfied with a lower standard than this.

An Economic Unit

Some people who raise chickens fail to make much money, not because they are
inefficient but because the flock they are working with is too small. An able-bodied
person who devotes all of his time to the poultry business and who has a conven-
ient poultry set up should be able to care for 2,500 to 3,000 laying hens.

A recent study of the relationship be-
tween the size of farm and the cost of producing a dozen eggs by the Arizona
Agricultural Experiment Station indicated that it cost 33.4 cents to produce a
dozen eggs in flocks of less than 900 birds compared with 21 cents per dozen in
the flocks containing 2,000 or more birds.
STATION EXPLORES POSSIBILITIES OF VEGETABLE SEED PRODUCTION IN UTAH

In an attempt to find new sources of income for farmers in Utah, the Agricultural Experiment Station in cooperation with the U. S. Bureau of Plant Industry has inaugurated a series of experiments with vegetable seed production. The federal bureau is represented by Mr. Michael Shapovalov, stationed in Logan since 1938 in connection with tomato disease investigations, and the Station by Dr. L. H. Pollard, in charge of the vegetable crops work.

The success with the seed production of different vegetable crops depends, aside from proper cultural conditions and the type of soil, on a combination of climatic factors. With some seed the best yields are obtained in humid coastal regions, whereas others produce better in drier interior sections. This year’s experiments in Utah deal primarily with seed of carrots and table beets, and, to a limited extent, with turnips.

The purpose of these experiments is three-fold: (1) to ascertain what parts of the state are best suited for these crops; (2) to determine the best time of planting; and (3) to test out different methods of root handling. A number of counties in this state have both the soil and climate apparently suitable for the vegetable seed industry. There are certain limitations, however, on the territory that may be occupied by the garden-beet-seed plots because of rather generally distributed sugar-beet-seed patches of various sizes. These plots do not, by any means, occupy the entire suitable area in a given section but the beet pollen is capable of being carried to a distance of 40 miles. Therefore, no table-beet-seed culture is advisable within that radius from the sugar-beet-seed plot. Carrots, on the other hand, can be grown in any of these localities.

The most common method of carrying a vegetable to the seed production stage so far has been to store the roots over winter and to set them out the next spring. This method, however, has certain disadvantages, as it involves a complete destruction of small rootlets and also permits at least initial stages of root decay to set in. Consequently there is a delay in the development the following spring, and also a greater or lesser percentage of loss through the root decay. On the other hand, when the roots survive the winter in the field as planted, vigorous plants are developed early in the season and there is practically no root decay. This has been already demonstrated in Utah by certain commercial carrot seed patches grown this summer. Some were planted with the roots this spring, others developed from the roots left over winter in the field. This phase will be further studied through different experimental handling of roots of both carrots and beets.

The estimated yield from the commercial carrot seed patches will vary from about 400 pounds of the seed per acre to nearly 1,500 pounds, depending on the combination of various factors.

So far, experimental plots have been established with the cooperation of county extension agents and interested growers in the following counties: Cache, Davis, Iron, Washington, Kane, Piute, Sevier and Duchesne. No table beets were planted in the sections where sugar beet seed is produced.

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UTAH STATE AGRICULTURAL COLLEGE
LOGAN, UTAH

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