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For Your Interest

Agricultural and Home Economics Experiment Station

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Seek To Improve Seed Testing Methods

Pure seed is essential to a high yield of high quality. To assure the purity of your seed, seed testing laboratories use many techniques for determining seed quality. And the Experiment Station is conducting continuing research to improve and refine seed testing procedures.

Some of the areas of study along this line are: determining the field performance of legume seed with the aim of determining the relationship of seed size, seeding rate and germination to field performance; comparing methods for the purity analysis of Kentucky bluegrass; testing seedling vigor as it relates to stand establishment; and investigating the efficiency of mechanical dividers for lawn grass seed mixtures.

Duane Isely, L. E. Everson and A. L. Larson are the key personnel conducting this research on seed testing procedures.

Madrid Sweetclover is Superior Legume For Green Manure

Madrid sweetclover out-yielded all other legumes studied in terms of dry matter and nitrogen yield in Experiment Station tests conducted by Fred C. Stickler, W. D. Shradar and I. J. Johnson. India, Africa and Ranger alfalfa, Kenland red clover and Ladino white clover grown alone or in combinations were studied to learn their comparative value for green manure. Here are some other results from that study:

- Southern-type alfalfas—such as India and Africa—were better for this purpose than the adapted northern-type, Ranger.
- Ranger alfalfa and Kenland red clover were about equal in yield for green manure.
- Ladino clover was consistently lowest in dry matter and nitrogen yields. The study was conducted, however, in predominantly below-normal rainfall seasons.
- Legume combinations which included Madrid as one member of the mixture were superior to legume combinations without Madrid sweetclover.
- No legume combination with Madrid was superior to Madrid grown alone in terms of yield for green manure. The researchers add, however, that for practical purposes, a mixture would be best in most instances. Though nitrogen production may be somewhat less, a mixture spreads the chances of getting a good stand among several legumes.

- First-year corn yields following legumes plowed down at the end of their first year of growth varied widely. Differences in the amount of organic nitrogen supplied by the legumes and differences in soil moisture use by legumes accounted for this erratic corn growth.
- Second-year corn yields showed residual response from both legume and fertilizer nitrogen sources. Considering both first- and second-year corn yields, the nitrogen replacement values of different legumes varied from less than 25 to over 100 pounds of inorganic nitrogen.

The results of this study were reported in more detail in the May 1959 issue of Iowa Farm Science (reprint FS-812).

Grinding Grain Sorghum Increases Feed Value For Chicks Under 8 Weeks

Grinding or cracking grain sorghum increased its feeding value by about 6 to 8 percent in Experiment Station trials in feeding chicks 4-8 weeks old. After the age of 8 weeks, if grit was fed, whole milo was about equal to cracked or ground milo in feeding value.

The feeding of grit apparently was quite important to the efficient use of whole grain sorghum.
for chicks of any age, according to S. L. Balloun and R. E. Phillips who conducted the experiments. In two tests, weight gains of 8-12 week old chicks fed whole milo grain were increased by 12 percent and feed efficiency by over 9 percent when grit was fed. In the same experiment when the milo was cracked, grit feeding improved weight gains just 7 percent and did not improve feed efficiency.

The researchers also plan to offer chicks various sizes and colors of grit to study the relative acceptability of different grits and different sizes of grit for chicks of varying ages.

**Evaluate New Method To Measure Performance Of Poultry in Iowa**

A new random sample egg laying test, the Iowa Official Multiple Unit Poultry Test, is now in operation in Iowa to aid in measuring the performance of poultry. The unique feature of this test is that strains of commercial chickens are being compared on a number of farms under practical farm conditions, report A. W. Nordskog and R. E. Phillips of the Experiment Station.

**LIVESTOCK**

Copper Sulfate Improves Gains, Feed Efficiency Of Growing-Finishing Hogs

Copper sulfate added to growing-finishing rations for swine resulted in more rapid and more efficient gains than did the rations containing no copper sulfate in preliminary experiments conducted by Vaughn C. Speer and co-workers at the Experiment Station.

Two experiments were conducted to study this effect of copper sulfate. The first experiment involved adding levels of 0, 1, 2 and 3 pounds of copper sulfate per ton of complete feed. Though all levels improved gains, the most efficient feed conversion was at the level of 2 pounds per ton.

The second experiment compared copper sulfate and 3-Nitro singly and in combination. Both copper sulfate and 3-Nitro improved gains and feed conversion; the greatest stimulation in gains, however, was from copper sulfate alone. The combination of 3-Nitro and copper sulfate resulted in the most efficient feed conversion—requiring 20 pounds less feed per 100 pounds of gain than did the rations containing no additions.

**Test Ultrasonics To Measure Backfat Thickness in Swine**

Ultrasonic techniques for measuring backfat thickness of swine have been tested by L. N. Hazel and co-workers at the Experiment Station. The researchers report a high correlation between ultrasonic readings and the percentage of lean cuts obtained on the carcass. Though this correlation is somewhat higher than that usually obtained from using a mechanical probe, use of the mechanical probe is so simple that it still is recommended for selection of breeding stock in breeders’ herds, says Hazel.

**Use Soybean Oil To Prevent Bloat**

Alfalfa pasture trials during 1958 again showed that soybean oil at the rate of 3/4 pound per animal can prevent bloat for 3 to 4 hours when fed in grain immediately before grazing the animals.

Previous work aimed at bloat prevention indicated that increasing the oil had an additional beneficial effect if the mixture was kept at a ratio of about one part oil to five parts grain. Increasing the percentage of oil in the grain, however, makes the mixture unpalatable and cuts down consumption by some animals. A mixture of oil with ground corn cobs and grain was less effective than a mixture of oil with grain alone. And feeding ground or flaked raw soybeans had little or no effect.

Some antibiotics also were tested for their ability to prevent bloat. The antibiotic erythromycin greatly reduced bloat severity for several days when fed in the grain at the rate of 75 mg. per animal per day. But the animals apparently develop a resistance to the antibiotic, and the effect soon decreases. Withholding the antibiotic for 2 to 4 weeks and then reintroducing it into the ration does not restore its effectiveness.

Treatment of severe cases of bloat by putting 1/2 pound or more of lard oil into the paunch through a stomach tube gave prompt relief in most cases. Injection of the oil by needle and syringe directly into the rumen is an effective alternative in severe cases where a stomach tube can’t be used. Speed is important; the earlier the animal can be treated, the better.

These conclusions are based on the results of a concerted Experiment Station study conducted by researchers in animal and dairy husbandry, chemistry, agronomy and bacteriology. Key personnel working on this problem are N. L. Jacobson, R. S. Allen, Wise Broughs, W. R. Woods, J. M. Scholl and P. A. Hartman.

**Pelleting Increases Lamb Gains, Feed Cost**

Pelleted rations for lambs can increase gain and feed efficiency—but cost of feed preparation also increases. Lambs fed a ration containing alfalfa, corn and soybean meal gained 0.45 pound per day. Feeding a completely mixed or pelleted ration containing alfalfa hay increased gains by 0.05 pound. This increase in gain, however, did not offset the increased cost of preparing the pelleted feeds.

In the same trial, lambs fed a fortified pelleted ration containing oat hulls gained 0.1 pound more per day than those fed an unpelleted ration of alfalfa, corn and soybean meal. The increased gain from pelleting the feeds appears to be caused by an increased feed consumption, says Walter Woods who directed the trials.
Experiment Station foresters have been studying methods of converting poor timber stands to more productive tree crops. At left is a typical spot-planting site with enough space for 25 to 50 seedlings in a two-aged stand composed mostly of pole-sized trees and a scattering of large sawtimber. The large white oak removed from the plot was harvested for staves. Right photo: Researchers have found that soil preparation by plowing is necessary on some old sites before replanting. This is because the surface soil has become structureless, compact and almost impermeable to rainfall.

ing poor timber stands to more productive tree crops have been studied by A. L. McComb and N. J. Hansen of the Experiment Station.

Over 30 acres of low-quality timberland has been clearcut and planted with several broadleaf and coniferous species the first, second and third seasons after clearing. Various herbicides were tried for controlling the undesirable vegetation. Some planting of fields and pastures has also been done.

Clearcutting often involves handling large quantities of small roundwood for which markets aren’t readily available. Scattered among pole and sapling stands, however, there frequently are several large merchantable trees per acre which use a lot of space. A logical method for improving such stands is to harvest the mature trees and plant the resultant openings with suitable species—leaving the smaller trees until they reach merchantable size. The present work is leading into this type of stand treatment. Large white oaks from 18 to over 30 inches in diameter are being cut and worked into staves and logs.

The research has also given some clues for saving time and labor in planting seedlings. LEFT: Digging and planting holes with a tractor wheel spud increases planting ease and efficiency in some areas. RIGHT: Planting bars—more rugged than spades—are useful in planting small areas.
The tops will be used for charcoal cordwood. The removal of one tree usually leaves an opening from 20 to 30 feet in diameter—enough space for 25 to 50 seedlings. Such a harvesting procedure doesn't disturb the forest floor to any extent so the development of undesirable vegetation is held to a minimum. Some treatment of the planted spots is necessary, however, to kill brush, small saplings and seedlings of undesirable species. Also, the trees planted in the spot openings probably will require additional release from the surrounding trees during the first 10 years.

Study Factors Affecting The Spread of Oak Wilt

Many of the factors that might influence the spread of oak wilt are being studied by researchers at the Experiment Station. Preliminary results from work in 1958 indicate that the oak wilt organism is spread throughout the outer sapwood ring of the tree by means of spores before the symptoms of the disease appear in the leaves. Another line of study showed that, when the monthly fluctuations in moisture content of sapwood were studied, the sapwood of diseased trees maintained the spring moisture level while the healthy sapwood showed the common seasonal fluctuations.

The possibility that white oak species might be inoculum reservoirs and play an important factor in the spread of the disease is also under study. And the researchers are continuing to search for disease-resistant trees.

Key personnel involved in these studies are: H. S. McNabb, Jr., W. H. Bragonier, H. M. Harris, A. L. McCombs, M. G. Boyer, M. A. Marchetti, R. W. Meyer, D. M. Rue, R. D. Smith and Larry E. Syndergaard.

Possible Industrial Users Of Iowa Charcoal Surveyed

The primary problem among potential producers of charcoal concerns marketing. Most potential producers apparently aren't interested in trying to develop retail market outlets but are more interested in disposing of the charcoal in bulk. Consequently, foresters at the Experiment Station are looking into the possibilities of marketing charcoal through industrial users in Iowa and into the quantities and grades of charcoal used by these industries.

The largest industrial users of charcoal in the state are the manufacturers of livestock and poultry minerals, supplements and feeds, report N. J. Hansen and co-workers. Also, large quantities of activated carbon are used primarily by sugar, sirup and flavor extract manufacturers. The foresters add that they plan to complete this survey in more detail soon.

Farm Business and Management

Livestock and Meat Are Big Business in Iowa

Livestock and meat are big business in Iowa—both on farms and in market channels. This fact is being further confirmed and emphasized in the results coming from a study of the changing patterns of livestock marketing in the north-central states. The Experiment Station at Iowa State is cooperating with the USDA and a number of other state experiment stations in this study.

A part of this study involved surveys of both farms and marketing agencies since statistical reports from the public stockyards and federally inspected points of slaughter give only a partial picture of the volume and patterns of livestock marketing. Results of the study are being published in IOWA FARM SCIENCE and elsewhere as they become available.

Sam H. Thompson and Wilbur R. Maki of the Experiment Station have been in charge of Iowa work in the cooperative study.

CCC Operations Stimulate Construction of Commercial Grain Storage Facilities

Much of the increased grain storage capacity of country and terminal elevators built after 1946 in the north-central states was stimulated by the opportunities to store CCC grain. About 58 percent of the increase in cooperative storage capacity in Iowa since 1946 was constructed for grain storage purposes. At least 26 percent was built specifically in response to government programs.

Country elevators increased their capacity more than terminal elevators, report Geoffrey Shepherd, John Nordin and Allen B. Richards of the Experiment Station. They add that additional construction of country elevator capacity for CCC storage was concentrated in Kansas, Iowa and Nebraska. Country elevators in Iowa with large existing storage capacities built mainly permanent storage facilities; small elevators added mostly quonsets, steel bins and flat warehouses to store grain.

The CCC concentrated its storage of wheat in commercial facilities—mostly in subterminal and country elevators. But the CCC didn't use commercial facilities so much for corn; corn was stored principally in CCC bins.

A substantial decrease in the size of the price-support program for grains would leave commercial elevator storage capacity greatly in excess of normal merchandising requirements. This would be particularly true in Nebraska and Iowa, the researchers say. But, they add, about half of the storage capacity in Iowa is in the form of flat-type structures which might be used for warehousing fertilizer, feed or other farm supplies.

Hog Production, Price Swings To Be More Violent in Future?

Because of trends and changes in recent years in the demand for pork and in other factors, preliminary work at the Experiment Station indicates that swings in hog production and prices may be more violent in the future than in the past. Knowledge of this possibility and of the factors behind it, however, are making it possible to look ahead and to make plans and recommendations for overcoming such a situation, reports Earl O. Heady.
Chemically Manufacture
A "Cottage Cheese" Product

The manufacture of "cottage cheese" by chemical means rather than with lactic-starter has been achieved on a small scale at the Experiment Station. Future plans are to make this product on a larger scale to determine the feasibility of the process. Laboratory studies of various modifications in the manufacture of such a "cottage cheese" product have also been studied, according to D. D. Deane who is directing this research.

Study Relationship Of Fat Content to Palatability of Pork

Home economists, food technologists and statisticians at the Experiment Station have begun a study to determine more specifically the relationship of fat content to the palatability and physical properties of selected samples of pork.

The main goals of the study are to examine the possibilities of (1) predicting or estimating a marbling score from backfat thickness; (2) predicting scores for tenderness, flavor or juiciness from the marbling score; (3) predicting these same quality characteristics from the backfat thickness; (4) predicting the fat and protein content of the lean meat from the marbling score; and (5) estimating the yield (percent fat, lean and bone) from the backfat thickness.

An experiment is under way to evaluate the characteristics of hog carcasses with backfat thickness ranging from 1 to 2.3 inches. The study is under the direction of Frances Carlin of the Department of Home Economics Research.

Investigate Problems In Packaging Cheese

Until a means of preventing mold growth can be found, film wrappers applied without complete sealing cannot be considered a satisfactory substitute for waxing Cheddar or Edam cheese. So reports D. D. Deane of the Experiment Station, who is conducting research on the manufacture and packaging of ripened cheese.

When Cheddar or Edam cheese was cured in film without sealing, the total weight loss was less than that found with waxed cheese. But the mold growth that occurred in much of the film-wrapped cheese—particularly that wrapped in Saran film—produced a musty, bitter flavor in the area next to the mold growth.

Methods of wrapping block-style, Swiss-type cheese to produce a rindless cheese that can be cured and stored with a minimum mold growth were also studied by Deane and co-workers. Painting the surface of the cheese with a small amount of U.S.P. mineral oil or a 15 to 20 percent solution of potassium sorbate before it was wrapped in Cryovac film was the most satisfactory method of those tested. Heat sealing the folds of the Cryovac film at the ends of block was less satisfactory than using tape seal because the heat seal often loosened during handling, thus favoring mold growth. A pressuresensitive vinyl tape was more sat-
isfactory than cellophane tape since the vinyl tape did not loosen when the cheeses were dipped in hot water to shrink the Cryovac film.

Test Chemical Control Of Weeds in Vegetables

HAND WEEDING of vegetable crops eats up a large part of the labor resources available to the grower. One possibility for cutting down this labor requirement is chemical weeding. Consequently, L. E. Peterson and co-workers are testing various chemical herbicides for use in sweetpotatoes and muskmelons.

In 1958 the researchers tested five chemicals at three different rates to determine their value in controlling weeds in sweetpotatoes. These chemicals included formulations for two different methods of application — sprays and granules. The treatments were applied 1 day after the sweetpotato sprouts were transplanted to the field.

Though all the chemicals gave only fair weed control, they did reduce the hours of hand labor needed for weeding the crop. A 4-pound rate of 3Y9 gave the best weed control but reduced the yields considerably. The granules gave essentially the same weed control as the sprays. Alanap-2 continues to be the best herbicide available for weeding sweetpotatoes. The weed control is only fairly good, but the herbicide is safe to use and there has been a small but consistent yield increase every year the chemical has been tested.

With muskmelons, tests for chemical weeding were continued with pre-emergence applications of Alanap-3 in both granular and spray forms. Both forms at 4 pounds actual per acre gave equally good weed control with no apparent damage to the plants.

Investigate Problem Of Chemical Residues

THE PROBLEM of insecticide residues is a complex one. In one way, we want to avoid using formulations which leave residues harmful to the plant or to the animals or humans eating the plant or its fruits. On the other hand, it's desirable to have certain minimum residues which will control the insects attacking the plant.

Experiment Station researchers under the direction of E. T. Hibbs are conducting several studies aimed at providing more information about this problem.

In one study the influence of formulations, methods of dispersal, time and frequency of application of selected insecticides on the toxicity of chemical residues remaining on fruits and vegetables is being investigated. In another study, strawberry plants treated with Thimet or Systox were sampled to measure the maximum residues tolerated by the plants and the minimum residues that would control mites, aphids and other insects.
The researchers are also attempting to discover whether the residues become localized in the foliage, flowers or fruit of a plant. In tests with chrysanthemum, foliar applications of insecticides resulted in only briefly effective residues in the control of two-spotted mites. But applications to the soil resulted in residues which lasted at levels toxic to mites for more than 90 days. Residues in the flower parts were smaller than the residues remaining in the foliage.

Try Pinching Shoots To Raise Grape Yields

Pruning or pinching the terminal growing points of grapes before bloom can increase the yield of Concord grapes. The difficulty, however, lies in pinpointing the date of bloom. Results of attempts at the Experiment Station to increase production of Concord grapes by this method have been variable because of the problem of determining the date of bloom.

In 1958, pinching of the shoot terminals 6 days, 4 days and 1 day before bloom increased grape yields. In this test, the 4-day interval gave the greatest increase in yields. Flower bud counts show that this increase in yields results from an increased set of berries rather than an increase in the size of the cluster or the individual berry.

Develop Onion Hybrids Resistant to Pink-Root

Onion hybrids resistant to pink-root disease have been developed at the Experiment Station under the direction of A. E. Kehr and J. C. Horton. This development, predict onion experts, will have as much influence on the onion industry as have hybrid onions.

A striking demonstration of the effectiveness of these new resistant hybrids was shown in New York State where pink-root susceptible Epoch was grown side by side with pink-root resistant Epoch developed at Ames. Differences were obvious. The hybrid containing pink-root resistance outyielded and was far superior to its susceptible counterpart.

The pink-root resistant line developed here resulted from crosses of susceptible but desirable onions with resistant but unadapted onions. Progeny from these crosses were then crossed back to the susceptible parent having desirable onion characteristics. Eventually, through the process of crossing, selecting and selfing, an inbred was obtained which was almost identical with the starting type but which contained a high level of pink-root resistance.

Hybrids for which pink-root resistant inbreds have been developed and tested include Spartan, Epoch and Bonanza. Seed is not yet available for sale, but future wide usage seems certain. Seed will be sold only by commercial seed companies and will not be available from Iowa State.

The Experiment Station is cooperating with the USDA in these onion-breeding studies.