

UNIVERSITY OF MINNESOTA  
DEPARTMENT OF AGRICULTURE  
AGRICULTURAL SHORT COURSES



ABSTRACT  
OF  
TWELFTH ANNUAL  
ANIMAL NUTRITION  
SHORT COURSE

September 17, 18, 1951  
UNIVERSITY FARM, ST. PAUL 1  
MINNESOTA

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DEPARTMENT OF AGRICULTURE  
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ANIMAL NUTRITION

SEPTEMBER 17, 18, 1951

UNIVERSITY FARM

ST. PAUL 1, MINNESOTA

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PROGRAM

TWELFTH ANNUAL ANIMAL NUTRITION SHORT COURSE

SEPTEMBER 17, 18, 1951

MONDAY, SEPTEMBER 17, 1951

Auditorium, Peters Hall

M. O. SCHULTZE, Presiding

a.m.

8:30 Registration -- Fee: \$5.00 for the course,  
\$2.50 for one day

9:45 The Use of Pasture and Roughages - - - - - W. E. PETERSEN

10:45 Livestock and Farming - - - - - S. A. ENGENE

11:15 Research in Agricultural Progress - - - - - HAROLD MACY

11:45 Luncheon

H. J. SLOAN, Presiding

p.m.

1:15 Panel: What About Feed Particle Size--For the Manufacturer and Merchant - -  
Bernard Crandall and R. E. Ahlin

For the Feeder --

Dairy - - - - - T. W. GULLICKSON

Poultry - - - - - J. W. HAYWARD

Beef Cattle and Swine - - - - - L. E. HANSON

2:15 Swine Nutrition Investigations at Purdue - - - - - W. M. BEESON

3:00 The Opportunities and Responsibilities of the Feed Retailer - - - - - JACK DEAN

3:45 Tour of Barns - - - - - STAFF

6:30 BANQUET -- sponsored jointly by manufacturers, retailers, and the nutrition  
short course

Junior Ballroom, Coffman Memorial Union

TUESDAY, SEPTEMBER 18, 1951

Auditorium, Peters Hall

J. B. FITCH, Presiding

a.m.

9:00 Management in Relation to Livestock Production

Swine - - - - - H. G. ZAVORAL

Sheep and Beef Cattle - - - - - W. E. MORRIS

Dairy Cattle and Calves - - - - - H. R. SEARLES

Poultry - - - - - CGRA E. COOKE

11:00 Today's Disease Problems in Livestock Production - - - - - B. S. POMEROY

11:45 Luncheon

E. F. FERRIN, Presiding

p.m.

1:15 Operating a Retail Feed Business - - - - - ELDON RODDIS

2:00 What's New in Nutrition --

For Swine? - - - - - W. M. BEESON

For Calves? - - - - - T. W. GULLICKSON

For Poultry? - - - - - ELTON L. JOHNSON

General Discussion

## ADMINISTRATION AND STAFF

- \*J. L. Morrill, President, University of Minnesota
- \*C. H. Bailey, Dean of the Department of Agriculture
- \*Harold Macy, Director, Minnesota Agricultural Experiment Station
- \*J. O. Christianson, Director, Agricultural Short Courses
- \*H. J. Sloan, Professor and Chief, Division of Poultry Husbandry,  
Chairman, Committee on Arrangements
- R. E. Ahlin, Director of Nutrition, Doughboy Mills, New Richmond  
Wisconsin
- W. M. Beeson, Professor of Animal Husbandry, Purdue University,  
Lafayette, Indiana
- \*Cora E. Cooke, Agricultural Extension Specialist in Poultry
- Bernard D. Crandall, Manager, Advertising and Sales Promotion  
Division, Minnesota Farm Bureau Service Company, St. Paul,  
Minnesota
- Jack Dean, Executive Vice President, Midwest Feed Manufacturers'  
Association, Kansas City, Missouri
- \*S. A. Engene, Professor, Division of Agricultural Economics
- \*E. F. Ferrin, Professor and Chief, Division of Animal Husbandry
- \*J. B. Fitch, Professor and Chief, Division of Dairy Husbandry
- \*T. W. Gullickson, Professor, Division of Dairy Husbandry
- \*L. E. Hanson, Professor, Division of Animal Husbandry
- J. W. Hayward, Director of Research, Archer Daniels Midland  
Company, Minneapolis, Minnesota
- E. L. Johnson, Department of Poultry Husbandry, Iowa State College
- \*W. E. Morris, Agricultural Extension Animal Husbandman
- \*W. E. Petersen, Professor, Division of Dairy Husbandry
- \*B. S. Pomeroy, Professor, School of Veterinary Medicine
- Eldon Roddis, Manager, Roddis Feed Mill, Rochester, Minnesota
- \*M. O. Schultze, Professor, Division of Agricultural Biochemistry
- \*H. R. Searles, Agricultural Extension Dairyman
- \*H. G. Zavoral, Agricultural Extension Animal Husbandman

\*University of Minnesota

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## THE USE OF PASTURE AND ROUGHAGES

W. E. Peterson  
Professor, Division of Dairy Husbandry  
University of Minnesota

Improved utilization of roughage may actually increase use of concentrates. The best roughage alone is enough for the cow to do her inherited best, but most roughages are so poor that actually more concentrate should be used to supplement the roughage.

Neither chemical analysis or federal grades are a reliable index of the quality of roughage. Federal grades do not take into account the maturity of the forage, and as the crop becomes more mature the lignin content increases. The lignin content is not shown in ordinary chemical tests. According to Cornell work there is a direct negative correlation between lignin content of feedstuffs and the digestibility of the component parts of the feed. The correlation is  $-0.9$  for cellulose,  $-0.887$  for crude fiber,  $-0.921$  for starch and  $-0.96$  for total digestibility. This is a nearly perfect negative correlation and shows that lignin depressed the digestibility of other constituents of the feed as well as being completely indigestible itself.

New Zealand uses pasture and forage better than we do. They have done this by developing better legumes and grasses, and by proper fertilization have delayed the age at which plants become high in lignin. They have also done a good job of getting crops into the cow while they were still immature. By pasture rotation they have animals on fresh pasture only 6-7 inches high each day. The forage not used for actual grazing is made into silage. Early harvesting is the most important factor in improving forage crops and with good forage there can be better use of concentrates.

Dairy cattle and other ruminants digest cellulose by converting it into a series of short chain fatty acids. Acetic acid makes up 70% of these short chain fatty acids, while butyric acid makes up 20% and proprionic acid 10%. These short chain fatty acids are apparently essential for cattle. Some work at Wisconsin has shown that if animals are kept on a high concentrate-low roughage diet the fat content of the milk will go down, but if sodium acetate is added to the diet the fat content of the milk goes back up. Minnesota work has shown that sodium acetate improves a vegetable oil-skim milk ration for dairy calves, thus furnishing additional evidence that ruminants require acetate.

## LIVESTOCK AND FARMING

S. A. Engeme  
Professor, Division of Agricultural Economics  
University of Minnesota

The demand for farm products should continue to be good. Estimates are that by 1975 the population will have increased to about 190 million. However, since we have full employment at the present time, a cut back in war preparation might reduce the ability of the consumer to purchase farm products. A new war would not increase the demand for farm products as much as in the last war because we have full employment now.

While the demand for farm products should remain fairly good, the things that the farmer must purchase are also rising in price. The farmer is going to have to learn to be more efficient by paying attention to rations and management and shopping around for bargains in purchased items.

Feed and livestock must balance. While indications are that the production of grain feed this year will be the second highest on record it will still not be enough to feed the livestock on hand; we must dip into feed reserves. Grain consuming livestock numbers will have to be reduced for the future.

In general, hog numbers probably should go down a little because of the feed situation, but there should be no great change in hog prices. Beef cattle are reaching a peak in production and there may be some weakening in prices. Dairy cattle numbers are low and there is a gradual tendency for the dairy industry to move south with the spread of electricity in that area and improvement in pastures. There may be a corresponding slight decrease in dairying in Minnesota.

## RESEARCH IN AGRICULTURAL PROGRESS

Harold Macy  
Director, Minnesota Agricultural Experiment Station

Research should be considered as insurance, more than as a capital investment. It has been said that the increase in production from hybrid corn, based upon scientific investigations, pays for all agricultural research many times over each year.

In Minnesota, a great deal of basic and applied research is underway at the St. Paul Campus, but the space available for field plots is gradually being reduced. Several years ago, the University of Minnesota took over a large area at Rosemount which is administered by the Department of Agriculture of the University and where nine divisions of the Agricultural Experiment Station conduct research.

In addition, there are five branch experiment stations in the state. These are located at Morris, Waseca, Crookston, Grand Rapids and Duluth. Ordinarily, basic work is conducted at University Farm and taken to the branch stations for field trials. Branch stations may be considered as pilot plants, but they work in cooperation with the Central Station, as well as on problems peculiar to the region of the state where they are located. In addition, research is conducted at the large Forestry station at Cloquet, the Fruit Breeding Farm at Excelsior and the Potato Breeding Farm at Castle Danger, all owned and operated by the University. Cooperative investigations are underway on many farms and in many factories throughout the state. The Agricultural Experiment Station also cooperates with other states in numerous regional and interregional projects on a variety of agricultural problems.

There is a broad program of cooperation between individual staff members and divisions of the Agricultural Experiment Station on all research projects and with many other departments of the University and outside institutions and agencies. Every bit of talent available is enlisted for a strong attack on problems facing agriculture.



PANEL: WHAT ABOUT FEED PARTICLE SIZE?

For the Manufacturer and Merchant

Bernard Crandall  
Manager, Advertising and Sales Promotion Division  
Minnesota Farm Bureau Service Company, St. Paul, Minnesota

A questionnaire was sent to the poultry departments of all of the agricultural colleges. Replies were received from 47 of these, of whom 20 had run actual tests, while most of the others had formed definite opinions. Among the advantages suggested for pellets were the following:

1. More weight gain in poultry.
2. Some indication of improved egg production when pellets were given as a noon lunch.
3. Less wind blowing of feed - though this was an opinion rather than a proven fact.

The following disadvantages of pellets were listed:

1. More feather picking.
2. Increased cost not justified.
3. Higher cost per dozen eggs produced.
4. Loss of certain vitamins.
5. Tendency of birds not to pick up spilled pellets.
6. There may be more mortality when pellets are fed, though this has not been proved.
7. When all the feed is fed in pelleted form, in contrast to a noon lunch of pellets, there may be a slight decrease in egg production, though this difference is non-significant.

R. E. Ahlin  
Director of Nutrition, Doughboy Mills  
New Richmond, Wisconsin

Pellet feeding, especially of poultry, has become very common in the last few years. From the standpoint of the retailer they have a definite merchandising value. Among the advantages that may be listed from the standpoint of the poultryman are the following:

1. Eliminate effect of particle size--bird cannot pick out corn, or other coarse particles.
2. Each pellet is a complete ration.
3. Pelleting overcomes the dust problem
4. Bulk delivery is easier in pellets than in mash, eliminates bag costs and settling of ingredients is eliminated.
5. Easier to "range feed" cattle as this is usually done on the ground.
6. Appetite of the birds is increased.
7. Easier to start poults on pellets or crushed pellets than on mash.

The chief disadvantage of pellets from the standpoint of the small manufacturer is the costly equipment that is necessary. Cost studies have shown that the actual cost of pelleting amounts to ten cents per hundred pound sack.

### For the Dairy Feeder

T. W. Gullickson  
Professor, Division of Dairy Husbandry

Dairy cattle have less need for feed preparation than other classes of animals. Cows prefer coarsely ground grain to finely ground grain, but the feeding of whole grain to adult cattle is very wasteful. On the other hand, whole grain feeding may be satisfactory for calves and they prefer whole or coarsely ground grain to finely ground grain and also prefer pellets to fine ground grain.

Pelleted hay may increase consumption for calves. Finely chopped hay is not satisfactory for either calves or adult animals. There appears to be less regurgitation of finely chopped hay which would account for less efficient use. The use of finely ground hay also increases the incidence of bloat. Some work at Washington State has indicated that pelleting hay may cause an increase in milk production.

### For the Poultry Feeder

J. W. Hayward  
Director of Research, Archer Daniels Midland Company  
Minneapolis, Minnesota

From the review of the literature and additional observations cited, we offer the following conclusions concerning the relative merits of mash vs. pellets vs. granules:

1. Pellets and crumbles are usually superior to mash for chicks as to gains and feed efficiency.
2. Pelleted and crumblized chick starters and broiler rations give similar results with a slight advantage for crumbles over pellets.
3. The most profitable use of compressed chick rations appears to be for broiler production.
4. Compressed chick starters and compressed chick broiler rations should be fed with considerable care to nervous, easily excited breeds or strains of chicks in close confinement because of the tendency to produce a significant incidence of feather pulling and cannibalism.
5. Pellets and crumbles are preferred to mash for regular turkey poults and turkey broilers. However, a mixture of mash and small pellets or mash and crumbles seem the safest for the first few weeks to avoid excessive feather pulling and possible cannibalism and to assure a more uniform intake of feed by each poult. If compressed feeds are fed to poults at early ages, it usually pays to debeak them in confinement. Debeaking is becoming a common practice for turkey poults going on range regardless of whether they are fed compressed feeds or mash.
6. Small starter pellets are superior to starter crumbles or granulated feeds for turkey poults, especially from the third week to the end of the starting period.
7. Pelleted and crumblized turkey balancers and turkey concentrates have shown an advantage over the same feeds as mash for use on the range or in confinement along with grains fed to market weight.
8. There is insufficient evidence from controlled experiments showing any economic advantage for pellets or crumbles over

- mash for continuous feeding of laying hens or breeders.
9. Pellets seem to have a place in the laying ration when fed as a noon lunch or fed late afternoon on top of an all mash feed or mash fed with grain. The amount of pellets used to advantage as a supplement to all mash or mash and grain varies from 3 to 8 pounds per 100 hens.
  10. Compressed feeds with conventional levels of fiber seem to promote as rapid gains in chicks and turkey poults as do most high energy low fiber starters or broiler rations fed as mash. However, compressing of feeds containing conventional levels of fiber does not make up for the usual striking advantage in feed efficiency that high energy low fiber feeds have over the conventional feeds fed as mash, pellets or crumbles.

For the Beef Cattle and Swine Feeder

L. E. Hanson  
Professor, Division of Animal Husbandry

Supplemental feeding of range cattle is generally on the ground and pelleted feed used in this way should be less wasteful than ground feed, however, no experimental data on this subject have been reported. Nebraska has done some work on pelleting alfalfa with a phosphorous supplement and urea. This mixture could not be fed satisfactorily except in pellet form. Other Nebraska work indicates that the destruction of carotene from alfalfa pellets is as rapid as from alfalfa meal. Some Washington State work has indicated that hogs may gain better on pellets than ground grain, while Illinois work did not indicate any increase in growth, but did show a very slight increase in feed efficiency. In other Illinois work, some pig starters were more acceptable to the suckling pigs in pellet form than in meal form.

## SWINE NUTRITION INVESTIGATIONS AT PURDUE

W. M. Beeson  
Professor of Animal Husbandry  
Purdue University, Lafayette, Indiana

Work at Purdue with synthetic rations has shown that the same ten amino acids required by the rat are also essential for swine. These are arginine, methionine, lysine, tryptophan, histidine, leucine, phenylalanine, threonine, valine and isoleucine. Of these there is evidence that some arginine is synthesized but not enough for optimum growth. It may be practical to use supplementary methionine in certain rations but most amino acids are too expensive to use in this way. A perfect balance of amino acids would lower protein requirements.

Tankage is not by itself a good protein to balance corn, although in former years it was by itself satisfactory. Work is under way at Purdue to attempt to determine why it does not appear to be as satisfactory as formerly. A supplement of 90% tankage and 10% alfalfa was not satisfactory when fed with corn, but adding niacin, riboflavin, pantothenic acid, vitamin B<sub>12</sub> and an antibiotic gave a response.

The requirement of swine for vitamin-B<sub>12</sub> is between 5 and 10 micrograms per pound of feed. B<sub>12</sub> makes all vegetable ration practical for hogs but does not change feed efficiency appreciably. B<sub>12</sub> is also necessary for the sow during gestation. In some Purdue work, sows that received B<sub>12</sub> during the gestation and lactation period weaned 7.5 pigs per litter as compared to 4.8 pigs per litter for sows with no B<sub>12</sub>.

Live cell yeast has not been found to improve growth of swine and in fact, at levels of 1 $\frac{1}{2}$ % or more depressed growth slightly. Feed efficiency was not affected.

Work is also under way at Purdue to trace mineral elements in swine nutrition. Cobalt, magnesium, iron, copper and zinc are all needed. If vitamin B<sub>12</sub> is in the ration pigs do not need additional cobalt.

## THE OPPORTUNITIES AND RESPONSIBILITIES OF THE FEED RETAILER

Jack Dean  
Executive Vice President, Midwest Feed Manufacturers' Association  
Kansas City, Missouri

One of the more important concepts in merchandising feed is that of selling a feeding program rather than just selling feed. Increasing competition increases the importance of this idea. The selling program should be built around customer's needs. All members of the firm are your salesmen in one way or another.

Information on how to make a good ration is no longer a serious problem. Over 100 ingredients are available to make formula feeds, so good formula feeds are common and are giving results. The job then is to get over to the farmer the idea of the importance and economy of good feeding. The possibilities of getting faster growth, greater production and more quality by use of good formula feed should be explained and emphasized. The feed must show a profit and we must show the feeder how good feeding, which sometimes means feeding more feed, can make money.

There isn't an industry in the U. S. that has the sales possibilities the formula feed industry has. The market is less than 50% covered. Here is how customers are lost: 68% by dealer indifference, 14% due to unadjusted grievances, 9% lower prices elsewhere, 5% because of friendships, 3% move away and 1% die, so most of the customer losses could be prevented. Keep the sales appeal up-to-date, friendly, vital and optimistic. Have faith in your business and product.

In most cases increased business is not limited by ability or know how. We can all do more than we do. Some of this extra should be used in planning for the future, making improvements, taking on new developments and added responsibilities. We must not just continue in the same old routine,--we must keep moving ahead.

## MANAGEMENT IN RELATION TO LIVESTOCK PRODUCTION

### Swine

H. G. Zavoral  
Agricultural Extension Animal Husbandman  
University of Minnesota

The pig crop this spring was 63,800,000, an increase of 7% over last year. The pig crop for this fall is expected to be the highest on record, with the production for the year being the second highest. There is a trend toward more farrowing in February and March and this will affect the price decline that normally comes in October and November. Ordinarily it has not been economical to keep 200 pound hogs past September.

Pig hatcheries which turn out weanling pigs ready for the feed lot are getting to be big business. These have advantages as well as disadvantages. Among the advantages may be listed:

1. No breeding stock need be kept on the farm.
2. No farrowing barns or equipment necessary.
3. Can purchase the right number of pigs for the feed on hand.

The following facts may be listed as disadvantages:

1. Not sure of heredity.
2. Good producer can raise his own pigs cheaper.
3. More danger of disease.

If a synthetic milk which would eliminate the necessity of suckling pigs becomes practical then sows in pig hatcheries could be bred back the third day after farrowing, and thus produce three litters per year.

### Sheep and Beef Cattle

W. E. Morris  
Agricultural Extension Animal Husbandman  
University of Minnesota

Cattle and lamb feeding industry in this state is big business. The bulk of those fattening cattle use protein supplements. There will be lots of immature corn this year, which will mean high prices. Hay this year, though good in supply, has been rain damaged to quite a large extent.

There is a tendency to rough more cattle through the first winter and then put them on dry lot with grain or on pasture with one-half grain ration.

Lambs cannot be used to salvage pasture and corn shock field as cattle are. There is a tendency to dock heavy feeder lambs as most feeders prefer to buy their feeder lambs on the light side. In Minnesota, due to the cold weather, more corn can be fed per lamb per day than in feeding areas farther south. Most feeders are now vaccinating to protect their lambs against over feeding.

Our concern this year is to make the feed grains go around. Hog production is the 2nd highest on record, turkey and poultry production is up.

The corn crop is short. Cattle and lamb feeders should be sure where their grain supply is coming from. More this year than usual will be heavy fed on roughage as corn silage and hay with less grain.

Antibiotics not effective with calves and lambs as they are with hogs. Tremendous benefits from these for pigs even up to marketing weights.

Minerals supplements needed for fattening cattle and lambs when non-legume roughages are fed.

### Dairy Cattle and Calves

H. R. Searles  
Agricultural Extension Dairyman  
University of Minnesota

Management is probably even more important in dairy farming than in other types of livestock production. Certain things that must be watched for by the successful manager include:

1. The use of good sires. Artificial breeding makes better sires available to the commercial herd.
2. Early cutting of legumes for best quality of roughage.
3. Avoid mastitis by management rather than medication.
4. Avoid leaving small pieces of baling wire and nails where cows can pick them up. There is considerable annual loss from cows picking up small pieces of baling wire and nails.
5. Should emphasize persistent production rather than high peak production.
6. Grow heifers rapidly and get them into production early.
7. Have cows calve regularly each year with a 6-8 week dry period between lactations.
8. Some dairymen are now following a program of feeding ensilage and grain only once a day in order to save labor.

### Poultry

Cora E. Cooke  
Agricultural Extension Specialist in Poultry  
University of Minnesota

The poultry situation in Minnesota is perhaps as critical as it has ever been. The number of hens, and number of eggs is still considerably up from pre-war days, but since the war there has been a decline in numbers, and from 1945-1949 the cash income from poultry increased only 1% compared with a 39% increase in cash income from all farm commodities. Figures from the Farm Management associations show that many individual farmers are not getting enough return from their hens to pay for the cost of the feed.

Some farmers are probably continuing to raise chickens from habit, but there is a gradual decrease in the number of farms maintaining chickens. In 1930 census figures showed that 90% of the farmers of the state maintained chickens, while in 1950 only 76% of the farms had chickens.

Two possible solutions for helping to overcome the present unfavorable egg-feed ratio are (1) to increase efficiency and (2) to increase the size of the poultry enterprise on the individual farms. This second point is the most

promising and while the trend is already in the direction of increased size of units it is quite slow. The larger flocks are usually better managed and produce better quality eggs as well as increasing the number. Larger flocks will be helpful only if it can be accomplished without corresponding increase in labor, thus there must be greater use of labor saving methods.

Among the things that can be done in the way of saving labor the following items may be listed:

1. Further use of built up litter.
2. Community nests--this usually results in a saving in labor and produces cleaner eggs as well.
3. Use of dropping pits. Some poultrymen are having good success with no roosts at all.
4. Some poultrymen are using an innovation in feeding equipment. This consists of a box about six feet square and 10 to 12 inches deep, in which the feed is poured, and the birds get right into the box.

From the standpoint of construction most poultrymen building new houses are building deeper houses than formerly. Many houses now are 24 feet deep or more, with the two story houses frequently being 30 feet deep, with some houses being as deep as 44 feet. Another new idea in construction is to omit the concrete floor where built-up litter is to be used.

From a management standpoint there should be a higher percentage of the chicks hatched in February or early March, with a corresponding decrease in May hatching. The added cost of brooding early chicks is but a small proportion of the total cost. Another need is for provision of temporary housing of the old hens in the fall as long as their production holds up. Brooder houses, range shelters or unused horse barns are sometimes used for this purpose.

Quality of eggs should be improved. One way to do this is to keep the hens confined. Too many producers still turn their hens out in the spring and pasture does not produce good eggs. All pullet flocks should be encouraged. The Farm Management Service Associations report that the flocks with the highest return have the highest percentage of pullets.



## TODAY'S DISEASE PROBLEMS IN LIVESTOCK PRODUCTION

B. S. Pomeroy  
Professor, School of Veterinary Medicine  
University of Minnesota

The loss caused by disease, parasites and insect pests amounts to millions of dollars each year. A second reason for the importance of these diseases is that many of them are transmitted to man.

There are three ways in which the farmer, the veterinarian and the feed manufacturer can improve our livestock production. These are: (1) use more effectively the knowledge we have about animal disease and parasites. Much disease exists that could be prevented by good management and the practice of good sanitation and care. (2) There are animal diseases that we cannot combat with full effectiveness until we have more knowledge, and further research on these problems is of paramount importance. (3) Although we may be thankful that many serious poultry and animal diseases of foreign countries have been kept out of this country, we must be alert at all times to see to it that we continue to keep them out. Among the diseases that may be mentioned that fall in this category are Rinderpest, Foot and Mouth disease, European and Asiatic form of Newcastle disease and Fowl Plague.

There are no strictly new diseases affecting the poultry and livestock industries, but some of the problems that have been important in only a few isolated areas are spreading because of our disregard of one basic principle which should be the key to all disease control programs. The important link in the cycle of infection of many of our disease problems is the carrier animal or bird which appears to be healthy from all physical appearances but when added to a herd or flock introduces the disease and starts a new focus of infection.

### Diseases of Cattle

Diseases of the newborn--Adequate nutrition of the dam and newborn is very important in helping to reduce the severe losses that occur in newborn calves. Calf scours and pneumonia are basically infectious disease problems but poor management and inadequate nutrition contribute greatly to these losses.

Brucellosis--Abortion, sterility and diminished milk and meat production are among the evils that follow this disease. These losses are estimated to total 30 to 50 million dollars yearly.

Bovine Mastitis--The total annual loss from this disease in the form of reduced production, poor quality milk and seriously diseased cows is larger than Brucellosis. The sulfonamides and antibiotics have aided considerably in reducing the loss from this disease, but the carrier animal and strict sanitary procedures are the important links in control.

### Diseases of Swine

Baby pig disease complex--This may include nutritional diseases and infectious diseases such as transmissible Gastro-enteritis and Dystrophic rhinitis. Pig hatcheries may spread these infectious diseases.

Hog cholera--This is still the number one disease of the swine industry but new developments in vaccination may revolutionize the present hog cholera program.

## Diseases of Poultry

Diseases of the chick--The most important diseases under this heading are Pullorum, Newcastle, Infectious Bronchitis and Coccidiosis. Approximately 400,000,000 birds were vaccinated in 1950 for Newcastle Disease and 95,000,000 for fowl pox, while 70,000,000 were tested for pullorum disease. The development of coccidiostatic agents in the past few years has lessened the losses from this disease but these drugs should not be considered as a substitute for good sanitation.

Disease of the adult--Leucosis is the most important disease of the adult fowl and causes one-half of the total loss in adult birds. This is a virus disease about which not very much is known about the cause of method of spread. Poor nutrition, unfavorable environment and parasitic infestations may predispose birds to attack.

## General Problem

Rabies--one of the general problems that became more acute within the past year. Part of the reason for this is the increased population of skunks in the state and the spread of rabies by skunks. This disease has been reported in cattle, as well as cats, dogs and other domestic animals.

## OPERATING A RETAIL FEED BUSINESS

Eldon Roddis

Manager, Roddis Feed Mill, Rochester, Minnesota

Your retail feed business is dependent of three basic elements; first on how you and your employes treat your customers, second on the service you render by having an up-to-date plant including modern machinery, and last by the prices you charge for quality feed and ingredients.

Let us look at the item of personnel. Good personnel or employe relations depends on what you have to offer. The type of business makes it necessary to pay better than average wages. In fact, better than average wages brings better than average employes and that is what is needed today. Good working conditions are a necessity. Employes in these times want a day off a week; they want time and a half for over 40 hours work; they want two weeks paid vacation. These are essentials or a start toward better employe relations. Additional grants are highly desirable, in the way of additional vacation allowance. A program of medical and hospital insurance for not only the employe but the entire family with either all or the greater portion of the premium being paid by the employer. Such additional benefits bring back the money many times through increased business and good will.

Good machinery makes work easier, labor more efficient and is a considerable aid in giving better service which always attracts business. The equipment in a plant must first pay for the electricity it uses, rent on the space it occupies, for the operator and finally a return on the investment. Therefore it is imperative that these basic costs be taken into consideration in purchasing new equipment or in replacing old. The hourly potential income of any machine can pay increased wages to the employes and increased profits for the owner providing it has the capacity and is properly installed. Remember good equipment makes a good employe better.

The prices you charge for services and feed depend largely on your buying technique. Quantity buying or car load buying is one requirement to meet competition and be able to sell at an attractive price. Quality can never be sacrificed in favor of price. Watching the transit freight to see that you get it whenever possible and using the services of feed specialists or brokers are two of many aids that a good feed dealer should use.

Much help can be had through your University of Minnesota, not only for your formula feeds, but also in supplying information on ingredients and proper farm management practices. There are many good books on nutrition and management which should be a part of every feed dealer's library. Every dealer should have good knowledge of nutrition and farm management as it applies to your farm trade thereby giving another service to the farmers through good, practical sound advice.

With satisfied employes, good equipment to render fast and efficient service, with price and quality of ingredients taken care of, you will find 75% of your selling job done. However advertising can not be overlooked and one good means of advertising is through cooperation with your local 4-H club, County Agent and the Vocational Agriculture Teachers. A good mailing list used regularly to advise farmers of your feeds and prices is a very good means of effective advertising.

Credit seems to be a necessary evil in all business and through the cooperation of 47 dealers in Southeastern Minnesota, there has been formed

a credit association wherein each dealer allows the same credit terms. The main emphasis on the terms of this credit association is to eliminate pyramiding of indebtedness by making a rule that 40 days after the first of the month, no more feed be charged until the account is in current condition.

## WHAT'S NEW IN NUTRITION

### For Swine

W. M. Beeson

Professor of Animal Husbandry  
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1. Antibiotics increase the growth rate of hogs about 0.4 pound daily--or 40# more liveweight in 100 days.
2. They improve feed efficiency about 5 to 10%.
3. A favorable response is obtained from antibiotics with hogs fed either on pasture or in dry-lot.
4. They tend to make a group of hogs grow at the same rate. Makes for more uniform market weight.
5. They eliminate many of the "runts" and poor doers and--
6. Will speed up the gains of either healthy or unhealthy pigs.
7. For maximum gains antibiotics should be fed from the time the pig starts eating--2 weeks of age or earlier until market weight.
8. Comparing hogs of the same market weight (224 pounds) back fat thickness is increased from 1.72 inches to 2.03 (about 1/4 inch) by antibiotic feeding.
9. Growth stimulation can be secured in swine by feeding aureomycin, bacitracin, penicillin, streptomycin and terramycin; and also many other antibiotics both known and unknown.
10. The level of antibiotic required for maximum response varies with the antibiotic, the individual animal, the environment and the type of diet. In general from 5 to 10 mg. of antibiotic per pound of total finished feed will usually give maximum response. In some cases lower levels are indicated. There are levels of antibiotic feeding such as 1 mg. of Penicillin per pound of diet which will give no noticeable effect in swine. (See memo AH 68 - Purdue University)
11. Feeding antibiotics to pregnant gilts or sows has no favorable effect on the birth weight, strength, livability or disease resistance of newborn pigs.
12. Evidence supports the fact that antibiotics are not transferred through the mother's milk, at least not in sufficient amounts to affect the growth or health of the nursing pig.
13. Creep feeding antibiotics to pigs during the suckling period will increase the weaning weight (56 days) about 10 pounds or more per pig.
14. Antibiotics are no substitute for well balanced rations, sanitation and disease control. Use antibiotics to improve your swine feeding and management practice not for substitution.
15. There is no experimental evidence that antibiotics have any effect on breeding efficiency of swine.

### For Calves

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Work at Cornell, which has been verified by other stations, has shown that antibiotics may be effective in calves up to 20 weeks of age. In one trial calves receiving an antibiotic in their ration gained 1.44 pounds per day. Antibiotics have not been effective in promoting gain in weight of calves much beyond the age of 20 weeks. The Oklahoma Station has reported a marked loss of appetite in steers fed antibiotics and a lowered digestibility, particularly of crude fiber. Unfavorable results have also been obtained when antibiotics have been used in sheep feeding trials.

Intra-venous injection of antibiotics may be helpful for calf scours and pneumonia.

Work with the vitamin requirements of calves have shown that they require thiamin, riboflavin, pyridoxine, folic acid, pantothenic acid, biotin and nicotinic acid. In other work, vitamin B<sub>12</sub> has not been shown to help an all-plant ration for calves.

In some Cornell work heifer calves were maintained on 65%, 100% and 140% of the Morrison Standards. The age at first oestrus for the three groups was 17.5 months, 11.3 months and 9.4 months with the services required per pregnancy being 1.3, 1.2, and 1.56 respectively for the three groups. There was distinctly less udder development on the low level calves.

### For Poultry

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The factors involved in converting poultry to the role of vegetarians are being extensively studied in research laboratories. Vitamin B<sub>12</sub>, antibiotics and unidentified factors constitute the nutritional developments of most interest at this date. The following reports reflect some of the facts learned during the past year.

The vitamin B<sub>12</sub> requirements of chickens and turkeys is more clearly understood than in past years. Breeder hens receiving a corn-soybean oil meal ration required 0.8 milligrams of this vitamin per ton of feed for satisfactory hatchability at the Iowa station. This is in accord with a report by the Cornell station. Investigators at the Maryland station found 3.6 milligrams (the minimum level added) to be adequate. These results were obtained by the oral feeding of vitamin B<sub>12</sub>. The Idaho station injected vitamin B<sub>12</sub> into hens with satisfactory hatchability resulting from one microgram per hen each week. This is equivalent to approximately one milligram per ton of feed.

The chicks requirement for vitamin B<sub>12</sub> is dependent in part on the amount of this vitamin in the egg at the time of setting. This means the dam's ration should be considered in evaluating studies on the chicks requirement for vitamin B<sub>12</sub>. The Minnesota poultry department found 10 milligrams per ton sufficient for chicks from hens receiving a practical ration. The University of Wisconsin reported 14 milligrams to be as effective as fish solubles fed at a three percent level. Additional reports

indicate a wide variation in requirements which may be affected by numerous factors such as different diets (both chicks and hens) as well as environmental conditions and inherited characteristics.

Practical levels of feeding vitamin B<sub>12</sub> to chicks and breeder hens would be 10 and 4 milligrams per ton, respectively. These levels would ordinarily compensate for variations in ration, strain, environment and assay of vitamin B<sub>12</sub> activity of the concentrate being fed.

Turkeys require vitamin B<sub>12</sub> not only for hatchability of eggs but also for maximum poult growth. Results at Iowa demonstrated the poult requires not more than 2.7 milligrams per ton. Choline also improved poult growth and livability on the vegetable ration. It was further emphasized that both nutrients were required for maximum growth.

Antibiotics continue to increase the growth rate of chickens and turkeys under most conditions. An exception to this was released by the Illinois experiment station. Workers at this station reported a basal ration was not improved by the addition of aureomycin but was improved by either fish or distillers solubles, dried whey, or grass juice.

An interesting contrast to the Illinois report was made by the Oklahoma station. These investigators injected aureomycin and penicillin with resulting growth increases comparable to oral feeding. This work raises the question of whether growth stimulation is due to intestinal or systemic action of the antibiotics

The feeding levels at which antibiotics should be fed for maximum returns are not completely established. Reports from several colleges and commercial laboratories suggest that penicillin may be fed with satisfactory results at a level of two grams per ton. Aureomycin, bacitracin and terramycin seem to be required at about a ten grams per ton level.

Unidentified factors appear to be required for maximum growth of poultry even though a vegetable diet is fortified with the known vitamins and antibiotics. Purdue reported the addition of fish solubles and whey generally improved chick growth. The Illinois report is in agreement with this work. Additional reports have been published to substantiate the need of the chicken for factors which have not been identified at this date.